

## **Anexo 8. Modelación y evaluación de alternativas de configuración regional**

### **1 Modelamiento Matemático del Número de Estaciones de Transferencia y Rellenos Sanitarios para la V Región.**

#### **1.1 Presentación del Problema.**

El desarrollo del plan integral del manejo de residuos sólidos de la V Región requiere definir las localizaciones de estaciones de transferencia y rellenos sanitarios. Decisión que atiende a la necesidad de obtener un mínimo costo de operación, considerando: a) los costos de transporte, entre los puntos de generación de los residuos y los destinos finales (Rellenos Sanitarios: RS) e intermedios (Estaciones de Transferencia: ET); y b) el tamaño y costo de los lugares de destino: RS y ET.

El modelo que se presenta define las alternativas más económicas dentro del universo de posibilidades que se genera como consecuencia de localizar plantas en determinados sitios y transportar los residuos a dichas plantas, conjugando los costos de transporte asociados y los niveles de inversión derivados de cada una de las alternativas. De esta forma el problema a solucionar corresponde a determinar el número, ubicación y tamaño de las instalaciones de ET y RS que se utilizarán.

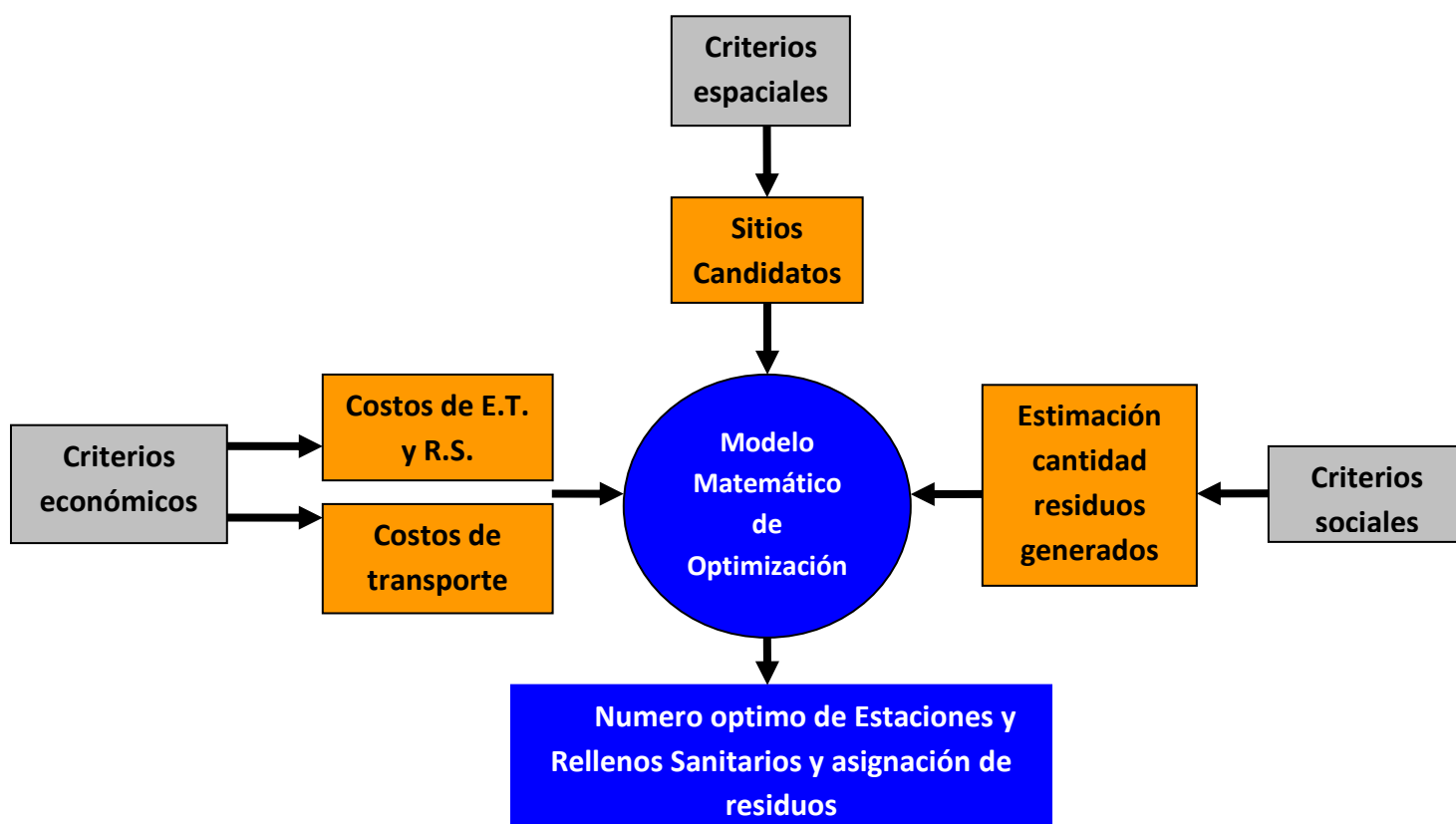
La metodología (Ilustración 1-1) que se ocupa descansa en cuatro factores:

- 1) la generación de residuos, como fuerzas impulsoras;
- 2) el número de instalaciones de ET y RS;
- 3) lo discreto del número de plantas posibles; y
- 4) el horizonte de tiempo de planificación.

*La generación de residuos*, es la fuerza impulsora de la ubicación de las estaciones de transferencia y rellenos, y está determinada por la cantidad de residuos generados por la población de las comunas de la región, valor definido por la producción per cápita de

residuos. En la Tabla 2-2 del presente Anexo, se entrega los volúmenes de residuos generados para las distintas comunas.

*El número de instalaciones.* Dada la característica topológica de la región y de la existencia de treinta y seis comunas, es necesario considerar la división de la demanda entre diferentes posibles plantas y sus consiguientes costos de instalación, como también los costos de transporte y tamaño de instalaciones.



**Ilustración 1-1 Modelo Matemático de Optimización.**

*Fuente: Propia 2011*

*Lo discreto de las opciones de localización.* Como es de suponer no existe una sola localización posible, sino que existe una variedad de potenciales ubicaciones, restringida por factores de exclusión geográficos especificados por la ley del medio ambiente y la normativa legal vigente, en cuanto a los asentamientos de instalaciones “no deseadas”. Para atender este punto se analizan diferentes escenarios de localizaciones, bajo la perspectiva

de ubicaciones fijas. Tales escenarios han sido seleccionados de acuerdo con criterios de sensatez y cuyo tratamiento de cálculo para determinar las localizaciones se efectúa en forma discreta. El desarrollo de lo antes dicho se efectúa mediante la aplicación de un modelo matemático basado en los centros de gravedad espaciales. De esta forma se determinan distintos tipos de conjuntos, correspondiente cada uno de ellos a agrupaciones de asociatividades y de comunas. A continuación se selecciona dentro de cada conjunto la localización de un número determinado de estaciones de transferencias y rellenos sanitarios, valor que es un dato de entrada para el modelo de mínimo costo. Este algoritmo determina la localización geográfica de cada uno de estos tipos de instalaciones.

*El horizonte de tiempo.* La naturaleza de las instalaciones lleva a considerar un horizonte de tiempo fijo, determinado por el tamaño de los rellenos sanitarios y su correspondiente vida útil. En este caso se ha establecido como horizonte de estudio un período de tiempo de 20 años, el que expira el año 2030. Para efectos del estudio se ha seleccionado un valor intermedio del monto de residuos (en base a proyecciones del INE), correspondiente este al año 2020.

### **1.1.1 Metodología de Desarrollo.**

#### ***1.1.1.1 Descripción del procedimiento general para obtener el número óptimo de Estaciones de Transferencia y Rellenos Sanitarios, de mínimo costo.***

El procedimiento general del cálculo del número óptimo de estaciones de transferencia y rellenos sanitarios, comprende el desarrollo de dos algoritmos y un procedimiento de exclusión derivado de las obligaciones legales que la ley exige para este tipo de instalaciones:

1.- Algoritmo de localización espacial de las Estaciones de Transferencia y Rellenos Sanitarios. (Modelo LogWare).

2.- Algoritmo de optimización de los costos de operación total de sistema: costo de transporte y costos de las instalaciones. (Modelo de Programación Lineal).

3.- Selección final de los sitios de localización, mediante criterios de exclusión.

*1.- Algoritmo de localización espacial de las Estaciones de Transferencia y Rellenos Sanitarios. (Modelo LogWare)*

El algoritmo de localización espacial sigue un procedimiento iterativo de cálculo que comprende lo siguiente:

1. Determinación de la demandas comunales
2. Selección de alternativas de números de estaciones transferencia y rellenos sanitarios posibles de instalar.
3. Cálculo de localizaciones óptimas, que minimiza el costo de transporte, para cada una de las alternativas anteriores. (Modelo LogWare, basado en el método de los centroides).
4. Determinación del número óptimo de estaciones transferencia y rellenos sanitarios para cada una de las alternativas localización antes calculadas (Modelo de programación lineal que minimiza el costo total de las instalaciones (ET y RS) y transporte de residuos)

El modelo LogWare, determina para las diferentes alternativas, dónde deben ubicarse las estaciones de transferencia y rellenos, dado un conjunto de puntos que representan los puntos de origen de los residuos, los volúmenes que se desplazan hacia o desde una instalación de ubicación desconocidas, y sus tarifas de transporte asociadas. Se busca minimizar el costo total de transporte, especificado por la cantidad de residuos generada en los centroides comunales, multiplicada por la tarifa de transporte para enviar a ese punto, ya sea esta una ET o un RS.

*2.- Algoritmo de optimización de los costos de operación total de sistema: costo de transporte y costos de las instalaciones. (Modelo de Programación Lineal)*

El algoritmo de optimización de los costos de operación persigue minimizar: a) los costos de inversión de las Estaciones de Transferencia (ET) y rellenos sanitarios (RS) de distintos tamaños, y b) los costos de transporte de los residuos, desde los centroides de las áreas comunales a las distintas ET y RS, calculados para las distintas alternativas en el modelo anterior

Para estos efectos se utiliza un modelo de programación lineal que minimiza los costos de transporte y determina las cantidades de residuos que deben ser asignados a las distintas estaciones de transferencia y rellenos sanitarios.

### *3.- Selección final de los sitios de localización, mediante criterios de exclusión geográfica.*

Finalmente y teniendo una línea base de selección, se incorpora un *modelo de exclusión geográfica*, el que determina exactamente, sobre la base de las coordenadas entregadas en los modelos anteriores, la localización donde es posible instalar estaciones de transferencia y rellenos sanitarios. Esto que modifica el escenario de óptimo costo. La aplicación de este modelo será posible una vez definida la proposición de macrozonas propuestas por el estudio.

La pertinencia del desarrollo de la metodología propuesta está en presentar el mínimo costo para diferentes tipos de instalaciones. Se ha considerado un escenario de inversión de nuevas instalaciones.

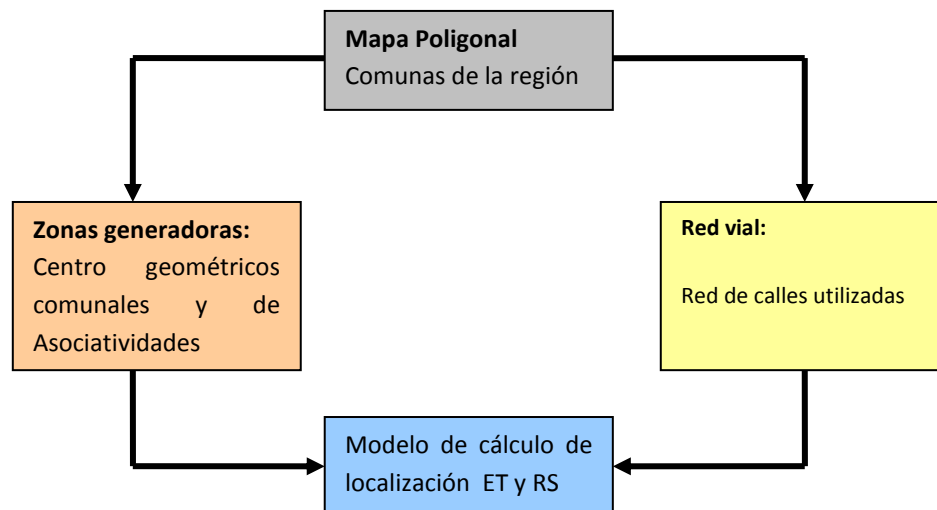
#### **1.1.2 Localización Espacial de las Estaciones de Transferencia y Rellenos Sanitarios (Modelo Logware).**

##### ***1.1.2.1 Estructura base del modelo de localización espacial.***

La aplicación del modelo de localización espacial considera tres clases de elementos espaciales, estas se ilustran en la Ilustración 1-2.

El modelo que se desarrolla no incorpora las estaciones y rellenos actualmente en explotación. Todo esto debido a que se desea encontrar una situación ideal de localización.

En todo caso, dada la situación actual de vigencias de los rellenos sanitarios y vertederos, la propuesta de una nueva localización, ajena a los lugares de disposición hoy en explotación, es del todo pertinente considerando sus fechas de cierre próximo (Diciembre 2012).



**Ilustración 1-2 Modelo de Localización Espacial.**  
*Fuente: Elaboración Propia 2011.*

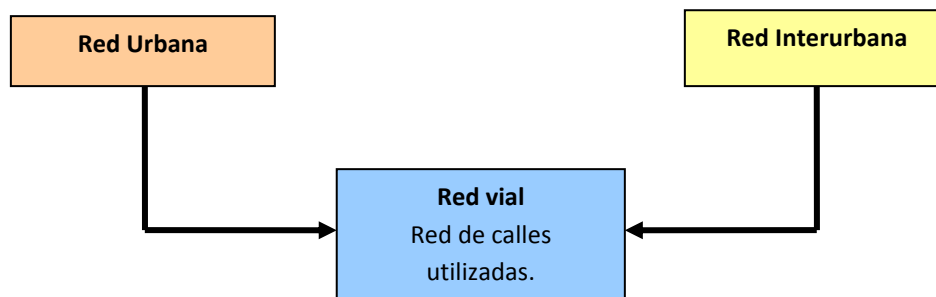
#### 1.1.2.1.1 Zonas generadoras de RSD.

Las zonas generadoras de RSD corresponden a las 36 comunas de la V región, sobre las cuales se supone dos grandes escenarios para identificarlas:

- A. Que los puntos de generación de basura se encuentra centrados en los centroides de las ocho asociatividades existentes.
- B. Que estos se encuentran situados en los centroides geométricos de cada una de las 36 comunas, puntos que para efecto del cálculo de las distancias, se utilizan como puntos de partida de la basura generada en las comunas y del cual se inician los recorridos sobre la red vial hacia las plantas de transferencia y rellenos sanitarios

#### 1.1.2.1.2 Red vial de transporte.

La red vial (siguiente ilustración) corresponde a la unión de dos redes: la primera de ellas, denominada como red urbana, reúne el conjunto de calles y avenidas de la ciudad, la segunda, la red interurbana, integra las vías relevantes por donde se transita para acceder, ya sea, a las estación de transferencia o, principalmente, al relleno sanitario.



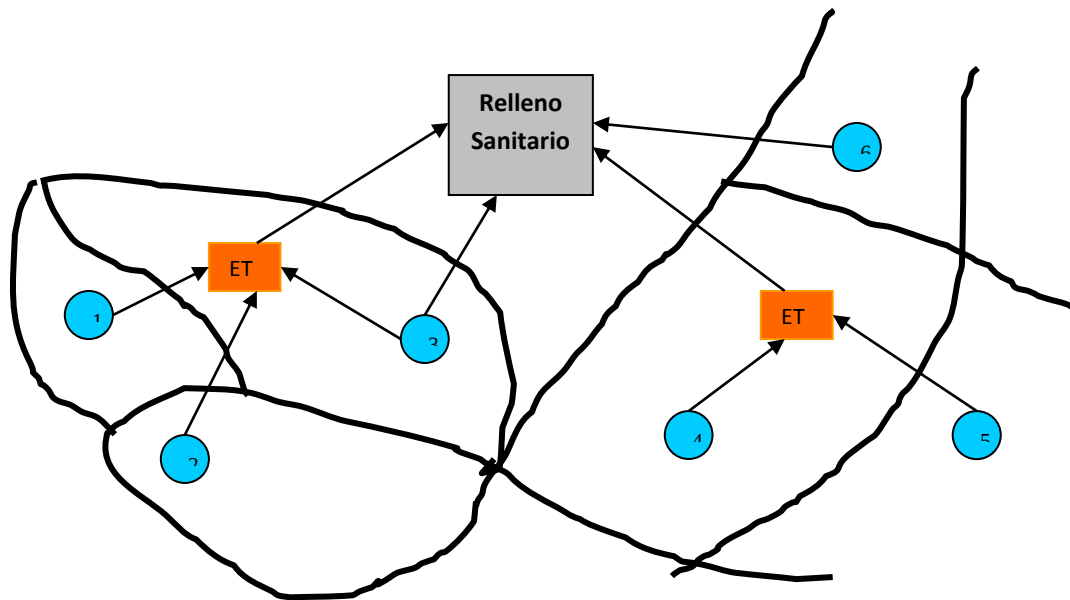
**Ilustración 1-3 Red Vial de Transporte.**

*Fuente: Elaboración Propia 2011.*

Con el propósito de contar con distancias lo más próximo a lo real, entre los puntos de origen y destino de los vehículos, el cálculo de localización considera distancias lineales modificadas por un factor de aumento, que da cuenta de un aumento como consecuencia del trazado de las calles, curvas, etc. La Tabla 2-2 del presente Anexo, muestra los antecedentes para el cálculo de factor de aumento de distancia.

#### **1.1.2.2 Presentación del modelo teórico de localización espacial.**

Para efecto de determinar los sitios candidatos, tanto para las estaciones de transferencia como para los rellenos sanitarios, se utiliza un modelo exacto de centro de gravedad, conocido también como el método del centroide (Ilustración 1-4). El método considera como únicos factores las tarifas de transporte y los volúmenes de los residuos generados al interior de las comunas. Modelo que se clasifica matemáticamente como de ubicación continua estática.



**Ilustración 1-4 Método del Centroide.**

*Fuente: Elaboración Propia 2011.*

El modelo de localización parte por identificar la generación de recursos de cada comuna ( $i=1 \dots 36$ ); para de ahí definir la localización las estaciones de transferencia (ET) y rellenos sanitarios (RS), los que conforman la red de transporte de mínimo costo. Esto equivale a determinar el lugar dónde ubicar una determinada instalación (ET) o relleno sanitario (RS), dado un conjunto de puntos de origen de generación de residuos, el nivel de volumen de estos y las tarifas de transporte asociadas.

Se busca minimizar el costo de traslado desde las comunas hasta las estaciones de transferencia o rellenos sanitarios

$$\text{Min (Costo Traslado)} = \sum_i V_i * CT_i * d_i \quad (1)$$

Donde:

$i$  = Comunas de la región ( $i=1 \dots 36$ )

$V_i$  = Volumen de residuos generados en la comuna  $i$  (en este caso en ton/sem)

$CT_i$  = tarifa de transporte cobrada a la comuna  $i$

$d_i$  = distancia desde a comuna  $i$  hasta la estación de transferencia o relleno

La ubicación se obtiene al resolver ecuaciones para las coordenadas de la localización<sup>1</sup>. Las coordenadas exactas del centro de gravedad están dadas por:

$$\bar{X} = \frac{\sum_i \frac{V_i C T_i X_i}{d_i}}{\sum_i \frac{V_i C T_i}{d_i}} \quad (2)$$

$$\bar{Y} = \frac{\sum_i \frac{V_i C T_i Y_i}{d_i}}{\sum_i \frac{V_i C T_i}{d_i}} \quad (3)$$

Donde:

$\bar{X}, \bar{Y}$  = Coordenadas de la localización de la estación de transferencia o relleno

$X_i, Y_i$  = Coordenadas de los puntos de origen de los residuos.

La distancia  $d_i$  se calcula mediante la siguiente expresión

$$d_i = K \sqrt{(X_i - \bar{X})^2 + (Y_i - \bar{Y})^2} \quad (4)$$

Donde K representa un factor de escala para convertir una unidad de un punto de coordenadas a una medida de distancia más común, como por ejemplo: km

Este procedimiento de solución implica la ejecución de varios pasos interactivos que a continuación se indica:

1. En primer término se determinan las coordenadas  $X_i$  e  $Y_i$  para cada punto de origen, los volúmenes de basura generados en la comuna  $i$ , junto con las correspondientes tarifas de transporte lineal.

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<sup>1</sup> Estas ecuaciones se derivan de las ecuaciones (1) y (4) al tomar las derivadas parciales del costo de CostoTraslado (1), con respecto de X e Y, e igualándola a cero y reagrupando los términos.

2. Se selecciona una localización hipotética,  $(\bar{X}, \bar{Y})$ , como punto de partida, mediante la omisión del término de distancia  $d_i$  en las expresiones (2) y (3).

$$\bar{X} = \frac{\sum_i V_i CT_i X_i}{\sum_i V_i CT_i} \quad (5)$$

$$\bar{Y} = \frac{\sum_i V_i CT_i Y_i}{\sum_i V_i CT_i} \quad (6)$$

3. Con los valores de las ecuaciones (5) y (6), se calcula  $d_i$  con la ecuación (4). Cabe hacer notar que en este punto no se requiere utilizar el factor de escala.
4. Se sustituye  $d_i$  en las ecuaciones (2) y (3) y se resuelve para las coordenadas  $(\bar{X}, \bar{Y})$  revisadas.
5. Se recalcula  $d_i$  con base en las coordenadas  $(\bar{X}, \bar{Y})$  revisadas.
6. Se repiten los pasos 4 y 5 hasta que las coordenadas  $(\bar{X}, \bar{Y})$  no cambien para interacciones sucesivas, o cambien poco, de forma tal que continuar con el cálculo no sea significativo.
7. Por último, se calcula el costo total para la mejor ubicación, utilizando la ecuación (1), lo que implica considerar las tarifas de transporte  $CT_i$

### 1.1.2.3 Selección de alternativas de localización.

Se establecen cinco alternativas de localización, señaladas en la tabla siguiente.

**Tabla 1-1 Alternativas de localización**

| <b>Centroides bases</b> | <b>Centroides de las E.T. a partir de los centroides bases</b> | <b>Centroides de los R.S. a partir de las E.T.</b> |
|-------------------------|----------------------------------------------------------------|----------------------------------------------------|
| 1) 8 asociatividades    | 8 estaciones de transferencia                                  | 2 rellenos sanitarios                              |
| 2) 8 asociatividades    | 8 estaciones de transferencia                                  | 3 rellenos sanitarios                              |
| 3) 36 comunas           | 5 estaciones de transferencia                                  | 2 rellenos sanitarios                              |
| 4) 36 comunas           | 8 estaciones de transferencia                                  | 2 rellenos sanitarios                              |
| 5) 36 comunas           | 8 estaciones de transferencia                                  | 3 rellenos sanitarios                              |

*Fuente: Elaboración Propia*

El mecanismo de cálculo parte por determinar los centroides bases de dos grandes alternativas: centroides para cada una de las 8 asociatividades (alternativas 1 y 2) y centroides para cada una de las 36 comunas (alternativas 3, 4 y 5). Teniendo esto calculado se procede a definir la localización de un determinado número de estaciones de transferencia a partir de los centroides antes calculados, por ejemplo para la alternativa 3 se calcula la localización geográfica de 5 estaciones de transferencia, sobre la base de 36 centroides comunales. Finalmente conociendo la localización geográfica de las estaciones de transferencia, se procede a calcular la localización de un número determinado de rellenos sanitarios, por ejemplo para la alternativa 3 se conoce la localización de 5 estaciones de transferencia, sobre la cual se calcula la localización de 2 rellenos sanitarios.

#### **1.1.2.4 Resultados: Coordenadas de los centroides comunales.**

En la tabla siguiente se entregan las coordenadas UTM de las comunas. Cabe señalar que para el cálculo de las coordenadas de las comunas se ha considerado el centroide de la ciudad principal.



**Tabla 1-2 Coordenadas UTM Comunas**

|        | <b>CENTROIDES<br/>COMUNALES</b> |         |           |            |
|--------|---------------------------------|---------|-----------|------------|
| N°COMi | NOMBRE                          | X[m]    | Y[m]      | RSD[t/año] |
| 1      | Viña.del.Mar                    | 261.638 | 6.343.263 | 132.175    |
| 2      | Valparaíso                      | 255.136 | 6.340.544 | 137.535    |
| 3      | Santa.María                     | 344.505 | 6.375.548 | 9.064      |
| 4      | San.Esteban                     | 352.036 | 6.369.872 | 12.001     |
| 5      | Llay.Llay                       | 317.653 | 6.364.738 | 13.590     |
| 6      | San.Felipe                      | 338.499 | 6.375.113 | 47.330     |
| 7      | Putendo                         | 338.956 | 6.388.675 | 14.290     |
| 8      | Catemu                          | 316.121 | 6.371.581 | 11.292     |
| 9      | Calle.Larga                     | 347.865 | 6.363.586 | 7.606      |
| 10     | Panquehue                       | 327.972 | 6.372.594 | 6.188      |
| 11     | Los.Andes                       | 350.292 | 6.366.457 | 45.320     |
| 12     | Rinconada                       | 342.092 | 6.365.251 | 5.105      |
| 13     | San.Antonio                     | 257.844 | 6.280.066 | 97.349     |
| 14     | El.Quisco                       | 249.518 | 6.302.091 | 26.457     |
| 15     | Cartagena                       | 258.971 | 6.285.551 | 24.360     |
| 16     | Algarrobo                       | 251.475 | 6.304.968 | 13.104     |
| 17     | Santo.Domingo                   | 256.241 | 6.275.123 | 5.646      |
| 18     | El.Tabo                         | 252.590 | 6.294.696 | 16.127     |
| 19     | Quillota                        | 289.476 | 6.361.250 | 73.795     |
| 20     | Nogales                         | 293.617 | 6.375.945 | 22.996     |
| 21     | La.Cruz                         | 291.622 | 6.365.579 | 11.576     |
| 22     | La.Calera                       | 294.231 | 6.370.226 | 30.060     |
| 23     | Hijuelas                        | 299.254 | 6.369.004 | 15.635     |
| 24     | Zapallar                        | 269.121 | 6.395.531 | 11.174     |
| 25     | Papudo                          | 269.862 | 6.399.647 | 5.992      |
| 26     | Petorca                         | 318.055 | 6.430.062 | 10.001     |
| 27     | La.Ligua                        | 291.631 | 6.407.520 | 28.619     |
| 28     | Cabildo                         | 305.712 | 6.410.298 | 7.738      |
| 29     | Olmue                           | 295.803 | 6.347.115 | 12.809     |
| 30     | Villa.Alemana                   | 278.373 | 6.341.529 | 81.797     |



|    |            |         |           |        |
|----|------------|---------|-----------|--------|
| 31 | Quilpue    | 271.232 | 6.340.502 | 85.910 |
| 32 | Limache    | 288.275 | 6.344.583 | 29.867 |
| 33 | Quintero   | 262.738 | 6.369.891 | 21.663 |
| 34 | Concon     | 264.652 | 6.355.141 | 80.655 |
| 35 | Puchuncavi | 273.540 | 6.375.692 | 14.995 |
| 36 | Casablanca | 275.028 | 6.311.000 | 25.128 |

*Fuente: Elaboración Propia*

#### **1.1.2.5 Resultados: Coordenadas de los centroides de las estaciones de transferencia y de los rellenos sanitarios.**

En las tablas siguientes se entrega el resultado del proceso del modelo, para cada una de las alternativas en coordenadas en UTM para las estaciones de transferencias y rellenos sanitarios.

A este respecto debe tenerse presente, que para las alternativas 1) y 2) las coordenadas de las asociatividades consideradas son las mismas que para las estaciones de transferencia.

**Alternativa 1: 8 estaciones de transferencia 2 rellenos sanitarios**

**Tabla 1-3 Alternativa 1.**

| RESULTADOS LOGWARE<br>ESTACION DE TRANSFERENCIA<br>(DATOS PARA EL PL) |                   |         |           |
|-----------------------------------------------------------------------|-------------------|---------|-----------|
| Nº ASOC.                                                              | NOMBRE ET         | X[m]    | Y[m]      |
| 1                                                                     | Valparaíso        | 255,136 | 6,340,544 |
| 2                                                                     | San.Felipe-.Andes | 339,468 | 6,374,513 |
| 3                                                                     | San.Antonio       | 257,848 | 6,280,063 |
| 4                                                                     | Quillota          | 291,618 | 6,365,583 |
| 5                                                                     | Petorca           | 291,628 | 6,407,523 |
| 6                                                                     | Marga-Marga       | 278,378 | 6,341,533 |
| 7                                                                     | Concón            | 264,648 | 6,355,143 |
| 8                                                                     | Casablanca        | 275,028 | 6,311,000 |

| RESULTADOS LOGWARE<br>RELLENO SANITARIO<br>(DATOS PARA EL PL) |         |           |
|---------------------------------------------------------------|---------|-----------|
| Nº RSj                                                        | X[m]    | Y[m]      |
| 1                                                             | 258,905 | 6,339,485 |
| 2                                                             | 310,231 | 6,373,615 |

*Fuente: IASA 2011.*

**Alternativa 2: 8 estaciones de transferencia 3 rellenos sanitarios**

**Tabla 1-4 Alternativa 2.**

| <b>RESULTADOS<br/>LOGWARE<br/>ESTACION DE<br/>TRANSFERENCIA<br/>(DATOS PARA EL PL)</b> |                   |         |           |
|----------------------------------------------------------------------------------------|-------------------|---------|-----------|
| Nº ASOC.                                                                               | NOMBRE ET         | X[m]    | Y[m]      |
| 1                                                                                      | Valparaíso        | 255,136 | 6,340,544 |
| 2                                                                                      | San.Felipe-.Andes | 339,468 | 6,374,513 |
| 3                                                                                      | San.Antonio       | 257,848 | 6,280,063 |
| 4                                                                                      | Quillota          | 291,618 | 6,365,583 |
| 5                                                                                      | Petorca           | 291,628 | 6,407,523 |
| 6                                                                                      | Marga-Marga       | 278,378 | 6,341,533 |
| 7                                                                                      | Concón            | 264,648 | 6,355,143 |
| 8                                                                                      | Casablanca        | 275,028 | 6,311,000 |

| <b>RESULTADOS<br/>LOGWARE<br/>RELLENO<br/>SANITARIO<br/>(DATOS PARA EL PL)</b> |         |           |
|--------------------------------------------------------------------------------|---------|-----------|
| Nº RSj                                                                         | X[m]    | Y[m]      |
| 1                                                                              | 255,138 | 6,340,543 |
| 2                                                                              | 339,468 | 6,374,513 |
| 3                                                                              | 278,378 | 6,341,533 |

*Fuente: IASA 2011.*

**Alternativa 3:                    5 estaciones de transferencia                    2 rellenos sanitarios**

**Tabla 1-5 Alternativa 3.**

| <b>RESULTADOS<br/>LOGWARE<br/>ESTACION DE<br/>TRANSFERENCIA<br/>(DATOS PARA EL PL)</b> |         |           |
|----------------------------------------------------------------------------------------|---------|-----------|
| °ASOC.ETm                                                                              | X[m]    | Y[m]      |
| 1                                                                                      | 271,228 | 6,340,503 |
| 2                                                                                      | 261,638 | 6,343,263 |
| 3                                                                                      | 257,848 | 6,280,063 |
| 4                                                                                      | 303,528 | 6,371,843 |
| 5                                                                                      | 278,378 | 6,341,533 |

| <b>RESULTADOS<br/>LOGWARE RELLEO<br/>SANITARIO<br/>(DATOS PARA EL PL)</b> |         |           |
|---------------------------------------------------------------------------|---------|-----------|
| N°RSj                                                                     | X[m]    | Y[m]      |
| 1                                                                         | 261,638 | 6,343,263 |
| 2                                                                         | 303,528 | 6,371,843 |

*Fuente: IASA 2011.*

**Alternativa 4:                      8 estaciones de transferencia                      2 rellenos sanitarios**

**Tabla 1-6 Alternativa 4.**

| <b>RESULTADOS<br/>LOGWARE<br/>ESTACION DE<br/>TRANSFERENCIA<br/>(DATOS PARA EL PL)</b> |         |           |
|----------------------------------------------------------------------------------------|---------|-----------|
| Nº ASOC.                                                                               | X[m]    | Y[m]      |
| 1                                                                                      | 261,638 | 6,343,263 |
| 2                                                                                      | 255,138 | 6,340,543 |
| 3                                                                                      | 292,378 | 6,369,773 |
| 4                                                                                      | 338,508 | 6,375,113 |
| 5                                                                                      | 257,848 | 6,280,063 |
| 6                                                                                      | 278,378 | 6,341,533 |
| 7                                                                                      | 271,228 | 6,340,503 |
| 8                                                                                      | 288,278 | 6,344,583 |

| <b>RESULTADOS<br/>LOGWARE<br/>RELLENO<br/>SANITARIO<br/>(DATOS PARA EL PL)</b> |         |           |
|--------------------------------------------------------------------------------|---------|-----------|
| Nº RSj                                                                         | X[m]    | Y[m]      |
| 1                                                                              | 261,898 | 6,341,923 |
| 2                                                                              | 291,378 | 6,369,773 |

*Fuente: IASA 2011.*

**Alternativa 5:                      8 estaciones de transferencia                      3 rellenos sanitarios**

**Tabla 1-7 Alternativa 5.**

| <b>RESULTADOS<br/>LOGWARE<br/>ESTACION DE<br/>TRANSFERENCIA<br/>(DATOS PARA EL PL)</b> |         |           |
|----------------------------------------------------------------------------------------|---------|-----------|
| Nº ASOC. ETm                                                                           | X[m]    | Y[m]      |
| 1                                                                                      | 261,638 | 6,343,263 |
| 2                                                                                      | 255,138 | 6,340,543 |
| 3                                                                                      | 292,378 | 6,369,773 |
| 4                                                                                      | 338,508 | 6,375,113 |
| 5                                                                                      | 257,848 | 6,280,063 |
| 6                                                                                      | 278,378 | 6,341,533 |
| 7                                                                                      | 271,228 | 6,340,503 |
| 8                                                                                      | 288,278 | 6,344,583 |

| <b>RESULTADOS<br/>LOGWARE<br/>RELLENO<br/>SANITARIO<br/>(DATOS PARA EL PL)</b> |         |           |
|--------------------------------------------------------------------------------|---------|-----------|
| Nº RSj                                                                         | X[m]    | Y[m]      |
| 1                                                                              | 261,638 | 6,343,263 |
| 2                                                                              | 257,848 | 6,280,063 |
| 3                                                                              | 292,378 | 6,369,773 |

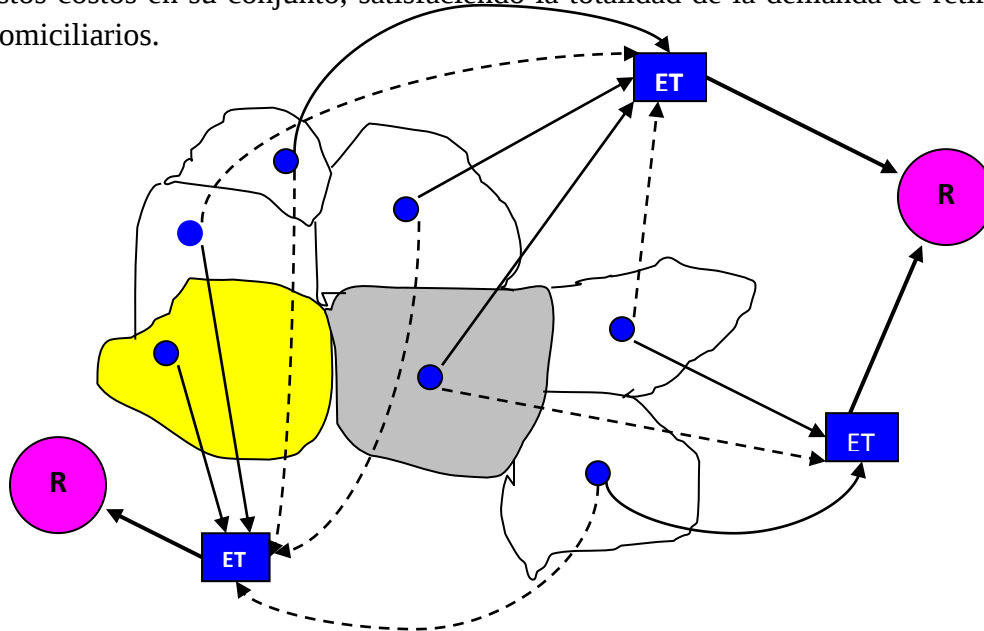
*Fuente: IASA 2011.*

### 1.1.3 Algoritmo de Optimización de Mínimo Costo para las Localizaciones de Estaciones Transferencia y Rellenos Sanitarios.

Habiendo determinado alternativas de localización para la estación de transferencia y rellenos sanitarios, cabe definir el número óptimo de ambas instalaciones, considerando el costo de transporte entre los centroides y las estaciones de transferencia y disposición, además del costo propiamente tal de las instalaciones y su equipamiento.

El modelo que se presenta tiene como especial característica el buscar el mínimo costo del sistema a través de determinar la mejor combinación del tamaño y número de instalaciones (estaciones de transferencia y rellenos sanitarios) y los costos de transporte de los residuos comunales (figura siguiente). Todo esto sobre la base de localizaciones previamente determinadas (ya calculadas en el punto 3 anterior).

Numerosas son las posibilidades de interrelación entre el número de ET y RS y los costos de transporte, a mayor número de plantas, menores son los costos de transporte y viceversa. Así se tiene que encontrar el número de instalaciones que minimicen la suma de estos costos en su conjunto, satisfaciendo la totalidad de la demanda de retiro de residuos domiciliarios.



**Ilustración 1-5 Optimización de Mínimo Costo para Localizaciones.**

*Fuente: Elaboración Propia 2011.*

### 1.1.3.1 *Presentación del modelo de optimización del número de ET y RS.*

El modelo tiene como objetivo determinar la cantidad óptima de Estaciones de Transferencia (ET) y Rellenos Sanitarios (RS), donde deben ser destinados los residuos comunales de modo de minimizar:

- Los costos de inversión de las Estaciones de Transferencia (ET) y rellenos sanitarios (RS) de distintos tamaños, y
- Los costos de transporte de los residuos, desde los centroides de las áreas comunales a las distintas ET y RS, calculados para las distintas alternativas en el modelo anterior

La minimización de los costos de transporte requiere determinar las cantidades de residuos que deben ser asignados a las distintas Estaciones de Transferencia.

*Variable de localización:*

$z_m^n$  : representa la estación de transferencia “m”, donde se localiza un equipamiento de tamaño “n”

*Variable de asignación:*

$t_{i,m}$  : representa la cantidad de residuos de la comuna “i”, enviado a la ET “m”

### **Desarrollo del modelo:**

Considérese la siguiente nomenclatura:

|   |   |                                                                     |
|---|---|---------------------------------------------------------------------|
| I | = | Índice de zonas generadoras de RSD ( $i = 1 \dots r$ zonas)         |
| J | = | Índice de sitios candidatos para un RS ( $j = 1 \dots s$ sitios)    |
| K | = | Índice de tamaño de equipamiento para RS ( $k = 1 \dots o$ tamaños) |
| M | = | Índice de sitios candidatos para un ET ( $m = 1 \dots p$ sitios)    |
| N | = | Índice de tamaño de equipamiento para ET ( $n = 1 \dots q$ tamaños) |



|              |   |                                                                                          |
|--------------|---|------------------------------------------------------------------------------------------|
| $z_{mn}$     | = | 1 si un equipamiento de ET de tamaño $n$ es localizado en el sitio $m$<br>0 en otro caso |
| $y_{jk}$     | = | 1 si un equipamiento de RS de tamaño $k$ es localizado en el sitio $j$<br>0 en otro caso |
| $t_{ij}$     | = | Residuos destinados de desde el centro de población $i$ al RS $j$                        |
| $u_{im}$     | = | Residuos destinados de desde el centro de población $i$ a la ET $m$                      |
| $x_{mj}$     | = | Residuos destinados desde la ET $m$ al RS $j$                                            |
| $D_i$        | = | Residuos generados (demanda) por el centro de población $i$                              |
| $a_k$        | = | Capacidad de un equipamiento de RS de tamaño $k$                                         |
| $b_n$        | = | Capacidad de un equipamiento de ET de tamaño $n$                                         |
| $C(ET)_{mn}$ | = | Costo total de un equipamiento de ET de tamaño $n$ en el sitio $m$                       |
| $C(RS)_{jk}$ | = | Costo total de un equipamiento de RS de tamaño $k$ en el sitio $j$                       |
| $CT_{ij}$    | = | Costo unitario de transporte desde el centro de población $i$ al sitio RS $j$            |
| $CT_{im}$    | = | Costo unitario transporte desde el centro de población $i$ al sitio RS $m$               |
| $CT_{mj}$    | = | Costo unitario de transporte desde la ET $m$ al RS $j$                                   |
| $P_1, P_2$   | = | Ponderaciones.                                                                           |

### Función objetivo z:

Min z = Min (Costo de equipamiento + Costo de transporte)

$$z = f(y, z, t, x, u) = \sum_m \sum_n C(ET)_{mn} * z_{mn} + \sum_j \sum_k C(RS)_{jk} * y_{jk} \\ + \sum_i \sum_j CT_{ij} * t_{ij} + \sum_i \sum_m CT_{im} * u_{im} + \sum_m \sum_j CT_{mj} * x_{mj}$$

### Restricciones:

*Restricción 1. Los RSR generados en la zona  $i$  ( $D_i$ ), deben ser dispuestos totalmente:*

La cantidad de RSR que es transportada desde una Zona Generadora, ya sea directa a la ER y/o indirecta a una Estación de Transferencia, debe ser igual a la cantidad de RSR generados en una Zona ( $D_i$ )

$$\sum_j t_{ij} + \sum_m u_{im} = D_i \quad \forall i$$

*Restricción 2. Los residuos que son asignados a una Estación de Transferencia  $m$ , deben ser transferidos totalmente a un Relleno Sanitario  $j$ .*

Esta restricción asegura que la cantidad total de RSD que llega a una Estación de Transferencia debe ser transferida a uno o más Rellenos Sanitarios

$$\sum_i u_{im} = \sum_j x_{mj} \quad \forall m$$

*Restricción 3. La cantidad de residuo enviado a un Relleno Sanitario  $j$ , no deben sobrepasar la capacidad de este.*

La cantidad de residuos transportados deben ser coherentes con la capacidad para poder disponer estos residuos, tanto para la alternativa de transporte directo de residuos desde las Zonas Generadoras hasta los Rellenos Sanitarios, como para los residuos proveniente de las Estaciones de Transferencia.

$$\sum_j t_{ij} + \sum_m x_{mj} \leq a_k * y_{jk} \quad \forall j$$

*Restricción 4. Los residuos asignados a un Estación de Transferencia  $m$ , no deben sobrepasar la capacidad  $n$  de esta.*

Al igual que la restricción anterior, es necesario que la cantidad de residuos que llega a la Estación de Transferencia sea igual o inferior a la capacidad que tiene esta instalación.

$$\sum_i u_{im} \leq \sum_n b_n * z_{mn} \quad \forall m$$

*Restricción 5. Debe seleccionarse un solo tipo de Estación de Transferencia  $m$  en un sitio candidato.*

Esta restricción tiene la función de seleccionar una Estación de Transferencia del set de alternativas de capacidades propuesta para cada sitio candidato de cada instalación.

$$\sum_n z_{mn} \leq 1 \quad \forall m$$

*Restricción 6. Debe seleccionarse un solo tipo de capacidad para instalar un Relleno Sanitario  $j$  en un sitio candidato*

Esta restricción tiene la función de seleccionar un Relleno Sanitario del set de alternativas de capacidades propuesta para cada sitio candidato de cada instalación.

$$\sum_k y_{jk} \leq 1 \quad \forall j$$

*Restricción 7. Se requiere encontrar al menos un sitio para localizar un Relleno Sanitario  $j$  dentro del set de sitios candidatos propuestos  $k$ .*

$$\sum_m \sum_n z_{mn} \geq 0$$

*Restricción 8. Selección de un sitio para localizar una estación de transferencia  $m$  dentro del set de sitios candidatos propuestos  $n$*

A diferencia de las restricción anterior, donde obligadamente había que seleccionar un sitio, esta restricción considera la posibilidad de no escoger ninguna Estación, por lo que estamos en el caso de la alternativa de transporte directo al Relleno Sanitario, sin pasar por la Estación de Transferencia. Esto es, que a diferencia del transporte desde las Estaciones de Transferencia, donde obligadamente se debía seleccionar un Relleno Sanitario (restricción 7), los residuos desde un punto de generación pueden no pasar por una Estación de Transferencia e ir directamente al Relleno.

$$\sum_m \sum_n z_{mn} \geq 0$$

*Restricción 9,10, 11. Restricciones lógicas de no negatividad*

Estas restricciones aseguran que la cantidad de residuos transportados:  $t_{ij}$ ,  $u_{im}$ ,  $x_{mj}$ , deben tener siempre un valor positivo o cero:

$$\begin{aligned} t_{ij} &\geq 0 & \forall i, j \\ u_{im} &\geq 0 & \forall i, m \\ x_{mj} &\geq 0 & \forall m, j \end{aligned}$$

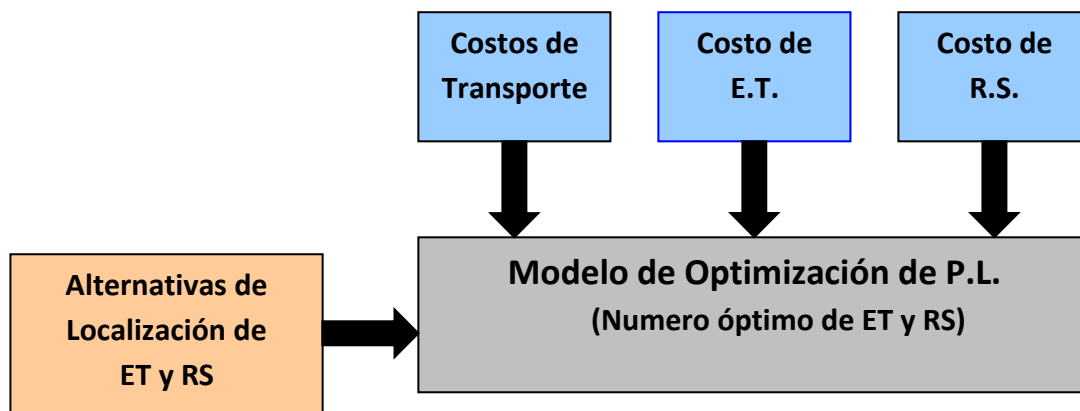
*Restricción 12,13. Restricciones que aseguran que las variables que determinan sus que determinadas variables deben ser enteras (no existen medias instalaciones o plantas)*

Las variables enteras son dos:  $z_{mn}$ ,  $y_{jk}$ . La primera corresponde a la localización de Estaciones de Transferencia, la segunda a la localización de Rellenos Sanitarios

$$\begin{aligned} z_{mn} &= 0 \text{ o } 1 & \forall m, n \\ y_{jk} &= 0 \text{ o } 1 & \forall j, k \end{aligned}$$

### 1.1.3.2 Determinación de los costos del modelo.

Como se muestra en la ilustración siguiente, tres son los costos considerados en el modelo de optimización: costo de transporte, costo de las estaciones de transferencia y costo de los rellenos sanitarios.



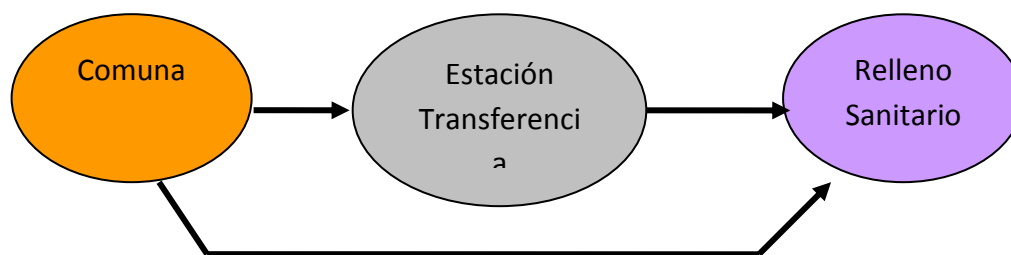
**Ilustración 1-6 Costo Considerados en Modelo de Optimización.**  
*Fuente: Elaboración Propia 2011.*

A continuación se explica brevemente cada una de estas partidas. Ahora bien, es importante consignar que los valores seleccionados para cada una de ellos deben entenderse como una primera aproximación, ya que cabe refinar con mayor detalle las alternativas hasta ahora consideradas. Sin embargo la cifra que se da permite estimar con una aproximación razonable el número de estaciones de transferencia y rellenos requeridos.

#### 1.1.3.2.1 Costo de transporte.

El costo de transporte depende directamente del tipo de camión utilizado. Para efecto de cálculo se consideran dos tipo de camiones: a) un primer tipo utilizado en la recolección domiciliaria y cuyo destino son las estaciones de transferencia o bien la disposición final de los residuos en los rellenos sanitarios (

Ilustración 1-7), cuando el modelo de costo así lo determine (camión de 19 m<sup>3</sup>), y b) un segundo tipo de camión a utilizar entre las estaciones de transferencia y los rellenos sanitarios (camión de 70 m<sup>3</sup> con amplirol), todos esos costos están expresados en las Tabla 1-8 y Tabla 1-9.



**Ilustración 1-7 Transporte Directo o con Transferencia.**

*Fuente: Elaboración Propia 2011.*

El costo de transporte está compuesto, por costos variables y costos fijos, expresados en [\$/km-t].

**Tabla 1-8 Costos variables camión 19 m<sup>3</sup>**

| <b>COSTOS VARIABLES DEL CAMION DE 19m<sup>3</sup> UTILIZADO EN EL TRANSPORTE DE LAS COMUNAS A LA ET Y AL RS DIRECTAMENTE</b> |                |            |
|------------------------------------------------------------------------------------------------------------------------------|----------------|------------|
| <b>Características</b>                                                                                                       |                |            |
| Volumen                                                                                                                      | m <sup>3</sup> | 19         |
| Carga máxima.                                                                                                                | t              | 13         |
| Grado de llenado                                                                                                             | %              | 80%        |
| Carga útil                                                                                                                   | t              | 9.12       |
| <b>Costos de Vehículo</b>                                                                                                    |                |            |
| Vehículo                                                                                                                     | \$             | 40,460,000 |
| Caja compactadora / Ampliroll accesorios                                                                                     | \$             | 24,500,000 |
| Costo total del vehículo RECOLECTOR 19 m <sup>2</sup>                                                                        | \$             | 64,960,000 |
| Costo por km                                                                                                                 | \$/km          | 619.74     |
| Costo por hora                                                                                                               | \$/h           | 14,802.17  |
| Costo variable de transporte                                                                                                 | \$/km-t        | 67.95      |

*Fuente: IASA, 2011*

**Tabla 1-9 Costos variables camión 70 m<sup>3</sup>**

| <b>COSTOS VARIABLES DEL CAMION DE 70m<sup>3</sup> CON AMPLIROL UTILIZADO<br/>EN EL TRANSPORTE DE LA ET AL RS</b> |                |            |
|------------------------------------------------------------------------------------------------------------------|----------------|------------|
| <b>Características</b>                                                                                           |                |            |
| Volumen                                                                                                          | m <sup>3</sup> | 70         |
| Carga máxima                                                                                                     | t              | 19         |
| Grado de llenado                                                                                                 | %              | 90%        |
| Carga útil                                                                                                       | ton            | 18.9       |
| <b>Costos de Vehículo</b>                                                                                        |                |            |
| Vehículo                                                                                                         | \$             | 40,460,000 |
| Caja compactadora / Amplirol accesorios                                                                          | \$             | 43,000,000 |
| Costo total del vehículo                                                                                         | \$             | 83,460,000 |
| Costo por km                                                                                                     | \$/km          | 457.69     |
| Costo por hora                                                                                                   | \$/h           | 11,086.90  |
| Costo variable de transporte                                                                                     | \$/km-t        | 24.22      |

*Fuente: IASA, 2011*

En la Tabla 2-3 y Tabla 2-4 del presente Anexo se muestra el detalle del cálculo del costo variable de \$/km para ambas alternativas.

### **Costos fijos anuales**

Los costos fijos están compuestos por:

- la partida de capital, expresado esto en una anualidad considerando un periodo de depreciación de 5 años;
- el costo del personal;

- c) por un conjunto de otros costos en lo que se incluye equipos de servicio, arriendos, revisiones técnicas, seguros, patentes, y artículos de seguridad; y
- d) costos de administración e imprevistos.

### **Cálculo del costo de transporte**

El costo de transporte a ser introducido en el modelo está expresado en [\$/t-km] y corresponde a la suma de los costos variable más los costos fijos. La dimensión del costo de transporte obliga a expresar los costos fijos en [\$/t-km], para tales efectos se sigue el siguiente procedimiento.

Se supone una cantidad de kilómetros recorridos por los camiones de recolección y transporte, teniendo en mente el kilometraje normal para camiones de este tipo. De esta forma se adopta un kilometraje de recorrido de 30.000 [km/a] para los camiones de recolección y 80.000 [km/a] para los camiones de transporte ocupados desde la estación de transferencia a rellenos sanitarios.

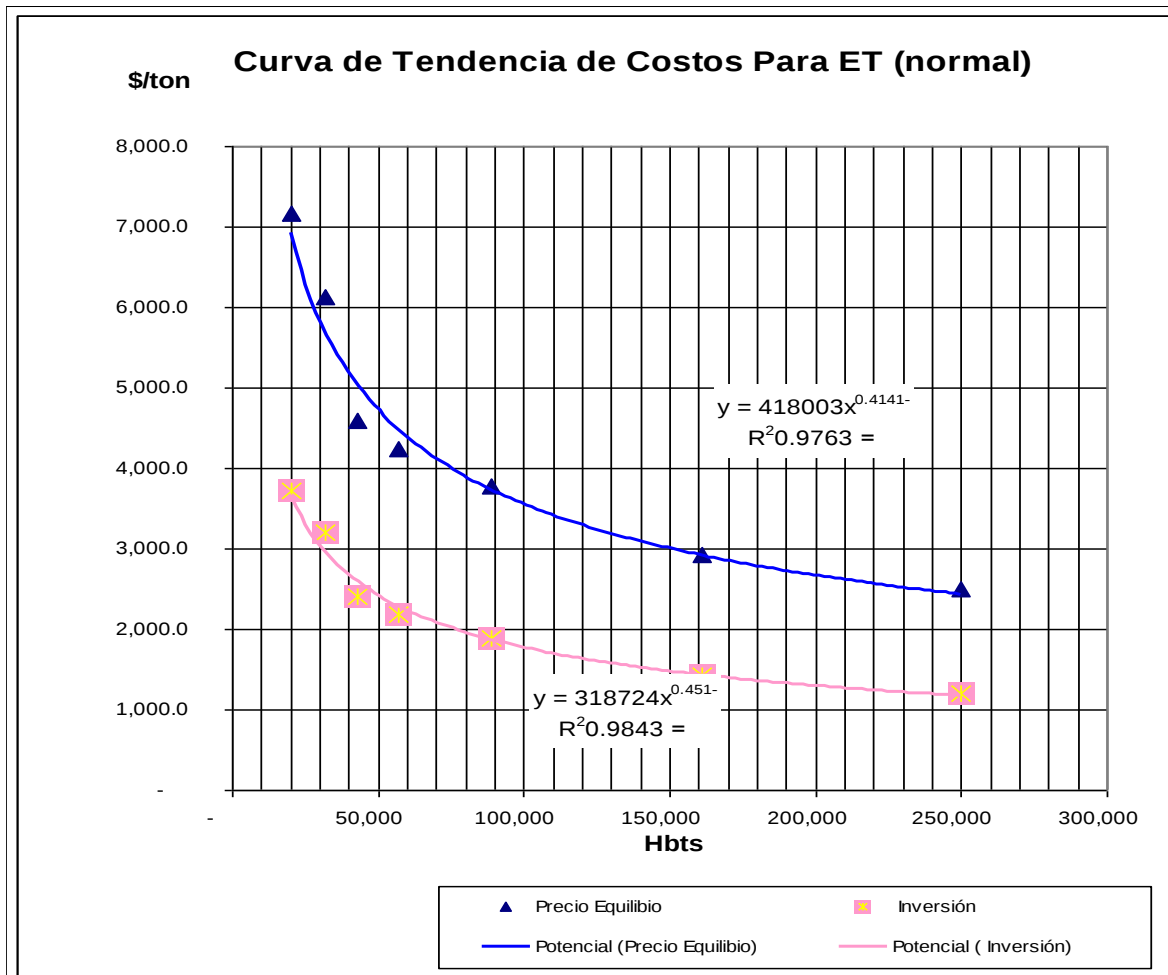
Cabe hacer notar que el modelo considera costos anuales para las diferentes partidas que se muestran en las Tabla 2-3, Tabla 2-4 y Tabla 2-5.

#### **1.1.3.2.2 Costo de las estaciones de transferencia.**

El costo de las estaciones de transferencia sigue una tendencia exponencial decreciente de forma asintótica, la que tiende a aplanarse a medida que aumenta al tamaño de planta.

Los valores de las estaciones de transferencia se obtuvieron del gráfico siguiente y son los considerados para confeccionar la

Tabla 1-10, la que muestra los valores para distintos tamaños de planta en función de la cantidad de residuos.



**Gráfico 1-1 Curva de Tendencia de Costos para ET.**

*Fuente: Elaboración Propia 2011.*

**Tabla 1-10 Costo Anual de ET normal (\$/año).**

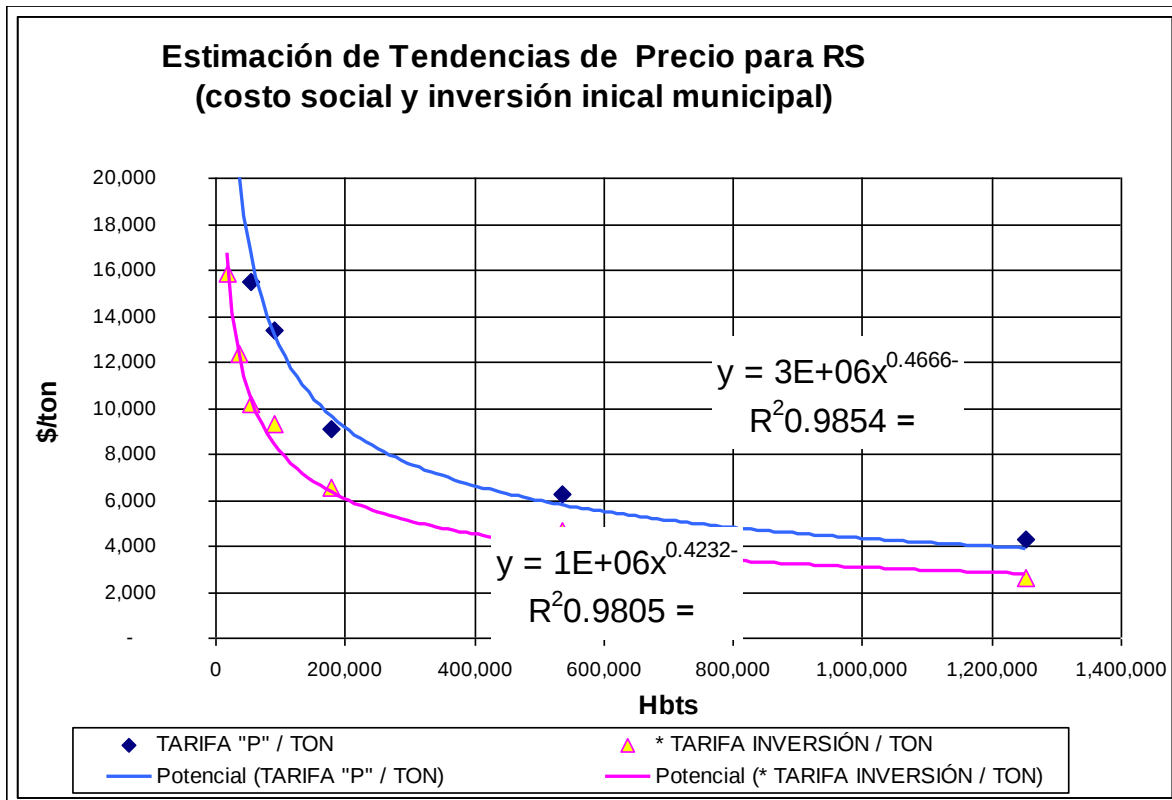
| Residuos ton/año |           | \$/ton   | \$/año      |
|------------------|-----------|----------|-------------|
| (a)              | (b)       | (c)      | (d)=(c)*(a) |
| 13,980           | 50,000    | 4,891.74 | 68,384,021  |
| 27,959           | 100,000   | 3,663.81 | 102,436,592 |
| 41,939           | 150,000   | 3,093.88 | 129,752,676 |
| 55,918           | 200,000   | 2,744.13 | 153,446,013 |
| 83,877           | 300,000   | 2,317.26 | 194,364,440 |
| 100,000          | 357,667   | 2,153.44 | 215,344,115 |
| 150,000          | 536,500   | 1,818.46 | 272,768,498 |
| 200,000          | 715,333   | 1,612.89 | 322,577,072 |
| 300,000          | 1,073,000 | 1,361.99 | 408,596,554 |
| 450,000          | 1,609,500 | 1,150.12 | 517,554,279 |
| 600,000          | 2,145,999 | 1,020.10 | 612,061,676 |
| 750,000          | 2,682,499 | 929.46   | 697,097,820 |
| 900,000          | 3,218,999 | 861.42   | 775,276,091 |

**PPC = 0.766 kg/hab-día**

*Fuente: Elaboración Propia.*

#### 1.1.3.2.3 Costo de los rellenos sanitarios.

El costo de los rellenos sanitarios se obtiene de idéntica manera al punto anterior y descansa en el gráfico siguiente, en el que se detalla los costos \$/ton para diferentes volúmenes de residuos, los que se muestran en la Tabla 1-11.



**Gráfico 1-2 Tendencias de Precio para RS.**  
*Fuente: Elaboración Propia 2011.*

**Tabla 1-11 Costo Anual de RS (\$/año)**

| Residuos t/año<br>(a) | Hab equiv.<br>(b) | \$/t<br>(c) | \$/año<br>(d)=(c)*(a) |
|-----------------------|-------------------|-------------|-----------------------|
| 1,400,000             | 5,007,332         | 2,227       | 3,117,906,879         |
| 1,250,000             | 4,470,832         | 2,348       | 2,935,180,787         |
| 1,100,000             | 3,934,332         | 2,493       | 2,741,887,754         |
| 950,000               | 3,397,833         | 2,669       | 2,535,831,657         |
| 800,000               | 2,861,333         | 2,892       | 2,313,919,063         |
| 650,000               | 2,324,833         | 3,187       | 2,071,538,636         |
| 500,000               | 1,788,333         | 3,602       | 1,801,244,324         |
| 350,000               | 1,251,833         | 4,256       | 1,489,448,087         |
| 200,000               | 715,333           | 5,527       | 1,105,376,926         |
| 150,000               | 536,500           | 6,322       | 948,266,792           |
| 50,000                | 178,833           | 10,561      | 528,047,056           |
| 25,000                | 89,417            | 14,599      | 364,967,120           |
| 15,000                | 53,650            | 18,533      | 277,990,876           |
| 10,000                | 35,767            | 22,397      | 223,970,856           |

**PPC = 0.766 kg/hab-día**

*Fuente:Elaboración Propia.*

#### 1.1.4 Resultados.

##### 1.1.4.1 Alternativas de proceso.

Teniendo en cuenta lo dicho anteriormente y habiendo calculado: a) los centroides de las 8 asociatividades existentes, y b) los centroides de las 36 comunas de la región, se procesó el modelo de programación lineal a fin de obtener valores referenciales de la localización de las estaciones de transferencia y de las capacidades de esta. Proceso que se ejecutó para 5 alternativas (Tabla 1-1).

Adicionalmente a las alternativas antes mencionadas se procesaron para efectos de sensibilización de los resultados dos grupos de alternativas adicionales, las que introducían una cantidad mínima de ET y RS, y una cantidad fija de RS, generándose para las mismas

alternativas antes mostradas dos nuevos conjuntos de resultados (conjuntos 2 y 3). Es importante para el lector reconocer que se han efectuado 15 corridas del modelo lineal; cinco corridas para el conjunto 1, considerando las cinco alternativas que se muestran en la tabla; otras cinco corridas para el conjunto 2, en el que se introducen restricciones en cuanto al número de ET y RS, para las mismas cinco alternativas anteriores; y finalmente otras cinco corridas para el conjunto 3, con diferentes restricciones de ET y RS, para las mismas cinco alternativas anteriores.

Conjunto 2: Un número mínimo de 2 ET y un número mínimo de 2 RS.

Conjunto 3: Un número mínimo de 2 ET y un número fijo de 2 RS.

En la Tabla 1-12, se muestra el resultado para las 15 corridas indicándose para cada conjunto el costo mínimo de la función objetivo del modelo.

Min  $z$  = Min (Costo de equipamiento + Costo de transporte)

$$z = f(y, z, t, x, u) = \sum_m \sum_n C(ET)_{mn} * z_{mn} + \sum_j \sum_k C(RS)_{jk} * y_{jk} \\ + \sum_i \sum_j CT_{ij} * t_{ij} + \sum_i \sum_m CT_{im} * u_{im} + \sum_m \sum_j CT_{mj} * x_{mj}$$

Dónde:

- $C(ET)_{mn}$  = Costo total de un equipamiento de ET de tamaño  $n$  en el sitio  $m$   
 $C(RS)_{jk}$  = Costo total de un equipamiento de RS de tamaño  $k$  en el sitio  $j$   
 $CT_{ij}$  = Costo unitario de transporte desde el centro de población  $i$  al sitio RS  $j$   
 $CT_{im}$  = Costo unitario transporte desde el centro de población  $i$  al sitio RS  $m$   
 $CT_{mj}$  = Costo unitario de transporte desde la ET  $m$  al RS  $j$

En la Tabla 1-13, se ordenan los resultados anteriores a partir de los mejores con mínimo costo. Las corridas computacionales dieron como resultados que algunas alternativas son idénticas a otras, por lo que se procedieron a agrupar como una sola.

#### 1.1.4.2 Localización por asociatividad de las estaciones de transferencia y rellenos sanitarios.

El detalle de los resultados que se muestra a continuación indica el lugar de localización de las ET y RS, como así también las capacidades de cada una de estas instalaciones con su correspondiente costo. Información que se entrega para cada uno de los conjuntos y alternativas antes mencionadas.

**Tabla 1-12 Resultados de Costos para Distintas Alternativas de Equipamiento.**

| Alternativa | Estaciones de Transferencia | Rellenos Sanitarios | Costo [\$/año] |
|-------------|-----------------------------|---------------------|----------------|
| Alt 1a      | 7 ET                        | 2 RS                | 7,908,496,991  |
| Alt 1b      | 5 ET                        | 3 RS                | 7,576,242,682  |
| Alt 1c      | 3 ET                        | 2 RS                | 8,871,021,426  |
| Alt 1d      | 4 ET                        | 2 RS                | 8,084,296,722  |
| Alt 1e      | 3 ET                        | 3 RS                | 7,832,776,383  |
|             |                             |                     |                |
| Alt 2a      | 7 ET                        | 2 RS                | 7,922,851,584  |
| Alt 2b      | 5 ET                        | 3 RS                | 7,576,242,682  |
| Alt 2c      | 3 ET                        | 2 RS                | 8,871,021,426  |
| Alt 2d      | 4 ET                        | 2 RS                | 8,084,296,722  |
| Alt 2e      | 3 ET                        | 3 RS                | 7,832,776,383  |
|             |                             |                     |                |
| Alt 3a      | 7 ET                        | 2 RS                | 7,922,851,584  |
| Alt 3b      | 6 ET                        | 2 RS                | 7,781,893,581  |
| Alt 3c      | 3 ET                        | 2 RS                | 8,871,021,426  |
| Alt 3d      | 4 ET                        | 2 RS                | 8,084,296,722  |
| Alt 3e      | 5 ET                        | 2 RS                | 8,010,892,684  |

Fuente: IASA 2011.

**Tabla 1-13 Resultados de Costos para Distintas Alternativas de Equipamiento Ordenadas por Costo.**

| Alternativa             | Estaciones de Transferencia | Rellenos Sanitarios | Costo [\$/año] |
|-------------------------|-----------------------------|---------------------|----------------|
| Alt 1b y Alt 2b         | 5 ET                        | 3 RS                | 7,576,242,682  |
| Alt 3b                  | 6 ET                        | 2 RS                | 7,781,893,581  |
| Alt 1e y Alt 2e         | 3 ET                        | 3 RS                | 7,832,776,383  |
| Alt 1a                  | 7 ET                        | 2 RS                | 7,908,496,991  |
| Alt 2a y 3a             | 7 ET                        | 2 RS                | 7,922,851,584  |
| Alt 3e                  | 5 ET                        | 2 RS                | 8,010,892,684  |
| Alt 1d, Alt 2d y Alt 3d | 4 ET                        | 2 RS                | 8,084,296,722  |
| Alt 1c, Alt 2c y Alt 3c | 3 ET                        | 2 RS                | 8,871,021,426  |

Fuente: IASA 2011.

**Tabla 1-14 Alternativa 1a con Costos.**

| Alternativa 1a: ET: 8 - RS: 2        |                        |      |                   |               |
|--------------------------------------|------------------------|------|-------------------|---------------|
| Sin restricción de número de ET y RS |                        |      |                   |               |
| Costo Total [\$/año                  | 7,908,496,991          |      |                   |               |
| Estaciones de Transferencias (Zmn)   |                        |      |                   |               |
| Ubicación                            | Ciudad                 | Tipo | Capacidad [t/año] | Costo ET [\$] |
| 2                                    | San Felipe - Los Andes | 8    | 100,000           | 215,344,115   |
| 3                                    | San Antonio            | 8    | 100,000           | 215,344,115   |
| 4                                    | Quillota               | 8    | 100,000           | 215,344,115   |
| 5                                    | Petorca                | 10   | 45,000            | 132,071,723   |
| 6                                    | Marga-Marga            | 8    | 100,000           | 215,344,115   |
| 7                                    | Concón                 | 9    | 70,000            | 175,021,154   |
| 8                                    | Casablanca             | 11   | 25,000            | 94,289,769    |
| Rellenos Sanitarios (Yjk)            |                        |      |                   |               |
| Ubicación                            | Ciudad                 | Tipo | Capacidad [t/año] | Costo RS [\$] |
| 1                                    | Valparaíso             | 5    | 800,000           | 2,313,919,063 |
| 2                                    | San Felipe - Los Andes | 9    | 200,000           | 902,014,950   |

Fuente: IASA 2011.



Tabla 1-15 Alternativa 1b con Costos.

| Alternativa 1b: ET: 8 - RS: 3        |                             |               |                   |               |
|--------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Sin restricción de número de ET y RS |                             |               |                   |               |
| Costo Total [\$ /año]                |                             | 7,576,242,682 |                   |               |
| Estaciones de Transferencias (Zmn)   |                             |               |                   |               |
| Ubicación                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 3                                    | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 4                                    | Quillota                    | 7             | 150,000           | 272,768,498   |
| 5                                    | Petorca                     | 10            | 45,000            | 132,071,723   |
| 7                                    | Con Con                     | 9             | 70,000            | 175,021,154   |
| 8                                    | Casablanca                  | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)            |                             |               |                   |               |
| Ubicación                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                    | Valparaiso                  | 7             | 500,000           | 1,801,244,324 |
| 2                                    | San Felipe - Los Andes      | 9             | 200,000           | 902,014,950   |
| 3                                    | Marga-Marga (Villa Alemana) | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-16 Alternativa 1c con Costos.

| Alternativa 1c: ET: 5 - RS: 2 (libre) |                             |      |                   |               |
|---------------------------------------|-----------------------------|------|-------------------|---------------|
| Sin restricción de número de ET y RS  |                             |      |                   |               |
| Costo Total [\$ /año]                 | 8,871,021,426               |      |                   |               |
| Estaciones de Transferencias (Zmn)    |                             |      |                   |               |
| Ubicación                             | Ciudad                      | Tipo | Capacidad [t/año] | Costo ET [\$] |
| 1                                     | Marga-Marga (Quilpue)       | 9    | 70,000            | 175,021,154   |
| 3                                     | San Antonio                 | 8    | 100,000           | 215,344,115   |
| 5                                     | Marga-Marga (Villa Alemana) | 9    | 70,000            | 175,021,154   |
| Rellenos Sanitarios (Yjk)             |                             |      |                   |               |
| Ubicación                             | Ciudad                      | Tipo | Capacidad [t/año] | Costo RS [\$] |
| 1                                     | Valparaiso                  | 6    | 650,000           | 2,071,538,636 |
| 2                                     | San Felipe - Los Andes      | 8    | 350,000           | 1,489,448,087 |

Fuente: IASA 2011.



Tabla 1-17 Alternativa 1d con Costos.

| Alternativa 1d: ET: 8 - RS: 2 (libre) |                             |               |                   |               |
|---------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Sin restricción de número de ET y RS  |                             |               |                   |               |
| Costo Total [\$ /año]                 |                             | 8,084,296,722 |                   |               |
| Estaciones de Transferencias (Zmn)    |                             |               |                   |               |
| Ubicación                             | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 4                                     | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |
| 5                                     | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 6                                     | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| 8                                     | Marga - Marga (Limache)     | 11            | 25,000            | 94,289,769    |
| Rellenos Sanitarios (Yjk)             |                             |               |                   |               |
| Ubicación                             | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                     | Viña del Mar                | 5             | 800,000           | 2,313,919,063 |
| 2                                     | Quillota (Calera)           | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-18 Alternativa 1e con Costos.

| Alternativa 1e: ET: 8 - RS: 3 (libre) |                             |               |                   |               |
|---------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Sin restricción de número de ET y RS  |                             |               |                   |               |
| Costo Total [\$ /año]                 |                             | 7,832,776,383 |                   |               |
| Estaciones de Transferencias (Zmn)    |                             |               |                   |               |
| Ubicación                             | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 4                                     | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |
| 6                                     | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| 8                                     | Marga - Marga (Limache)     | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)             |                             |               |                   |               |
| Ubicación                             | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                     | Viña del Mar                | 7             | 500,000           | 1,801,244,324 |
| 2                                     | San Antonio                 | 9             | 200,000           | 902,014,950   |
| 3                                     | Quillota (Calera)           | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

**Tabla 1-19 Alternativa 2a con Costos.**

| <b>Alternativa 2a: ET: 8 - RS: 2</b>                        |                        |             |                          |                      |
|-------------------------------------------------------------|------------------------|-------------|--------------------------|----------------------|
| <i>Restricción: N° mínimo de ET: 2 y N° mínimo de RS: 2</i> |                        |             |                          |                      |
| <b>Costo Total [\$ /año] 7,922,851,584</b>                  |                        |             |                          |                      |
| <b>Estaciones de Transferencias (Zmn)</b>                   |                        |             |                          |                      |
| <i>Ubicación</i>                                            | <i>Ciudad</i>          | <i>Tipo</i> | <i>Capacidad [t/año]</i> | <i>Costo ET [\$]</i> |
| 2                                                           | San Felipe - Los Andes | 8           | 100,000                  | 215,344,115          |
| 3                                                           | San Antonio            | 8           | 100,000                  | 215,344,115          |
| 4                                                           | Quillota               | 8           | 100,000                  | 215,344,115          |
| 5                                                           | Petorca                | 10          | 45,000                   | 132,071,723          |
| 6                                                           | Marga-Marga            | 8           | 100,000                  | 215,344,115          |
| 7                                                           | Concón                 | 9           | 70,000                   | 175,021,154          |
| 8                                                           | Casablanca             | 12          | 16,000                   | 67,720,696           |
| <b>Rellenos Sanitarios (Yjk)</b>                            |                        |             |                          |                      |
| <i>Ubicación</i>                                            | <i>Ciudad</i>          | <i>Tipo</i> | <i>Capacidad [t/año]</i> | <i>Costo RS [\$]</i> |
| 1                                                           | Valparaíso             | 5           | 800,000                  | 2,334,651,735        |
| 2                                                           | San Felipe - Los Andes | 9           | 200,000                  | 902,014,950          |

*Fuente: IASA 2011.*



Tabla 1-20 Alternativa 2b con Costos.

| Alternativa 2b: ET: 8 - RS: 3                        |                             |               |                   |               |
|------------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° mínimo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                                |                             | 7,576,242,682 |                   |               |
| Estaciones de Transferencias (Zmn)                   |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 3                                                    | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 4                                                    | Quillota                    | 7             | 150,000           | 272,768,498   |
| 5                                                    | Petorca                     | 10            | 45,000            | 132,071,723   |
| 7                                                    | Concón                      | 9             | 70,000            | 175,021,154   |
| 8                                                    | Casablanca                  | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)                            |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                    | Valparaíso                  | 7             | 500,000           | 1,816,871,006 |
| 2                                                    | San Felipe - Los Andes      | 9             | 200,000           | 902,014,950   |
| 3                                                    | Marga-Marga (Villa Alemana) | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-21 Alternativa 2c con Costos.

| Alternativa 2c: ET: 5 - RS: 2 (libre)                |                             |               |                   |               |
|------------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° mínimo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                                |                             | 8,871,021,426 |                   |               |
| Estaciones de Transferencias (Zmn)                   |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 1                                                    | Marga-Marga (Quilpue)       | 9             | 70,000            | 175,021,154   |
| 3                                                    | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 5                                                    | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| Rellenos Sanitarios (Yjk)                            |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                    | Valparaíso                  | 6             | 650,000           | 2,071,538,636 |
| 2                                                    | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |

Fuente: IASA 2011.



Tabla 1-22 Alternativa 2d con Costos.

| Alternativa 2d: ET: 8 - RS: 2 (libre)                |                             |               |                   |               |
|------------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° mínimo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                                |                             | 8,084,296,722 |                   |               |
| Estaciones de Transferencias (Zmn)                   |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 4                                                    | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |
| 5                                                    | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 6                                                    | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| 8                                                    | Marga - Marga (Limache)     | 11            | 25,000            | 94,289,769    |
| Rellenos Sanitarios (Yjk)                            |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                    | Valparaíso (Viña del Mar)   | 5             | 800,000           | 2,334,651,735 |
| 2                                                    | Quillota (Calera)           | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-23 Alternativa 2e con Costos.

| Alternativa 2e: ET: 8 - RS: 3 (libre)                |                             |               |                   |               |
|------------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° mínimo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                                |                             | 7,832,776,383 |                   |               |
| Estaciones de Transferencias (Zmn)                   |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 4                                                    | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |
| 6                                                    | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| 8                                                    | Marga - Marga (Limache)     | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)                            |                             |               |                   |               |
| Ubicación                                            | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                    | Valparaíso (Viña del Mar)   | 7             | 500,000           | 1,816,871,006 |
| 2                                                    | San Antonio                 | 9             | 200,000           | 902,014,950   |
| 3                                                    | Quillota (Calera)           | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-24 Alternativa 3a con Costos.

| Alternativa 3a: ET: 8 - RS: 2                      |                        |               |                   |               |
|----------------------------------------------------|------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° fijo de RS: 2 |                        |               |                   |               |
| Costo Total [\$ /año]                              |                        | 7,922,851,584 |                   |               |
| Estaciones de Transferencias (Zmn)                 |                        |               |                   |               |
| Ubicación                                          | Ciudad                 | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 2                                                  | San Felipe - Los Andes | 8             | 100,000           | 215,344,115   |
| 3                                                  | San Antonio            | 8             | 100,000           | 215,344,115   |
| 4                                                  | Quillota               | 8             | 100,000           | 215,344,115   |
| 5                                                  | Petorca                | 10            | 45,000            | 132,071,723   |
| 6                                                  | Marga-Marga            | 8             | 100,000           | 215,344,115   |
| 7                                                  | Concón                 | 9             | 70,000            | 175,021,154   |
| 8                                                  | Casablanca             | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)                          |                        |               |                   |               |
| Ubicación                                          | Ciudad                 | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                  | Valparaíso             | 5             | 800,000           | 2,334,651,735 |
| 2                                                  | San Felipe - Los Andes | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.



Tabla 1-25 Alternativa 3b con Costos.

| Alternativa 3b: ET: 8 - RS: 3                      |                        |               |                   |               |
|----------------------------------------------------|------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° fijo de RS: 2 |                        |               |                   |               |
| Costo Total [\$ /año]                              |                        | 7,781,893,581 |                   |               |
| Estaciones de Transferencias (Zmn)                 |                        |               |                   |               |
| Ubicación                                          | Ciudad                 | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 3                                                  | San Antonio            | 8             | 100,000           | 215,344,115   |
| 4                                                  | Quillota               | 7             | 150,000           | 272,768,498   |
| 5                                                  | Petorca                | 10            | 45,000            | 132,071,723   |
| 6                                                  | Marga-Marga            | 8             | 100,000           | 215,344,115   |
| 7                                                  | Concón                 | 9             | 70,000            | 175,021,154   |
| 8                                                  | Casablanca             | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)                          |                        |               |                   |               |
| Ubicación                                          | Ciudad                 | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                  | Valparaíso             | 5             | 800,000           | 2,334,651,735 |
| 2                                                  | San Felipe - Los Andes | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-26 Alternativa 3c con Costos.

| Alternativa 3c: ET: 5 - RS: 2 (libre)              |                             |               |                   |               |
|----------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° fijo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                              |                             | 8,871,021,426 |                   |               |
| Estaciones de Transferencias (Zmn)                 |                             |               |                   |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 1                                                  | Marga-Marga (Quilpué)       | 9             | 70,000            | 175,021,154   |
| 3                                                  | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 5                                                  | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| Rellenos Sanitarios (Yjk)                          |                             |               |                   |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                  | Valparaíso                  | 6             | 650,000           | 2,089,839,208 |
| 2                                                  | San Felipe - Los Andes      | 8             | 350,000           | 1,489,448,087 |

Fuente: IASA 2011.



Tabla 1-27 Alternativa 3d con Costos.

| Alternativa 3d: ET: 8 - RS: 2 (libre)              |                             |               |                     |               |
|----------------------------------------------------|-----------------------------|---------------|---------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° fijo de RS: 2 |                             |               |                     |               |
| Costo Total [\$ /año]                              |                             | 8,084,296,722 |                     |               |
| Estaciones de Transferencias (Zmn)                 |                             |               |                     |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [t/año]   | Costo ET [\$] |
| 4                                                  | San Felipe - Los Andes      | 8             | 100,000             | 215,344,115   |
| 5                                                  | San Antonio                 | 8             | 100,000             | 215,344,115   |
| 6                                                  | Marga-Marga (Villa Alemana) | 9             | 70,000              | 175,021,154   |
| 8                                                  | Marga - Marga (Limache)     | 11            | 25,000              | 94,289,769    |
| Rellenos Sanitarios (Yjk)                          |                             |               |                     |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [ton/año] | Costo RS [\$] |
| 1                                                  | Valparaíso (Viña del Mar)   | 5             | 800,000             | 2,334,651,735 |
| 2                                                  | Quillota (Calera)           | 9             | 200,000             | 902,014,950   |

Fuente: IASA 2011.

Tabla 1-28 Alternativa 3e con Costos.

| Alternativa 3e: ET: 8 - RS: 3 (libre)              |                             |               |                   |               |
|----------------------------------------------------|-----------------------------|---------------|-------------------|---------------|
| Restricción: N° mínimo de ET: 2 y N° fijo de RS: 2 |                             |               |                   |               |
| Costo Total [\$ /año]                              |                             | 8,010,892,684 |                   |               |
| Estaciones de Transferencias (Zmn)                 |                             |               |                   |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [t/año] | Costo ET [\$] |
| 4                                                  | San Felipe - Los Andes      | 8             | 100,000           | 215,344,115   |
| 5                                                  | San Antonio                 | 8             | 100,000           | 215,344,115   |
| 6                                                  | Marga-Marga (Villa Alemana) | 9             | 70,000            | 175,021,154   |
| 7                                                  | Marga-Marga (Quilpué)       | 9             | 70,000            | 175,021,154   |
| 8                                                  | Marga - Marga (Limache)     | 12            | 16,000            | 67,720,696    |
| Rellenos Sanitarios (Yjk)                          |                             |               |                   |               |
| Ubicación                                          | Ciudad                      | Tipo          | Capacidad [t/año] | Costo RS [\$] |
| 1                                                  | Valparaíso (Viña del Mar)   | 5             | 800,000           | 2,334,651,735 |
| 3                                                  | Quillota (Calera)           | 9             | 200,000           | 902,014,950   |

Fuente: IASA 2011.

### 1.1.4.3 Localización geográfica de las estaciones de transferencia y rellenos sanitarios.

La localización geográfica de las ET y RS, se muestran en las Tabla 1-29 para cada una de las alternativas procesadas.

**Tabla 1-29 Localización Geográfica y Costos de ET y RS.**

| Alternativa            | Costo [\$/año]        | Resultados                       | Coordenada X [UTM]        | Coordenada y [UTM]        |
|------------------------|-----------------------|----------------------------------|---------------------------|---------------------------|
| <b>Alt 1a</b>          | <b>7,908,496,991</b>  | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                        |                       | San Felipe - Los Andes           | 339468                    | 6374513                   |
|                        |                       | San Antonio                      | 257848                    | 6280063                   |
|                        |                       | Quillota                         | 291618                    | 6365583                   |
|                        |                       | Petorca                          | 291628                    | 6407523                   |
|                        |                       | Marga-Marga                      | 278378                    | 6341533                   |
|                        |                       | Con Con                          | 264648                    | 6355143                   |
|                        |                       | Casablanca                       | 275028                    | 6311000                   |
|                        |                       | <b>RELLENO SANITARIO</b>         |                           |                           |
|                        |                       | Valparaíso                       | 258905                    | 6339485                   |
|                        |                       | San Felipe - Los Andes           | 310231                    | 6373615                   |
| <b>Alternativa</b>     | <b>Costo [\$/año]</b> | <b>Resultados</b>                | <b>Coordenada X [UTM]</b> | <b>Coordenada y [UTM]</b> |
| <b>Alt 1b y Alt 2b</b> | <b>7,576,242,682</b>  | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                        |                       | San Antonio                      | 257848                    | 6280063                   |
|                        |                       | Quillota                         | 291618                    | 6365583                   |
|                        |                       | Petorca                          | 291628                    | 6407523                   |
|                        |                       | Con Con                          | 264648                    | 6355143                   |
|                        |                       | Casablanca                       | 275028                    | 6311000                   |
|                        |                       | <b>RELLENO SANITARIO</b>         |                           |                           |
|                        |                       | Valparaíso                       | 255138                    | 6340543                   |
|                        |                       | San Felipe - Los Andes           | 339468                    | 6374513                   |
|                        |                       | Marga-Marga (Villa Alemana)      | 278378                    | 6341533                   |

|                                |                        |                                  |                           |                           |
|--------------------------------|------------------------|----------------------------------|---------------------------|---------------------------|
| <b>Alt 1c, Alt 2c y Alt 3c</b> | <b>8,871,021,426</b>   | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                                |                        | Marga-Marga (Quilpue)            | 271228                    | 6340503                   |
|                                |                        | San Antonio                      | 257848                    | 6280063                   |
|                                |                        | Marga-Marga (Villa Alemana)      | 278378                    | 6341533                   |
|                                |                        | <b>RELLENO SANITARIO</b>         |                           |                           |
|                                |                        | Valparaíso                       | 261638                    | 6343263                   |
|                                |                        | San Felipe - Los Andes           | 303528                    | 6371843                   |
|                                |                        |                                  |                           |                           |
| <b>Alt 1d, Alt 2d y Alt 3d</b> | <b>8,084,296,722</b>   | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                                |                        | San Felipe - Los Andes           | 338508                    | 6375113                   |
|                                |                        | San Antonio                      | 257848                    | 6280063                   |
|                                |                        | Marga - Marga (Villa Alemana)    | 278378                    | 6341533                   |
|                                |                        | Marga - Marga (Limache)          | 288278                    | 6344583                   |
|                                |                        | <b>RELLENO SANITARIO</b>         |                           |                           |
|                                |                        | Viña del Mar                     | 261898                    | 6341923                   |
|                                |                        | Quillota (Calera)                | 291378                    | 6369773                   |
| <b>Alt 1e y Alt 2e</b>         | <b>7,832,776,383</b>   | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                                |                        | San Felipe - Los Andes           | 338508                    | 6375113                   |
|                                |                        | Marga - Marga (Villa Alemana)    | 278378                    | 6341533                   |
|                                |                        | Marga - Marga (Limache)          | 288278                    | 6344583                   |
|                                |                        | <b>RELLENO SANITARIO</b>         |                           |                           |
|                                |                        | Viña del Mar                     | 261638                    | 6343263                   |
|                                |                        | San Antonio                      | 257848                    | 6280063                   |
|                                |                        | Quillota (Calera)                | 292378                    | 6369773                   |
| <b>Alternativa</b>             | <b>Costo [\$ /año]</b> | <b>Resultados</b>                | <b>Coordenada X [UTM]</b> | <b>Coordenada y [UTM]</b> |
| <b>Alt 2a y 3a</b>             | <b>7,922,851,584</b>   | <b>ESTACIÓN DE TRANSFERENCIA</b> |                           |                           |
|                                |                        | San Felipe - Los Andes           | 339468                    | 6374513                   |
|                                |                        | San Antonio                      | 257848                    | 6280063                   |
|                                |                        | Quillota                         | 291618                    | 6365583                   |
|                                |                        | Petorca                          | 291628                    | 6407523                   |
|                                |                        | Marga-Marga                      | 278378                    | 6341533                   |
|                                |                        | Con Con                          | 264648                    | 6355143                   |
|                                |                        | Casablanca                       | 275028                    | 6311000                   |

|  |  | <b>RELLENO SANITARIO</b> |        |         |
|--|--|--------------------------|--------|---------|
|  |  | Valparaíso               | 258905 | 6339485 |
|  |  | San Felipe - Los Andes   | 310231 | 6373615 |

| <b>Alt 3b</b> | <b>7,781,893,581</b> | <b>ESTACIÓN DE TRANSFERENCIA</b> |        |         |
|---------------|----------------------|----------------------------------|--------|---------|
|               |                      | San Antonio                      | 257848 | 6280063 |
|               |                      | Quillota                         | 291618 | 6365583 |
|               |                      | Petorca                          | 291628 | 6407523 |
|               |                      | Marga-Marga                      | 278378 | 6341533 |
|               |                      | Con Con                          | 264648 | 6355143 |
|               |                      | Casablanca                       | 275028 | 6311000 |
|               |                      | <b>RELLENO SANITARIO</b>         |        |         |
|               |                      | Valparaíso                       | 258905 | 6339485 |
|               |                      | San Felipe - Los Andes           | 310231 | 6373615 |
| <b>Alt 3e</b> | <b>8,010,892,684</b> | <b>ESTACIÓN DE TRANSFERENCIA</b> |        |         |
|               |                      | San Felipe - Los Andes           | 338508 | 6375113 |
|               |                      | San Antonio                      | 257848 | 6280063 |
|               |                      | Marga - Marga (Villa Alemana)    | 278378 | 6341533 |
|               |                      | Marga - Marga (Quilpue)          | 271228 | 6340503 |
|               |                      | Marga - Marga (Limache)          | 288278 | 6344583 |
|               |                      | <b>RELLENO SANITARIO</b>         |        |         |
|               |                      | Valparaíso (Viña del Mar)        | 261638 | 6343263 |
|               |                      | Quillota (Calera)                | 292378 | 6369773 |

Fuente: IASA 2011.

## 1.2 Sistema de Exclusión para Alternativas Dadas por Centros Gravitacionales.

En la Región se identifican escenarios de agrupación de municipios, sobre la base de la geografía, conectividad vial y asociatividad pre-existente, los que son los siguientes:

- Sector Centro (Asociatividad de Valparaíso): Viña del Mar, Valparaíso (junto con otras comunas de la provincia o región, según sea el escenario de agrupación, por ejemplo Asociatividad de Marga Marga y comuna de Casablanca);
- Sector Norte-Norte (Asociatividad de Petorca): Petorca, Cabildo, La Ligua, Papudo, Zapallar;
- Sector Centro-Norte (Asociatividad de Quillota y de Concón-Quintero-Puchuncaví): Nogales, Hijuelas, Quillota, Concón, Quintero, Puchuncaví, La Calera, La Cruz;
- Sector Oriente (Asociatividad de San Felipe-Los Andes): Santa María, San Felipe, San Esteban, Rinconada, Putaendo, Panquehue, Los Andes, Llay Llay, Catemu y Calle Larga;
- Sector Sur (Asociatividad de San Antonio): Algarrobo, El Quisco, El Tabo, Cartagena, San Antonio y Santo Domingo;
- Asociatividad de Marga-Marga: Villa Alemana, Quilpué, Olmué y Limache;
- Sector de Casablanca.

Sobre la base de las agrupaciones de municipios, se calcularon distintos centros de gravedad para la región, sobre la base de la fórmula de Centro de Gravedad Poblacional (CG)<sup>2</sup>:

$$C.G. = X;Y$$

$$X = \sum (x*w) / (\sum w) \quad Y = \sum (y*w) / (\sum w)$$

---

<sup>2</sup> CARRERA, *et al*, 1998.

Donde:

X; coordenada 1 del C.G.

Y; coordenada 2 del C.G.

$\sum (x*w)$ ; sumatoria de la multiplicación de las coordenadas 1 de los centros poblados considerados y su población.

$\sum (y*w)$ ; sumatoria de la multiplicación de las coordenadas 2 de los centros poblados considerados y su población.

$\sum w$ ; sumatoria de la población de los centros poblados considerados.

Los datos de población utilizados fueron las proyecciones al año 2009 realizadas por el INE para los principales centros poblados de la Región de Valparaíso.

### 1.2.1 Configuración de Escenarios de Destinación Final de RSD y RSAD

Con las consideraciones anteriores, se configuraron tres escenarios de asociatividad comunal de la región, según los centros de gravedad:

- Escenario 1: Un solo relleno sanitario ubicado en el centro de gravedad regional, ubicado entre las comunas de: Quillota, Limache, Villa Alemana, Quilpué, Concón y Viña del Mar (Ilustración 1-8).



**Ilustración 1-8 Mapa de Escenario 1.**

*Fuente: IASA, 2011.*

- Escenario 2a: Dos Rellenos Sanitarios; Dos Estaciones de Transferencia (Ilustración 1-9).
  - CG Sur: Casablanca, Asociatividad de San Antonio.
  - CG Centro: Asociatividades de Concón-Quintero Puchuncaví, Valparaíso, Quillota y Marga Marga.

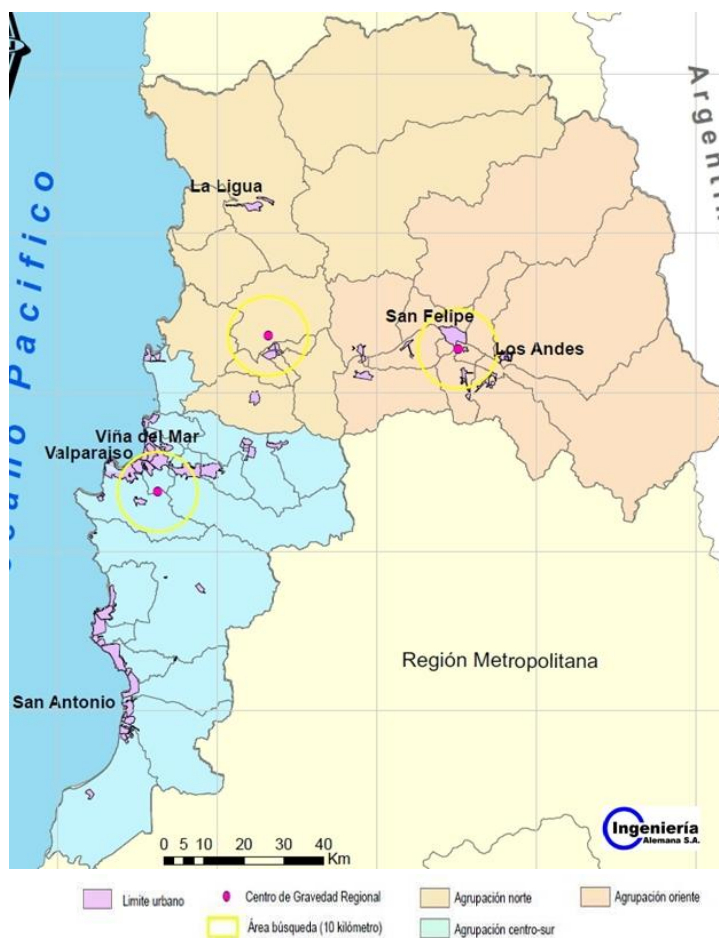
**Ilustración 1-9 Mapa Escenario 2a.**  
*Fuente: IASA, 2011.*



- Escenario 2b: Dos Rellenos Sanitarios; Dos Estaciones de Transferencia (Ilustración 1-10)
  - CG Norte: Asociatividades de Petorca y Quillota, comuna de Puchuncaví.
  - CG Centro: Comunas de Quintero y Concón, Asociatividades de Marga Marga.

Además de dos estaciones de transferencia:

- CG Oriente: Asociatividad de San Felipe-Los Andes
- CG Sur: Comuna de Casablanca, Asociatividad de San Antonio.



**Ilustración 1-10 Mapa Escenario 2b.**

*Fuente: IASA, 2011.*

- Escenario 3: Tres rellenos sanitarios interprovinciales, más una Estación de Transferencia (Ilustración 1-11).
  - CG Norte: Asociatividades de Petorca y Quillota, comuna de Puchuncaví.
  - CG Centro: Comunas de Quintero y Concón, Asociatividades de Marga Marga y Valparaíso.
  - CG Sur: Comuna de Casablanca, Asociatividad de San Antonio.

Además de una Estación de Transferencia:

- CG Oriente: Asociatividad de San Felipe-Los Andes.



**Ilustración 1-11 Mapa Escenario 3.**  
*Fuente: IASA, 2011.*

### 1.2.2 Análisis Económico de los Escenarios de Destinación final de RSD

Para la definición de una alternativa preliminar para el manejo de los residuos generados en la región, se realizó una evaluación económica tanto de la situación actual en el manejo de los residuos y como de los escenarios definidos anteriormente:

- Escenario 0: Situación actual;
- Escenario 1: 1 RS (CENTRO) + 1 ET (ORIENTE);
- Escenario 2a: 2 RS (SUR y CENTRO) + 2 ET (NORTE y ORIENTE);
- Escenario 2b: 2 RS (NORTE y CENTRO + 2 ET (SUR y ORIENTE);
- Escenario 3: 3 RS (SUR; NORTE y CENTRO) +1 ET (ORIENTE)

Se toma en consideración la existencia de asociaciones y proyectos, tales como Estación de Transferencia de la Asociación de Marga Marga y Casablanca (RCA). Estos escenarios fueron configurados sobre la base de la geografía, conectividad vial y pre-existencia de asociatividad en la región.

### 1.2.3 Evaluación de Escenarios de Destinación Final

Los escenarios a analizar corresponden a:

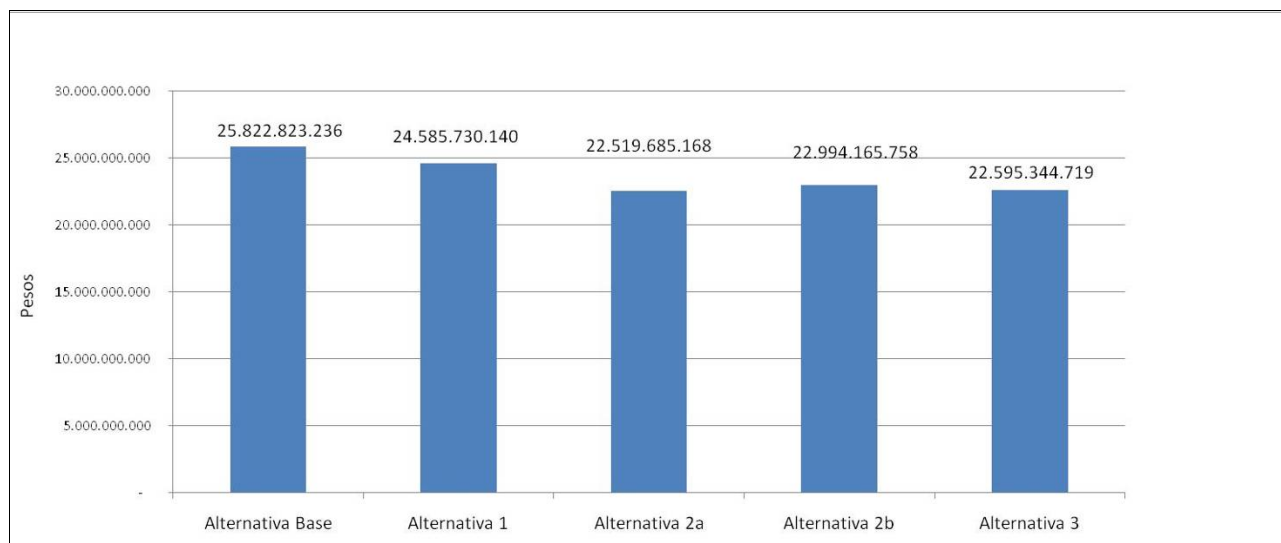
- Relleno Sanitario;
- Estación de Transferencia; con Centro de Manejo de Residuos.

Para efectos de la evaluación económica a nivel de perfil se realizó un análisis comparativo de los costos de transporte y disposición final para los cinco escenarios descritos. Esta abarca los costos estimados para; recolección, transporte, transferencia y los escenarios de disposición final de residuos estimados, cuantificados y proyectados en el estudio de anteproyecto. Igualmente se tomó en cuenta los costos por peaje en los distintos escenarios.

En el caso de la Estación de Transferencia del CG Oriente se consideró una disposición final fuera de la región, debido a su cercanía al relleno sanitario Lomas Los Colorados. Este primer paso del análisis pretende determinar de los escenarios propuestos la mejor opción para la disposición final, antes de optimizar las alternativas de transporte.

### 1.2.3.1 Evaluación Económica de Anteproyectos.

En el gráfico siguiente se presenta una síntesis de los resultados obtenidos en la estimación de los costos totales en el manejo anual de los residuos de la región.

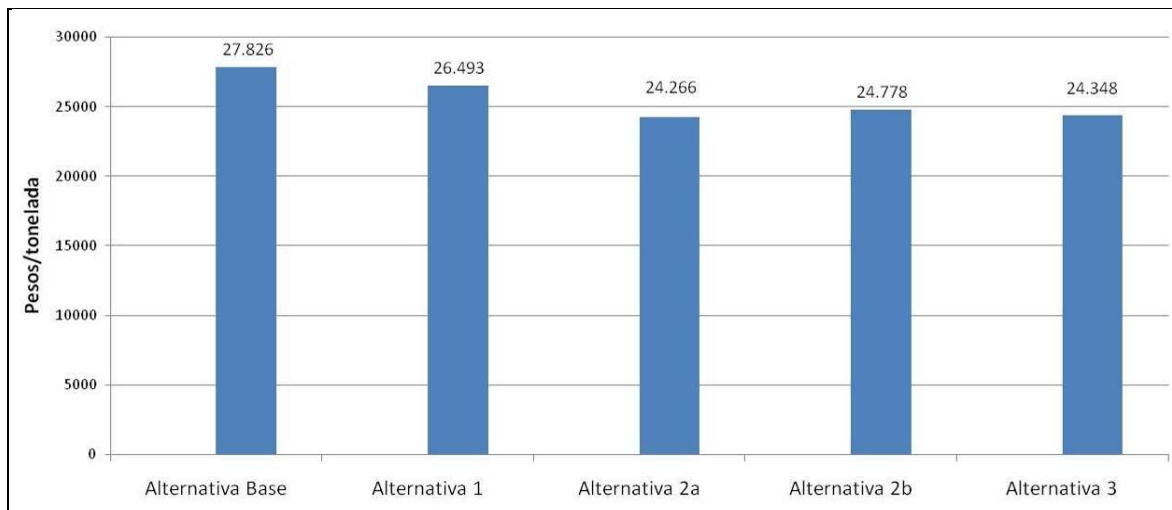


**Gráfico 1-3 Costos Anuales Según Alternativas Evaluadas.**

*Fuente: Elaboración propia, IASA 2011.*

De este mismo análisis propuesto se obtienen una estimación de costos por tonelada para cada uno de estos escenarios evaluados.

Como se desprende del Gráfico 1-3 y Gráfico 1-4 Alternativa “2a” es la más conveniente en cuanto a la destinación final de los RSU.



**Gráfico 1-4 Costos por Tonelada Residuos Según Alternativa.**

*Fuente: Elaboración propia, IASA 2011.*

En el Gráfico 1-5 se presentan los costos respectivos por tonelada por cada comuna, desglosados en costos de recolección, de transporte directo, transporte con camión tipo Ampliroll, de la estación de transferencia y de disposición. Los costos mancomunados como del equipo Ampliroll, de las estaciones de transferencia y del relleno sanitario se distribuye a las comunas según su participación con respecto a las toneladas involucradas. En términos generales, las comunas más grandes de Viña del Mar y Valparaíso tienen los menores costos por tonelada, lo que refleja la importancia de las economías de escala.

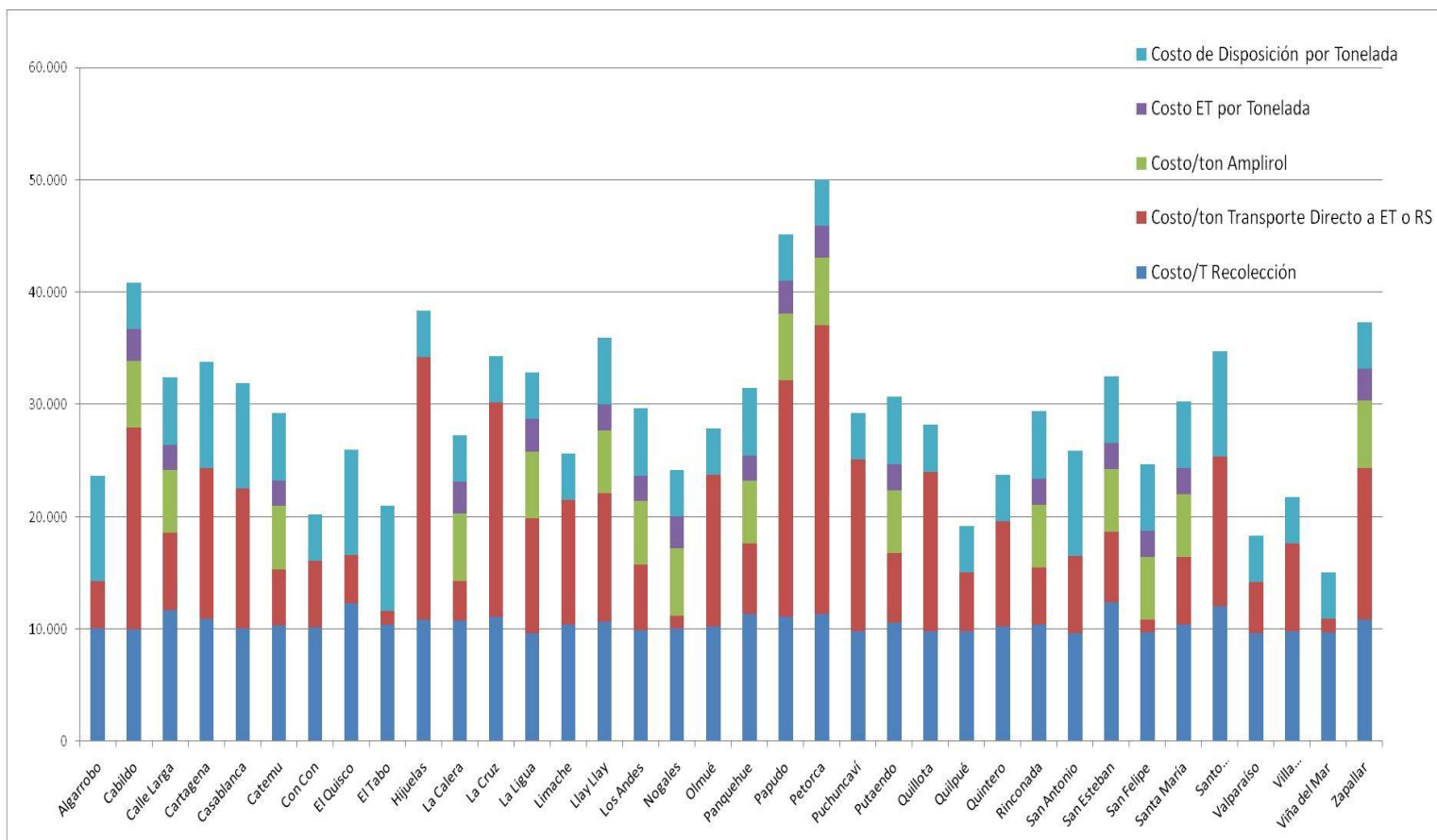
Finalmente se ofrece en el Gráfico 1-6 una comparación de los costos de disposición. Se compara los costos de disposición actuales por tonelada (columna azul), los costos de disposición actuales optimizados por tonelada para el año 2009 (columna roja), o sea la misma forma de disponer como hoy pero los sitios de disposición y sus costos convertidos en un relleno sanitario para las cantidades del 2020 y los costos de disposición de la alternativa mejor evaluada 2a anteriormente para las cantidades del 2020 (columna verde).

Los costos actuales de disposición sirven más bien como referencia. Comparables son los costos de las columnas rojas y los costos de las columnas verdes. Se aprecia en el gráfico que los costos de disposición de la alternativa propuesta 2a, siempre son más bajos que en el caso del escenario base optimizado, e incluso en muchos casos más económico que los costos de disposición actuales, lo que se debe a economías de escala.



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



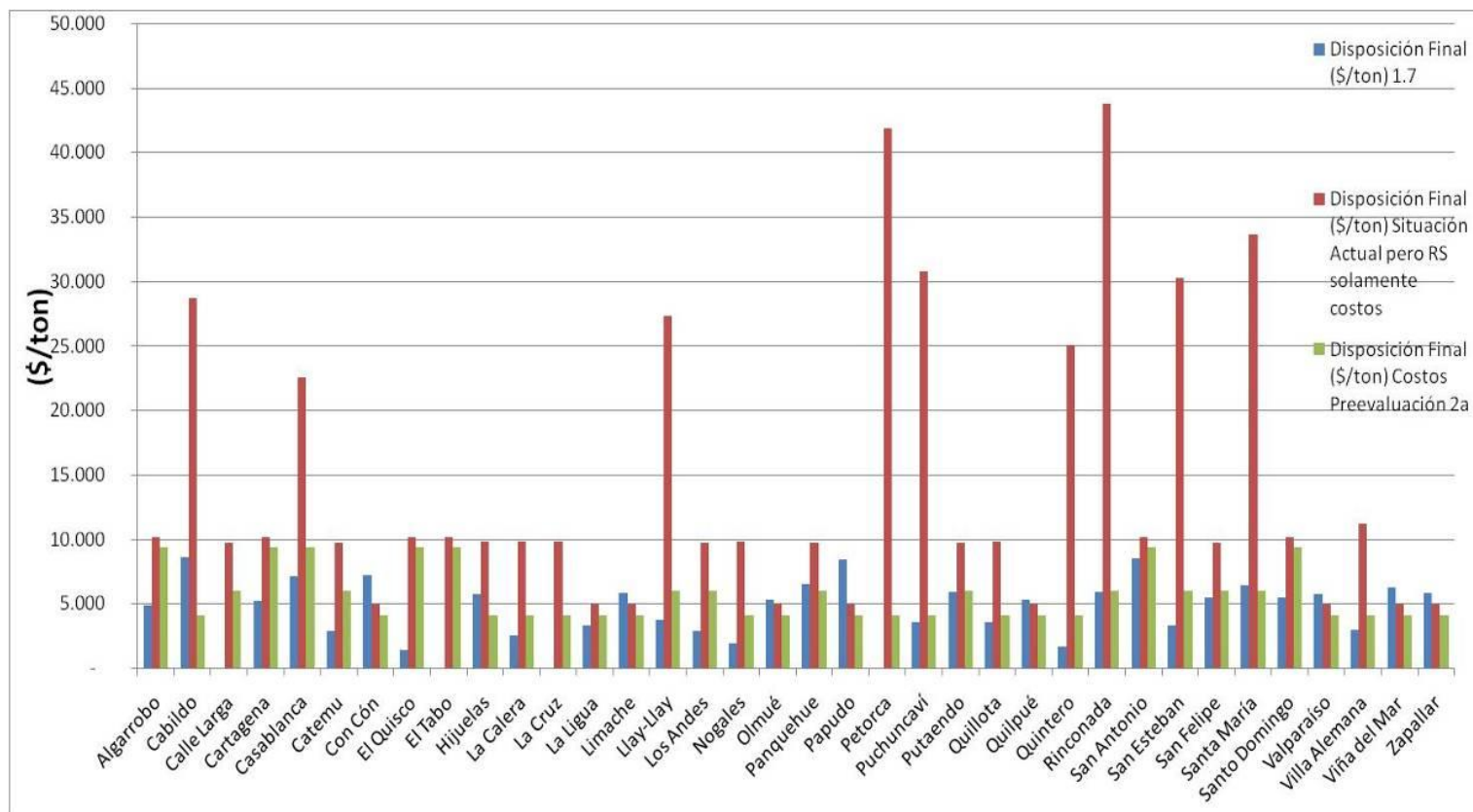
**Gráfico 1-5 Costos por Comuna, Desglosados por Tonelada de Residuos para el año 2020 para Análisis de Alternativa 2a.**

*Fuente: Elaboración propia, IASA 2011.*



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



**Gráfico 1-6 Comparación de Costos de Disposición Final.**

*Fuente: Elaboración propia, IASA 2011.*

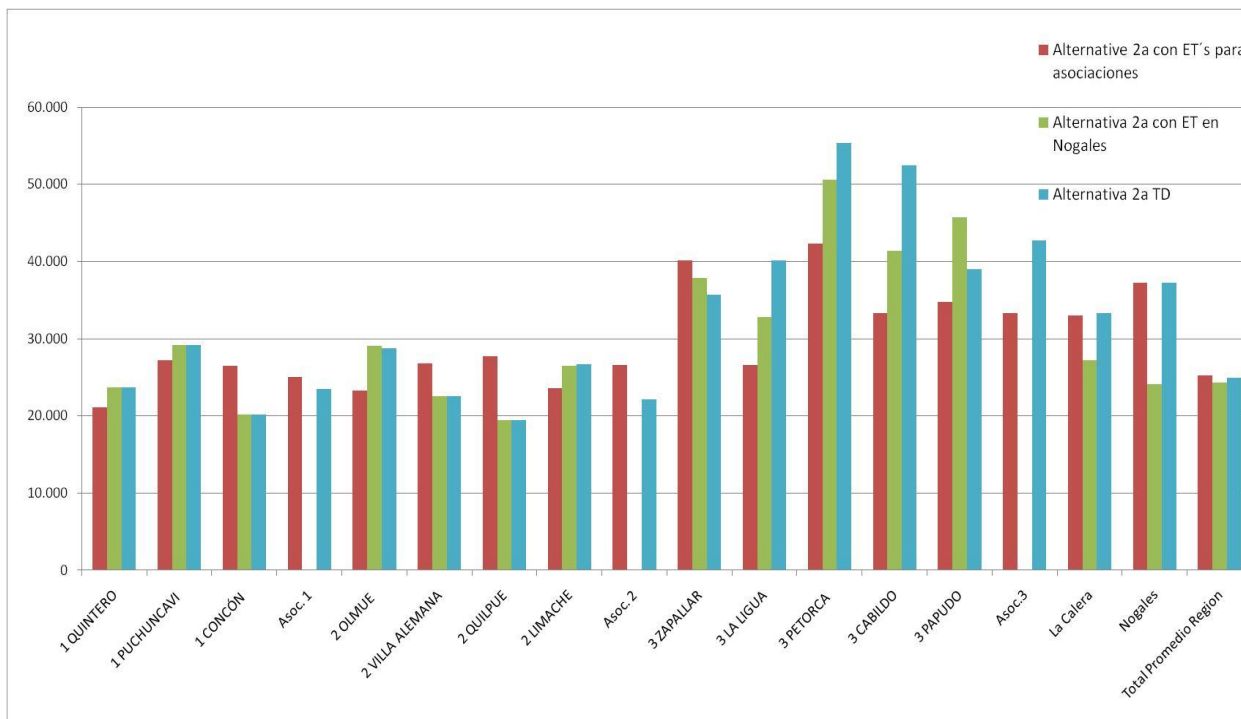
### **1.2.3.2 Evaluación Económica del Transporte.**

Después de haber evaluado en el punto anterior los lugares de disposición final (con el resultado de que la Escenario 2a es la más favorable), se analizarán las alternativas desde el punto de vista del transporte para un escenario modificado del tipo 2a, ya que debido a la recomendación de no tener una distancia de transporte de residuos mayor de 30 km se evaluará la situación agregando una ET más al escenario 2a original.

En el análisis se considera el transporte de las comunas de la zona norte a un RS Centro. Este escenario se muestra con Transporte Directo (TD), con una ET en el sector de Nogales (esto solo a modo de ejercicio, debido a lo central en la zona norte de la región) y con ET en cada asociación implicada. El resultado se presenta en el Gráfico 1-7.

Las tres estaciones de transferencias consideradas, son para las siguientes agrupaciones:

- ET Quintero, para las comunas de Quintero, Concón y Puchuncaví,
- ET Marga-Marga, para las comunas de Olmué, Limache, Villa Alemana y Quilpué,
- ET Petorca, para las comunas de La Ligua, Zapallar, Papudo, Petorca y Cabildo.



**Gráfico 1-7 Costos por Tonelada Según Alternativa.**

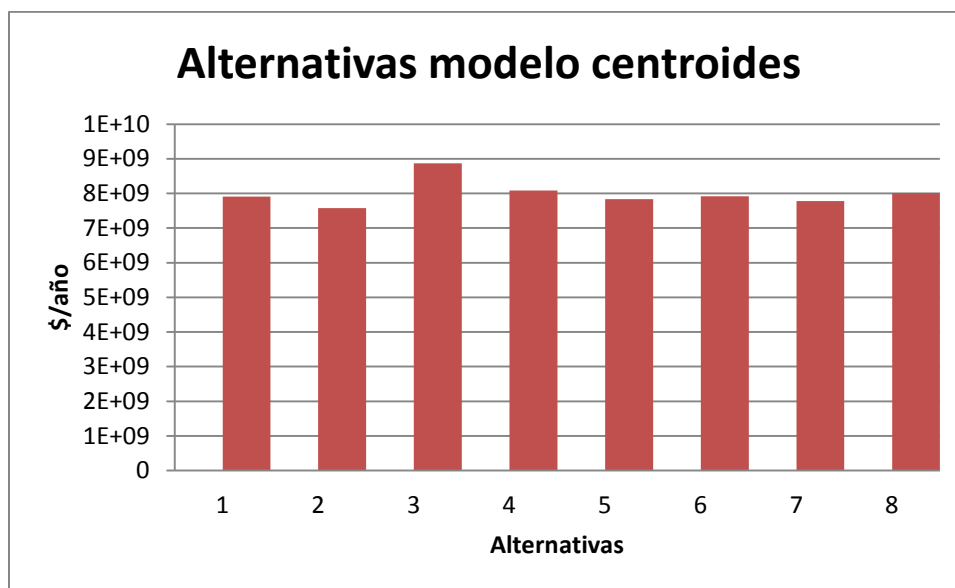
*Fuente: Elaboración propia, IASA 2011.*

Del gráfico presentado se desprende que con la ubicación del sitio de disposición final en el Centro de Gravedad Centro y las distancias resultantes para la Asociatividad de Petorca resulta económicamente conveniente una estación de transferencia. En el caso de la otras asociatividades resulta el transporte directo menos costoso con las distancias presentes, aunque cabe destacar que para la asociación Quintero en algunos casos si conviene instalar un ET en su zona, por lo que si finalmente el RS se instala más al sur o este de la zona de Valparaíso se podría instalar el ET Quintero.

## 2 Combinación de los resultados

Para obtener la alternativa más conveniente, se combinan los resultados obtenidos con los dos sistemas vistos anteriormente: Modelación Matemática y Sistema de Exclusión.

En el primer sistema se llegó a ocho soluciones finales, de las cuales la segunda es la más conveniente económicamente (Gráfico 2-1) y al ser obtenida por el algoritmo de los centroides asegura una locación ideal dada por los centros de gravedad poblacional.



**Gráfico 2-1 Alternativa Arrojadadas por Modelo de Centroides.**

*Fuente: Elaboración Propia 2011.*

La alternativa 2 de modelamiento matemático recomienda 3 RS y 5 ET, que se ven en la siguiente tabla:

**Tabla 2-1 Opción 2 de Modelo Matemático.**

| Rellenos Sanitarios  | Estación de Transferencia |
|----------------------|---------------------------|
| Valparaíso           | San Antonio               |
| San Felipe-Los Andes | Quillota                  |
| Marga-Marga          | Petorca                   |
|                      | Con-Con                   |
|                      | Casablanca                |

*Fuente: Elaboración Propia*

El sistema de exclusión en cambio, presenta la mejor alternativa dada por el análisis de sistema real de asociaciones comunales desde el punto de vista económico y por locación

Al comparar ambos resultados (Ilustración 2-1) se puede ver que hay gran coincidencia en lo que respecta a los Rellenos Sanitarios, ya que la alternativa 2a presenta dos rellenos (Sur y Centro) pero también hace uso del relleno Lomas Los Colorados (para residuos de San Felipe – Los Andes) lo que vendría a reemplazar al relleno San Felipe- Los Andes planteado por el modelo matemático, con esto se llega a dos rellenos en la región que es la opción planteada por exclusión, lo que por lo demás evita el monopolio comercial.

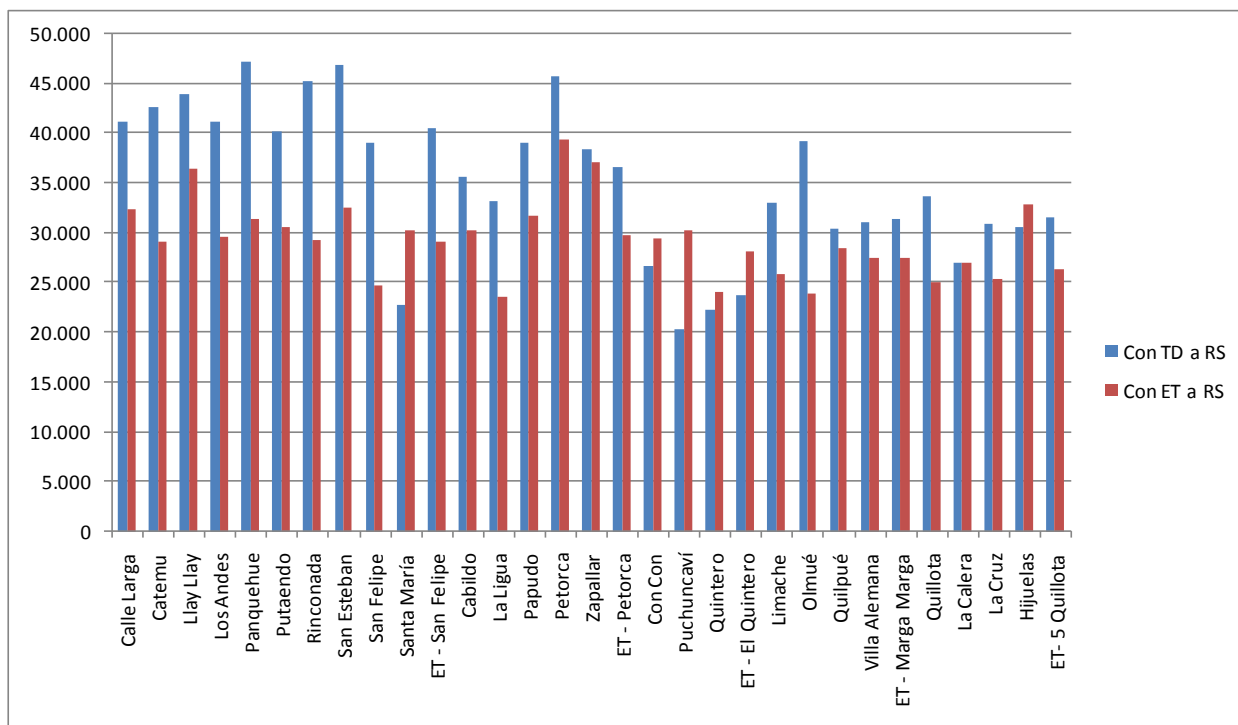
Respecto al relleno en Valparaíso planteado, se encuentra actualmente en funcionamiento Los Molles pero debido a la incertidumbre de su vida útil para el año 2020 se prefiere no considerarlo como una opción segura y considerar un gran RS centro como lo plantea la alternativa 2a. Sobre la posible localización de este gran RS en Marga-Marga, se debe decir que ya existe en tramitación una ET en esa zona por lo que el RS Centro se debe ubicar en el sector de Quintero que está dentro de la macro zona planteada por la alternativa 2a.

Referente a las estaciones de transferencias, el modelo matemático plantea 5 ET de las cuales Petorca coincide con la alternativa 2a y San Antonio sería remplazada por el RS Sur por las razones recién esbozadas. La ET de Casablanca es un caso especial ya que está en tramitación por lo que aunque no coincida totalmente con el sistema de exclusión se considera de todas maneras. Respecto a la estación con locación Con-Con se suple con el RS ubicado en las cercanías de Quintero. La opción de Quillota planteada por el modelo matemático se incorporará en el siguiente análisis.



**Ilustración 2-1 Solución Matemática y de Exclusión.**  
*Fuente: Elaboración Propia 2011.*

Para validar las alternativas recién planteadas de estaciones de transferencia, se compara para las 5 asociaciones, el Transporte Directo (TD) a Relleno Sanitario (RS) Centro (o Lomas Los Colorados en el caso de San Felipe) versus el paso por Estación de Transferencia (ET). Ante el escenario planteado, se obtienen los resultados mostrados en el siguiente gráfico.



**Gráfico 2-2 Costos por Tonelada de Disposición Directa Versus Disposición con Transferencia para Alternativa 2a Modificada.**

*Fuente: Elaboración propia, IASA 2011.*

Se observa en el Gráfico 2-2 que para el caso de las asociaciones de San Felipe; Petorca; Marga–Marga y Quillota, conviene económicamente la incorporación de una ET. Este resultado es contrario solo para la asociatividad de Quintero que debido a la cercanía del relleno sanitario no arroja una conveniencia económica en la incorporación de una estación de transferencia.

Con la información analizada se puede presentar como solución final y viable económicamente: dos Rellenos Sanitarios (Centro y Sur) más la utilización de Lomas Los Colorados. Para las Estaciones de Transferencia se plantea la necesidad de cuatro (San Felipe- Los Andes, Petorca, Marga-Marga y Quillota) más la incorporación al sistema de Casablanca que está en desarrollo.



**Tabla 2-2(A) Antecedentes para el cálculo de factor de aumento de distancia.**

| Nombre        | Vertedero           | Distancia recta [km] | Distancia recorrida (por caminos) [km] | Parámetro $\alpha$ |
|---------------|---------------------|----------------------|----------------------------------------|--------------------|
| Cabildo       | Cabildo             | 2,45                 | 3,00                                   | 1,22               |
| Algarrobo     | Cartagena           | 23,06                | 34,27                                  | 1,49               |
| Cartagena     | Cartagena           | 2,51                 | 2,60                                   | 1,04               |
| El Quisco     | Cartagena           | 19,00                | 31,13                                  | 1,64               |
| El Tabo       | Cartagena           | 11,67                | 22,81                                  | 1,95               |
| San Antonio   | Cartagena           | 4,38                 | 4,40                                   | 1,00               |
| Santo Domingo | Cartagena           | 9,44                 | 13,28                                  | 1,41               |
| Casablanca    | Casablanca          | 1,81                 | 1,90                                   | 1,05               |
| Petorca       | Chincolco           | 6,46                 | 7,42                                   | 1,15               |
| Con Con       | El Molle            | 19,84                | 29,71                                  | 1,50               |
| La ligua      | El Molle            | 80,16                | 123,13                                 | 1,54               |
| Limache       | El Molle            | 36,22                | 47,84                                  | 1,32               |
| Olmué         | El Molle            | 43,99                | 62,75                                  | 1,43               |
| Quilpué       | El Molle            | 19,85                | 33,22                                  | 1,67               |
| Valparaíso    | El Molle            | 4,57                 | 9,48                                   | 2,07               |
| Viña del Mar  | El Molle            | 12,61                | 20,97                                  | 1,66               |
| Calle Larga   | La Hormiga          | 18,83                | 25,70                                  | 1,36               |
| Catemu        | La Hormiga          | 24,66                | 34,62                                  | 1,40               |
| Los Andes     | La Hormiga          | 17,64                | 23,37                                  | 1,32               |
| Panquehue     | La Hormiga          | 14,09                | 17,13                                  | 1,22               |
| Putando       | La Hormiga          | 9,20                 | 9,50                                   | 1,03               |
| San Esteban   | La Hormiga          | 16,08                | 16,10                                  | 1,00               |
| San Felipe    | La Hormiga          | 4,40                 | 4,40                                   | 1,00               |
| Llay - Llay   | Lomas Los Colorados | 19,43                | 44,00                                  | 2,26               |
| Rinconada     | Lomas Los Colorados | 16,27                | 57,00                                  | 3,50               |
| Zapallar      | Lomas Los Colorados | 75,60                | 122,00                                 | 1,61               |
| Puchuncaví    | Puchuncaví          | 5,66                 | 7,00                                   | 1,24               |
| Quintero      | Quintero            | 3,08                 | 3,10                                   | 1,01               |
| Hijuelas      | San Pedro           | 24,04                | 33,52                                  | 1,39               |
| La Calera     | San Pedro           | 22,17                | 25,37                                  | 1,14               |
| La Cruz       | San Pedro           | 15,95                | 19,72                                  | 1,24               |
| Nogales       | San Pedro           | 26,42                | 32,19                                  | 1,22               |
| Papudo        | San Pedro           | 50,32                | 75,00                                  | 1,49               |



|               |               |       |       |      |
|---------------|---------------|-------|-------|------|
| Quillota      | San Pedro     | 10,66 | 12,40 | 1,16 |
| Santa María   | Tabolango     | 7,08  | 7,10  | 1,00 |
| Villa Alemana | Villa Alemana | 2,53  | 2,60  | 1,03 |

Fuente: IASA 2011.

Tabla 2-3 (B) Detalle del costo variable (camión de 19 m<sup>3</sup>)

**Costos variables de comunas a ET o RS directamente.**

| Consumos                                 | Unidad | Camión Recolector                         |                                           | Comentario   |
|------------------------------------------|--------|-------------------------------------------|-------------------------------------------|--------------|
|                                          |        | A                                         | B                                         |              |
|                                          |        | Camión de recolección (14m <sup>3</sup> ) | Camión de recolección (19m <sup>3</sup> ) |              |
| <b>Insumos</b>                           |        |                                           |                                           |              |
| Consumo de combustible en la recolección | \$/h   | 1,317                                     | 1,317                                     |              |
| Costos Mantención                        | \$/h   | 725                                       | 812                                       | basado en km |
| Costos Lubricante                        | \$/h   | 66                                        | 66                                        |              |
| Costos Neumáticos                        | \$/h   | 500                                       | 500                                       | basado en km |
| Otros                                    | \$/h   |                                           |                                           |              |
|                                          |        |                                           |                                           |              |
| <b>Subtotal</b>                          | \$/h   | <b>2,608</b>                              | <b>2,695</b>                              |              |
|                                          |        |                                           |                                           |              |
| Administración                           | 10%    | 261                                       | 269                                       |              |
| Imprevistos                              | 5%     | 130                                       | 135                                       |              |
| <b>Total</b>                             | \$/h   | <b>2,999</b>                              | <b>3,099</b>                              |              |
|                                          | \$/km  | <b>600</b>                                | <b>620</b>                                |              |

*Nota: Los valores no incluyen IVA*

Fuente: IASA 2011.



**Tabla 2-4 (C) Detalle del costo variable (camión de 70 m<sup>3</sup>)**

| CONSUMOS                                   | UNIDAD           | CAMION DE TRANSPORTE     |                          |
|--------------------------------------------|------------------|--------------------------|--------------------------|
|                                            |                  | C<br>(35m <sup>3</sup> ) | D<br>(70m <sup>3</sup> ) |
| <b>Insumos</b>                             |                  |                          |                          |
| Consumo de Combustible para Transporte     | \$/km            | 174                      | 262                      |
| Costos Mantención                          | \$/km            | 49                       | 63                       |
| Costos Lubricante                          | \$/km            | 9                        | 13                       |
| Costos Neumáticos                          | \$/km            | 38                       | 60                       |
| Otros (horas extra por transporte directo) | \$/km            |                          |                          |
|                                            |                  |                          |                          |
| <b>Subtotal</b>                            | \$/km            | <b>269</b>               | <b>398</b>               |
|                                            |                  |                          |                          |
| Administración                             | 10%              | 27                       | 40                       |
| Imprevistos                                | 5%               | 13                       | 20                       |
|                                            |                  |                          |                          |
| <b>Costos por km</b>                       | <b>\$/km</b>     | <b>309</b>               | <b>458</b>               |
| <b>Costos Var por km y t de residuos</b>   | <b>\$/km - t</b> | <b>33</b>                | <b>24</b>                |

*Nota: Los valores no incluyen IVA*

*Fuente: IASA 2011.*



**Tabla 2-5 (D) Costos fijos de vehículos de recolección y transporte.**

|    | ITEM                              | UNIDAD     | CANTIDAD (Un.) | CAMION DE RECOLECCIÓN (c/ compactación) |                          | CANT. (Un.) | CAMION DE TRANSPORTE                         |                                              |
|----|-----------------------------------|------------|----------------|-----------------------------------------|--------------------------|-------------|----------------------------------------------|----------------------------------------------|
|    |                                   |            |                | A<br>(19m <sup>3</sup> )                | B<br>(14m <sup>3</sup> ) |             | C<br>(s/<br>remolque)<br>(35m <sup>3</sup> ) | D<br>(c/<br>remolque)<br>(70m <sup>3</sup> ) |
| 1. | <b>Costos de Capital</b>          |            |                |                                         |                          |             |                                              |                                              |
|    | Inversión                         | \$         |                | 64,960,000                              | 58,000,000               |             | 64,960,000                                   | 83,460,000                                   |
|    | Depreciación vehículo             |            |                |                                         |                          |             |                                              |                                              |
|    | Tasa de interés (i)               | %          |                | 8.0%                                    | 8.0%                     |             | 8.0%                                         | 8.0%                                         |
|    | Años (n)                          | años       |                | 5.0                                     | 5.0                      |             | 5.0                                          | 5.0                                          |
|    | Anualidad (a)                     | \$/año     |                | 1,355,804                               | 1,210,540                |             | 1,355,804                                    | 1,741,925                                    |
|    | <b>Subtotal 1</b>                 | \$/año     |                | <b>1,355,804</b>                        | <b>1,210,540</b>         |             | <b>1,355,804</b>                             | <b>1,741,925</b>                             |
| 2. | <b>Personal</b>                   |            |                |                                         |                          |             |                                              |                                              |
|    | Jefe de Operaciones, Ingeniero    | hombre-mes | 0.0            | 0                                       | 0                        | 0.0         | 0                                            | 0                                            |
|    | Supervisor                        | hombre-mes | 0.2            | 108,000                                 | 108,000                  | 0.2         | 108,000                                      | 108,000                                      |
|    | Mecánico                          | hombre-mes | 0.2            | 108,000                                 | 108,000                  | 0.2         | 108,000                                      | 108,000                                      |
|    | Chofer – camión                   | hombre-mes | 1.0            | 420,000                                 | 420,000                  | 1.0         | 420,000                                      | 420,000                                      |
|    | Peoneta                           | hombre-mes | 2.78           | 533,333                                 | 533,333                  | 0.0         | 0                                            | 0                                            |
|    | Ayudante (del mecánico)           | hombre-mes | 0.2            | 38,400                                  | 38,400                   | 0.0         | 0                                            | 0                                            |
|    | Secretaria                        | hombre-mes | 0.2            | 48,000                                  | 48,000                   | 0.2         | 48,000                                       | 48,000                                       |
|    | Guardia/vigilante                 | hombre-mes | 0.2            | 43,200                                  | 43,200                   | 0.2         | 43,200                                       | 43,200                                       |
|    | Electricista                      | hombre-mes | 0.2            | 96,000                                  | 96,000                   | 0.2         | 96,000                                       | 96,000                                       |
|    | Otro (personal de respaldo)       | hombre-mes | 0.0            |                                         |                          |             |                                              |                                              |
|    | <b>Subtotal 2</b>                 |            |                | <b>1,394,933</b>                        | <b>1,394,933</b>         |             | <b>823,200</b>                               | <b>823,200</b>                               |
| 3. | <b>Otros</b>                      |            |                |                                         |                          |             |                                              |                                              |
|    | Camioneta                         |            | 0.2            | 90,000                                  | 90,000                   | 0.2         | 90,000                                       | 90,000                                       |
|    | Arriendo patio de estacionamiento | \$/mes     | 0.2            | 60,000                                  | 60,000                   | 0.2         | 60,000                                       | 60,000                                       |
|    | Seguro voluntario                 | \$/mes     | 1              | 52,500                                  | 52,500                   | 1           | 52,500                                       | 52,500                                       |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



|                                         |                   |              |                  |                  |   |                  |                  |
|-----------------------------------------|-------------------|--------------|------------------|------------------|---|------------------|------------------|
| Revision técnica                        | \$/mes            | 1            | 3,333            | 3,333            | 1 | 5,000            | 6,667            |
| Seguro Obligatorio                      | \$/mes            | 1            | 1,250            | 1,250            | 1 | 1,250            | 1,250            |
| Patente                                 | \$/mes            | 1            | 6,000            | 6,000            | 1 | 7,200            | 8,400            |
| Artículos de seguridad                  | \$/mes            | 3            | 15,000           | 15,000           | 1 | 5,000            | 5,000            |
| <b>Subtotal 3</b>                       |                   |              | <b>228,083</b>   | <b>228,083</b>   |   | <b>220,950</b>   | <b>223,817</b>   |
| <b>Total</b>                            | <b>\$/mes</b>     |              | <b>2,978,821</b> | <b>2,833,556</b> |   | <b>2,399,954</b> | <b>2,788,941</b> |
| Administración                          | \$/mes            | 10%          | 297,882          | 283,356          |   | 239,995          | 278,894          |
| Imprevistos                             | \$/mes            | 5%           | 148,941          | 141,678          |   | 119,998          | 139,447          |
| <b>GRAN TOTAL</b>                       | <b>\$/mes</b>     |              | <b>3,425,644</b> | <b>3,258,590</b> |   | <b>2,759,947</b> | <b>3,207,283</b> |
| <b>COSTO / SEMANA</b>                   | <b>\$/ semana</b> | <b>4.3</b>   | <b>799,317</b>   | <b>760,338</b>   |   | <b>643,988</b>   | <b>748,366</b>   |
| <b>COSTO / DÍA</b>                      | <b>\$/día</b>     | <b>22</b>    | <b>155,711</b>   | <b>148,118</b>   |   | <b>125,452</b>   | <b>145,786</b>   |
| <b>COSTO/HORA Recolec.(6 días/sem.)</b> | <b>\$/hora</b>    | <b>231.4</b> | <b>14,802</b>    | <b>14,080</b>    |   |                  |                  |
| <b>COSTO/HORA Transp.(6 días/Sem)</b>   | <b>\$/hora</b>    | <b>289.3</b> |                  |                  |   | <b>11,926</b>    | <b>11,087</b>    |

Fuente: IASA 2011.



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Evaluación Económica de las Alternativas de Manejo de Residuos con Transporte por Estación de Transferencia a Relleno  
Sanitario Loma los Colorados

TABLA N°1: ALTERNATIVA 0: Escenario Actual, disposición final en Relleno Sanitario Actual

| N°   | Comuna        | Población<br>2020 | Cantidad RSU<br>2020 | Kilometros<br>lineales a ET<br>o RS | Número<br>de Peajes<br>en Ruta | Recolección |           | Transporte | Transporte | Tiempos<br>muertos | Vueltas | Numero de<br>Camiones<br>Recolector<br>es | Ocupaciones | Peaje      | Costo Variable<br>Recolectores +<br>TD |
|------|---------------|-------------------|----------------------|-------------------------------------|--------------------------------|-------------|-----------|------------|------------|--------------------|---------|-------------------------------------------|-------------|------------|----------------------------------------|
|      |               | [hab.]            | [ton/año]            | [km]                                | Unidades                       | [hrs./año]  | [km/año]  | [h/año]    | [km/año]   | [hrs./año]         | sem     | Unidades                                  | %           | [Ch\$/año] | [Ch\$/año]                             |
| 1    | Algarrobo     | 17.420            | 7.158                | 34                                  | 1                              | 3.579       | 17.896    | 2.376      | 71.276     | 520                | 20      | 2                                         | 75%         | 4.160.000  | 38.411.818                             |
| 2    | Cabildo       | 21.804            | 6.295                | 3                                   | 1                              | 3.147       | 15.736    | 177        | 5.304      | 442                | 17      | 2                                         | 65%         | 3.536.000  | 11.785.574                             |
| 3    | Calle Larga   | 11.086            | 5.465                | 26                                  | 1                              | 2.733       | 13.664    | 1.337      | 40.099     | 390                | 15      | 2                                         | 57%         | 3.120.000  | 23.838.298                             |
| 4    | Cartagena     | 32.953            | 13.542               | 0                                   | 1                              | 6.771       | 33.854    | 0          | 0          | 962                | 37      | 3                                         | 93%         | 7.696.000  | 20.980.422                             |
| 5    | Casablanca    | 36.634            | 15.055               | 1                                   | 1                              | 7.527       | 37.637    | 142        | 4.264      | 1.066              | 41      | 4                                         | 77%         | 8.528.000  | 24.959.546                             |
| 6    | Catemu        | 13.606            | 6.708                | 35                                  | 1                              | 3.354       | 16.771    | 2.160      | 64.802     | 468                | 18      | 2                                         | 70%         | 3.744.000  | 35.233.402                             |
| 7    | Con Con       | 93.336            | 45.653               | 30                                  | 1                              | 22.827      | 114.133   | 12.565     | 376.957    | 3.172              | 122     | 11                                        | 86%         | 25.376.000 | 215.226.470                            |
| 8    | El Quisco     | 21.332            | 8.765                | 31                                  | 1                              | 4.383       | 21.913    | 2.590      | 77.705     | 624                | 24      | 2                                         | 92%         | 4.992.000  | 43.366.051                             |
| 9    | El Tabo       | 16.217            | 32.787               | 23                                  | 1                              | 16.393      | 81.966    | 6.959      | 208.773    | 2.288              | 88      | 8                                         | 85%         | 18.304.000 | 130.823.962                            |
| 10   | Hijuelas      | 20.641            | 10.177               | 34                                  | 1                              | 5.089       | 25.443    | 3.253      | 97.597     | 728                | 28      | 3                                         | 71%         | 5.824.000  | 53.178.266                             |
| 11   | La Calera     | 56.954            | 24.227               | 25                                  | 1                              | 12.114      | 60.568    | 5.718      | 171.525    | 1.690              | 65      | 6                                         | 84%         | 13.520.000 | 103.284.553                            |
| 12   | La Cruz       | 18.230            | 7.491                | 20                                  | 1                              | 3.746       | 18.729    | 1.436      | 43.071     | 546                | 21      | 2                                         | 78%         | 4.368.000  | 28.116.555                             |
| 13   | La Ligua      | 41.747            | 22.646               | 123                                 | 1                              | 11.323      | 56.615    | 26.037     | 781.124    | 1.586              | 61      | 6                                         | 83%         | 12.688.000 | 334.505.115                            |
| 14   | Limache       | 48.868            | 20.523               | 48                                  | 1                              | 10.262      | 51.308    | 9.121      | 273.634    | 1.430              | 55      | 5                                         | 86%         | 11.440.000 | 136.686.357                            |
| 15   | Llay Llay     | 24.125            | 9.915                | 12                                  | 1                              | 4.957       | 24.786    | 1.123      | 33.696     | 702                | 27      | 3                                         | 68%         | 5.616.000  | 28.277.306                             |
| 16   | Los Andes     | 85.279            | 33.402               | 23                                  | 1                              | 16.701      | 83.506    | 7.292      | 218.762    | 2.340              | 90      | 8                                         | 87%         | 18.720.000 | 135.607.040                            |
| 17   | Nogales       | 28.752            | 17.040               | 32                                  | 1                              | 8.520       | 42.601    | 5.133      | 153.991    | 1.196              | 46      | 4                                         | 89%         | 9.568.000  | 85.428.733                             |
| 18   | Olmue         | 17.216            | 7.138                | 63                                  | 1                              | 3.569       | 17.845    | 4.351      | 130.529    | 520                | 20      | 2                                         | 76%         | 4.160.000  | 61.093.089                             |
| 19   | Panquehue     | 8.010             | 2.889                | 17                                  | 1                              | 1.444       | 7.222     | 475        | 14.256     | 208                | 8       | 1                                         | 60%         | 1.664.000  | 9.939.960                              |
| 20   | Papudo        | 6.174             | 5.307                | 99                                  | 1                              | 2.653       | 13.267    | 5.169      | 155.064    | 390                | 15      | 2                                         | 58%         | 3.120.000  | 67.661.049                             |
| 21   | Petorca       | 9.680             | 6.190                | 7                                   | 1                              | 3.095       | 15.475    | 437        | 13.125     | 442                | 17      | 2                                         | 64%         | 3.536.000  | 14.621.352                             |
| 22   | Puchuncaví    | 18.741            | 25.534               | 7                                   | 1                              | 12.767      | 63.834    | 1.674      | 50.232     | 1.794              | 69      | 6                                         | 88%         | 14.352.000 | 58.814.950                             |
| 23   | Putendo       | 18.803            | 9.271                | 10                                  | 1                              | 4.636       | 23.178    | 824        | 24.710     | 650                | 25      | 3                                         | 64%         | 5.200.000  | 23.835.806                             |
| 24   | Quillota      | 94.718            | 57.603               | 12                                  | 1                              | 28.802      | 144.008   | 6.619      | 198.583    | 4.004              | 154     | 13                                        | 91%         | 32.032.000 | 165.367.412                            |
| 25   | Quilpué       | 185.176           | 62.505               | 33                                  | 1                              | 31.253      | 156.263   | 19.233     | 576.999    | 4.342              | 167     | 15                                        | 87%         | 34.736.000 | 318.016.006                            |
| 26   | Quintero      | 29.063            | 30.534               | 3                                   | 1                              | 15.267      | 76.335    | 853        | 25.584     | 2.132              | 82      | 7                                         | 90%         | 17.056.000 | 57.114.486                             |
| 27   | Rinconada     | 8.775             | 3.315                | 12                                  | 1                              | 1.658       | 8.288     | 374        | 11.232     | 234                | 9       | 1                                         | 69%         | 1.872.000  | 9.441.661                              |
| 28   | San Antonio   | 104.877           | 65.314               | 4                                   | 1                              | 32.657      | 163.286   | 2.358      | 70.743     | 4.550              | 175     | 15                                        | 90%         | 36.400.000 | 128.311.330                            |
| 29   | San Esteban   | 19.414            | 7.978                | 12                                  | 1                              | 3.989       | 19.945    | 915        | 27.456     | 572                | 22      | 2                                         | 83%         | 4.576.000  | 22.884.685                             |
| 30   | San Felipe    | 86.449            | 35.527               | 1                                   | 1                              | 17.763      | 88.817    | 423        | 12.685     | 2.470              | 95      | 8                                         | 91%         | 19.760.000 | 59.905.356                             |
| 31   | Santa María   | 15.428            | 6.339                | 42                                  | 1                              | 3.170       | 15.848    | 2.498      | 74.936     | 442                | 17      | 2                                         | 67%         | 3.536.000  | 38.545.970                             |
| 32   | Santo Domingo | 10.213            | 4.196                | 13                                  | 1                              | 2.098       | 10.490    | 553        | 16.576     | 312                | 12      | 1                                         | 87%         | 2.496.000  | 12.855.100                             |
| 33   | Valparaíso    | 253.877           | 110.200              | 9                                   | 1                              | 55.100      | 275.501   | 9.694      | 290.815    | 7.670              | 295     | 25                                        | 91%         | 61.360.000 | 282.212.093                            |
| 34   | Villa Alemana | 163.329           | 55.697               | 12                                  | 1                              | 27.849      | 139.243   | 6.198      | 185.952    | 3.874              | 149     | 13                                        | 88%         | 30.992.000 | 157.572.732                            |
| 35   | Viña del Mar  | 280.140           | 136.570              | 21                                  | 1                              | 68.285      | 341.425   | 26.531     | 795.925    | 9.490              | 365     | 31                                        | 91%         | 75.920.000 | 516.685.743                            |
| 36   | Zapallar      | 8.455             | 9.057                | 90                                  | 1                              | 4.528       | 22.642    | 7.825      | 234.751    | 650                | 25      | 3                                         | 65%         | 5.200.000  | 104.016.262                            |
| 2020 | Año 2020      | 1.927.522         | 928.015              | 969                                 | 36                             | 464.008     | 2.320.039 | 184.424    | 5.532.731  | 64.896             | 2.496   | 225                                       | 79%         | 59.168.000 | 3.558.604.510                          |



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### Continuación TABLA N°1: ALTERNATIVA 0

| N°   | Comuna        | Costo Fijo<br>Recolectores +<br>TD | Costo Variable<br>Recolección | Costo Fijo<br>Recolección | Costo Variable<br>Transporte | Costo Fijo<br>Transporte | Total Costo<br>Rec.+ Transport<br>+ Peaje | Costo/T Rec.,<br>Peaje y<br>Transporte | Costo/ton<br>Recolección | Costo/ton<br>Transporte | Costo de<br>Disposición<br>por Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+Dis. | Costo/T<br>Rec.+Trans.+E<br>T+Disp. |
|------|---------------|------------------------------------|-------------------------------|---------------------------|------------------------------|--------------------------|-------------------------------------------|----------------------------------------|--------------------------|-------------------------|-----------------------------------------|----------------------------------|---------------------------------|-------------------------------------|
|      |               | [Ch\$/año]                         | [Ch\$/año]                    | [Ch\$/año]                | [Ch\$/año]                   | [Ch\$/año]               | [Ch\$/año]                                | [Ch\$/ton]                             | [Ch\$/ton]               | [Ch\$/ton]              | [Ch\$/t]                                | [Ch\$/año]                       | [Ch\$/año]                      | [Ch\$/ton]                          |
| 1    | Algarrobo     | 127.406.274                        | 11.090.520                    | 70.425.262                | 27.321.297                   | 56.981.011               | 169.978.091                               | 23.746                                 | 23.165                   | 11.777                  | 10.150                                  | 72.656.719                       | 242.634.810                     | 33.896                              |
| 2    | Cabildo       | 86.123.780                         | 9.752.456                     | 71.972.958                | 2.033.119                    | 14.150.823               | 101.445.355                               | 16.116                                 | 15.555                   | 2.571                   | 28.677                                  | 180.509.731                      | 281.955.086                     | 44.793                              |
| 3    | Calle Larga   | 115.754.704                        | 8.467.790                     | 70.935.369                | 15.370.508                   | 44.819.335               | 142.713.002                               | 26.112                                 | 25.541                   | 11.013                  | 9.711                                   | 53.076.008                       | 195.789.010                     | 35.823                              |
| 4    | Cartagena     | 123.323.187                        | 20.980.422                    | 107.981.094               | 0                            | 15.342.093               | 151.999.609                               | 11.225                                 | 10.656                   | 1.133                   | 10.150                                  | 137.447.893                      | 289.447.502                     | 21.375                              |
| 5    | Casablanca    | 167.058.460                        | 23.325.078                    | 143.954.197               | 1.634.468                    | 23.104.263               | 200.546.006                               | 13.321                                 | 12.755                   | 1.643                   | 22.523                                  | 339.086.246                      | 539.632.252                     | 35.844                              |
| 6    | Catemu        | 126.298.825                        | 10.393.670                    | 70.814.876                | 24.839.731                   | 55.483.949               | 165.276.226                               | 24.637                                 | 24.079                   | 11.973                  | 9.711                                   | 65.147.406                       | 230.423.633                     | 34.348                              |
| 7    | Con Con       | 660.093.686                        | 70.732.177                    | 390.720.884               | 144.494.293                  | 269.372.802              | 900.696.156                               | 19.729                                 | 19.173                   | 9.065                   | 4.986                                   | 227.605.013                      | 1.128.301.169                   | 24.715                              |
| 8    | El Quisco     | 122.634.852                        | 13.580.270                    | 70.748.447                | 29.785.781                   | 51.886.405               | 170.992.903                               | 19.508                                 | 18.939                   | 9.318                   | 10.150                                  | 88.967.681                       | 259.960.584                     | 29.658                              |
| 9    | El Tabo       | 445.832.842                        | 50.797.388                    | 285.044.778               | 80.026.575                   | 160.788.064              | 594.960.805                               | 18.147                                 | 17.588                   | 7.345                   | 10.150                                  | 332.786.151                      | 927.746.956                     | 28.297                              |
| 10   | Hijuelas      | 188.779.149                        | 15.767.697                    | 105.913.386               | 37.410.569                   | 82.865.764               | 247.781.415                               | 24.347                                 | 23.775                   | 11.818                  | 9.792                                   | 99.653.970                       | 347.435.386                     | 34.139                              |
| 11   | La Calera     | 344.058.280                        | 37.535.922                    | 213.501.098               | 65.748.631                   | 130.557.183              | 460.862.833                               | 19.023                                 | 18.465                   | 8.103                   | 9.792                                   | 237.232.090                      | 698.094.924                     | 28.815                              |
| 12   | La Cruz       | 108.508.385                        | 11.606.854                    | 70.964.625                | 16.509.701                   | 37.543.760               | 140.992.939                               | 18.820                                 | 18.237                   | 7.215                   | 9.792                                   | 73.356.880                       | 214.349.819                     | 28.612                              |
| 13   | La Ligua      | 697.254.147                        | 35.086.248                    | 202.714.185               | 299.418.868                  | 494.539.963              | 1.044.447.263                             | 46.121                                 | 45.560                   | 35.060                  | 4.986                                   | 112.902.023                      | 1.157.349.286                   | 51.106                              |
| 14   | Limache       | 356.613.813                        | 31.797.569                    | 175.827.030               | 104.888.787                  | 180.786.783              | 504.740.169                               | 24.593                                 | 24.036                   | 13.920                  | 4.986                                   | 102.319.573                      | 607.059.742                     | 29.579                              |
| 15   | Lluy Lluy     | 146.827.802                        | 15.361.022                    | 107.315.734               | 12.916.283                   | 39.512.068               | 180.721.108                               | 18.228                                 | 17.661                   | 5.288                   | 27.358                                  | 271.241.917                      | 451.963.025                     | 45.586                              |
| 16   | Los Andes     | 449.070.964                        | 51.751.623                    | 284.811.818               | 83.855.418                   | 164.259.146              | 603.398.004                               | 18.064                                 | 17.504                   | 7.428                   | 9.711                                   | 324.378.575                      | 927.776.580                     | 27.776                              |
| 17   | Nogales       | 246.949.968                        | 26.401.398                    | 141.695.378               | 59.027.335                   | 105.254.590              | 341.946.701                               | 20.067                                 | 19.505                   | 9.641                   | 9.792                                   | 166.860.400                      | 508.807.101                     | 29.859                              |
| 18   | Olmue         | 163.885.306                        | 11.059.133                    | 69.301.986                | 50.033.956                   | 94.583.320               | 229.138.395                               | 32.101                                 | 31.519                   | 20.260                  | 4.986                                   | 35.586.549                       | 264.724.944                     | 37.087                              |
| 19   | Panquehue     | 52.427.124                         | 4.475.527                     | 35.591.800                | 5.464.433                    | 16.835.324               | 64.031.084                                | 22.166                                 | 21.590                   | 7.720                   | 9.711                                   | 28.052.551                       | 92.083.635                      | 31.878                              |
| 20   | Papudo        | 209.958.431                        | 8.222.216                     | 67.839.611                | 59.438.833                   | 142.118.819              | 280.739.480                               | 52.901                                 | 52.313                   | 37.980                  | 4.986                                   | 26.457.798                       | 307.197.278                     | 57.886                              |
| 21   | Petorca       | 92.005.186                         | 9.590.458                     | 71.646.095                | 5.030.894                    | 20.359.092               | 110.162.538                               | 17.797                                 | 17.226                   | 4.102                   | 41.850                                  | 259.053.576                      | 369.216.114                     | 59.647                              |
| 22   | Puchuncaví    | 273.959.056                        | 39.560.121                    | 215.431.880               | 19.254.830                   | 58.527.176               | 347.126.006                               | 13.595                                 | 13.033                   | 3.046                   | 30.771                                  | 785.683.803                      | 1.132.809.809                   | 44.366                              |
| 23   | Putendo       | 141.804.001                        | 14.364.196                    | 107.598.519               | 9.471.610                    | 34.205.482               | 170.839.807                               | 18.427                                 | 17.866                   | 4.711                   | 9.711                                   | 90.034.613                       | 260.874.420                     | 28.138                              |
| 24   | Quilota       | 637.940.011                        | 89.246.792                    | 466.041.087               | 76.120.620                   | 171.898.925              | 835.339.424                               | 14.502                                 | 13.946                   | 4.306                   | 9.792                                   | 564.051.768                      | 1.399.391.191                   | 24.294                              |
| 25   | Quilpué       | 932.995.391                        | 96.841.776                    | 531.819.424               | 221.174.230                  | 401.175.968              | 1.285.747.397                             | 20.570                                 | 20.014                   | 9.957                   | 4.986                                   | 311.621.592                      | 1.597.368.989                   | 25.556                              |
| 26   | Quintero      | 301.365.745                        | 47.307.678                    | 252.082.212               | 9.806.808                    | 49.283.533               | 375.536.231                               | 12.299                                 | 11.740                   | 1.935                   | 25.086                                  | 765.987.848                      | 1.141.524.080                   | 37.385                              |
| 27   | Rinconada     | 48.921.496                         | 5.136.233                     | 35.786.284                | 4.305.428                    | 13.135.212               | 60.235.157                                | 18.170                                 | 17.605                   | 5.261                   | 43.807                                  | 145.224.014                      | 205.459.171                     | 61.976                              |
| 28   | San Antonio   | 654.313.423                        | 101.194.111                   | 540.070.198               | 27.117.219                   | 114.243.225              | 819.024.753                               | 12.540                                 | 11.982                   | 2.164                   | 10.150                                  | 662.947.453                      | 1.481.972.206                   | 22.690                              |
| 29   | San Esteban   | 98.057.109                         | 12.360.306                    | 71.426.747                | 10.524.379                   | 26.630.362               | 125.517.794                               | 15.733                                 | 15.160                   | 4.657                   | 30.269                                  | 241.483.183                      | 367.000.977                     | 46.003                              |
| 30   | San Felipe    | 335.500.397                        | 55.043.114                    | 288.514.999               | 4.862.242                    | 46.985.399               | 415.165.753                               | 11.686                                 | 11.130                   | 1.459                   | 9.711                                   | 345.009.607                      | 760.175.360                     | 21.397                              |
| 31   | Santa María   | 135.942.886                        | 9.821.684                     | 70.527.823                | 28.724.286                   | 65.415.062               | 178.024.855                               | 28.083                                 | 27.525                   | 14.850                  | 33.687                                  | 213.551.714                      | 391.576.569                     | 61.770                              |
| 32   | Santo Domingo | 50.148.906                         | 6.501.211                     | 35.514.630                | 6.353.889                    | 14.634.276               | 65.500.006                                | 15.610                                 | 15.015                   | 5.002                   | 10.150                                  | 42.591.028                       | 108.091.034                     | 25.760                              |
| 33   | Valparaíso    | 1.180.328.000                      | 170.737.334                   | 897.497.282               | 111.474.759                  | 282.830.718              | 1.523.900.093                             | 13.828                                 | 13.272                   | 3.578                   | 4.986                                   | 549.405.866                      | 2.073.305.959                   | 18.814                              |
| 34   | Villa Alemana | 634.685.016                        | 86.293.983                    | 466.103.247               | 71.278.749                   | 168.581.769              | 823.249.748                               | 14.781                                 | 14.224                   | 4.306                   | 11.232                                  | 625.568.352                      | 1.448.818.100                   | 26.012                              |
| 35   | Viña del Mar  | 1.689.830.860                      | 211.593.331                   | 1.106.267.517             | 305.092.412                  | 583.563.343              | 2.282.436.603                             | 16.713                                 | 16.157                   | 6.507                   | 4.986                                   | 680.874.032                      | 2.963.310.635                   | 21.698                              |
| 36   | Zapallar      | 294.827.256                        | 14.031.881                    | 102.671.734               | 89.984.380                   | 192.155.521              | 404.043.518                               | 44.613                                 | 44.039                   | 31.153                  | 4.986                                   | 45.152.386                       | 449.195.903                     | 49.598                              |
| 2020 | Año 2020      | 12.441.484.719                     | 1.437.809.391                 | 8.017.074.192             | 2.120.795.318                | 4.424.430.527            | 16.519.257.229                            | 757.917                                |                          |                         | 14.118                                  | 9.303.566.007                    | 25.822.823.236                  | 27.826                              |

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UNIVERSIDAD TECNICA  
FEDERICO SANTA MARIA

Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



**TABLA N°2: ALTERNATIVA 1: ET en San Felipe a RS Loma Los Colorados, las otras comunas depositan con transporte directo en nuevo RS Viña del Mar**

| N°   | Comuna          | Población | Cantidad RSU | Kilometros lineales a ET o RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte | Tiempos muertos | Vueltas   | Numero de Camiones Recolectores | Ocupaciones | Peaje       | Costo Variable Recolectores + TD |
|------|-----------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|------------|-----------------|-----------|---------------------------------|-------------|-------------|----------------------------------|
|      |                 | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]   | [hrs./año]      | semanales | Unidades                        | %           | [Ch\$/año]  | [Ch\$/año]                       |
| 1    | Algarrobo       | 17.420    | 7.158        | 67                            | 3                        | 3.579       | 17.896    | 4.666      | 139.984    | 520             | 20        | 4                               | 79%         | 10.400.000  | 64.748.907                       |
| 2    | Cabildo         | 21.804    | 6.295        | 126                           | 1                        | 3.147       | 15.736    | 7.426      | 222.768    | 442             | 17        | 5                               | 79%         | 3.536.000   | 95.143.440                       |
| 3    | Calle Larga     | 11.086    | 5.465        | 24                            | 0                        | 2.733       | 13.664    | 1.248      | 37.440     | 390             | 15        | 2                               | 79%         | 0           | 22.819.216                       |
| 4    | Cartagena       | 32.953    | 13.542       | 89                            | 1                        | 6.771       | 33.854    | 11.412     | 342.357    | 962             | 37        | 8                               | 86%         | 7.696.000   | 152.211.854                      |
| 5    | Casablanca      | 36.634    | 15.055       | 48                            | 2                        | 7.527       | 37.637    | 6.837      | 205.098    | 1.066           | 41        | 6                               | 93%         | 12.792.000  | 101.942.987                      |
| 6    | Catemu          | 13.606    | 6.708        | 40                            | 0                        | 3.354       | 16.771    | 2.484      | 74.506     | 468             | 18        | 3                               | 76%         | 0           | 38.953.008                       |
| 7    | Con Con         | 93.336    | 45.653       | 18                            | 0                        | 22.827      | 114.133   | 7.655      | 229.653    | 3.172           | 122       | 14                              | 87%         | 0           | 158.762.229                      |
| 8    | El Quisco       | 21.332    | 8.765        | 74                            | 3                        | 4.383       | 21.913    | 6.148      | 184.454    | 624             | 24        | 5                               | 80%         | 12.480.000  | 84.284.962                       |
| 9    | El Tabo         | 16.217    | 32.787       | 86                            | 0                        | 16.393      | 81.966    | 26.358     | 790.733    | 2.288           | 88        | 18                              | 90%         | 0           | 353.899.503                      |
| 10   | Hijuelas        | 20.641    | 10.177       | 77                            | 4                        | 5.089       | 25.443    | 7.484      | 224.515    | 728             | 28        | 6                               | 80%         | 23.296.000  | 101.828.414                      |
| 11   | La Calera       | 56.954    | 24.227       | 63                            | 4                        | 12.114      | 60.568    | 14.241     | 427.232    | 1.690           | 65        | 11                              | 92%         | 54.080.000  | 201.301.638                      |
| 12   | La Cruz         | 18.230    | 7.491        | 60                            | 4                        | 3.746       | 18.729    | 4.332      | 129.948    | 546             | 21        | 4                               | 78%         | 17.472.000  | 61.418.261                       |
| 13   | La Ligua        | 41.747    | 22.646       | 96                            | 1                        | 11.323      | 56.615    | 20.301     | 609.024    | 1.586           | 61        | 13                              | 92%         | 12.688.000  | 268.536.109                      |
| 14   | Limache         | 48.868    | 20.523       | 37                            | 2                        | 10.262      | 51.308    | 6.978      | 209.352    | 1.430           | 55        | 8                               | 84%         | 22.880.000  | 112.045.959                      |
| 15   | Llay Llay       | 24.125    | 9.915        | 36                            | 0                        | 4.957       | 24.786    | 3.388      | 101.650    | 702             | 27        | 4                               | 81%         | 0           | 54.325.144                       |
| 16   | Los Andes       | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672    | 2.340           | 90        | 10                              | 88%         | 0           | 115.256.683                      |
| 17   | Nogales         | 28.752    | 17.040       | 70                            | 4                        | 8.520       | 42.601    | 11.226     | 336.794    | 1.196           | 46        | 9                               | 84%         | 38.272.000  | 155.500.448                      |
| 18   | Olmue           | 17.216    | 7.138        | 44                            | 2                        | 3.569       | 17.845    | 3.044      | 91.312     | 520             | 20        | 3                               | 86%         | 6.240.000   | 46.060.666                       |
| 19   | Panquehue       | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562     | 208             | 8         | 1                               | 76%         | 0           | 9.673.932                        |
| 20   | Papudo          | 6.174     | 5.307        | 90                            | 0                        | 2.653       | 13.267    | 4.675      | 140.244    | 390             | 15        | 3                               | 93%         | 0           | 61.980.266                       |
| 21   | Petorca         | 9.680     | 6.190        | 145                           | 1                        | 3.095       | 15.475    | 8.545      | 256.360    | 442             | 17        | 5                               | 87%         | 3.536.000   | 107.857.860                      |
| 22   | Puchuncaví      | 18.741    | 25.534       | 54                            | 0                        | 12.767      | 63.834    | 12.869     | 386.069    | 1.794           | 69        | 11                              | 90%         | 0           | 187.547.241                      |
| 23   | Putendo         | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280     | 650             | 25        | 3                               | 82%         | 0           | 32.104.153                       |
| 24   | Quilota         | 94.718    | 57.603       | 50                            | 3                        | 28.802      | 144.008   | 26.747     | 802.402    | 4.004           | 154       | 24                              | 89%         | 80.080.000  | 396.821.769                      |
| 25   | Quilpué         | 185.176   | 62.505       | 16                            | 1                        | 31.253      | 156.263   | 9.136      | 274.067    | 4.342           | 167       | 18                              | 89%         | 17.368.000  | 201.896.606                      |
| 26   | Quintero        | 29.063    | 30.534       | 30                            | 0                        | 15.267      | 76.335    | 8.585      | 257.546    | 2.132           | 82        | 11                              | 85%         | 0           | 146.029.542                      |
| 27   | Rinconada       | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291     | 234             | 9         | 1                               | 84%         | 0           | 10.230.990                       |
| 28   | San Antonio     | 104.877   | 65.314       | 94                            | 1                        | 32.657      | 163.286   | 57.269     | 1.718.080  | 4.550           | 175       | 37                              | 92%         | 36.400.000  | 759.765.101                      |
| 29   | San Esteban     | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862     | 572             | 22        | 3                               | 68%         | 0           | 25.340.373                       |
| 30   | San Felipe      | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0          | 2.470           | 95        | 8                               | 91%         | 0           | 55.043.114                       |
| 31   | Santa María     | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117     | 442             | 17        | 2                               | 84%         | 0           | 21.749.314                       |
| 32   | Santo Domingo   | 10.213    | 4.196        | 110                           | 1                        | 2.098       | 10.490    | 4.593      | 137.779    | 312             | 12        | 3                               | 84%         | 2.496.000   | 59.314.458                       |
| 33   | Valparaíso      | 253.877   | 110.200      | 14                            | 0                        | 55.100      | 275.501   | 13.908     | 417.248    | 7.670           | 295       | 30                              | 92%         | 0           | 330.676.003                      |
| 34   | Villa Alemana   | 163.329   | 55.697       | 26                            | 2                        | 27.849      | 139.243   | 13.327     | 399.797    | 3.874           | 149       | 18                              | 90%         | 46.488.000  | 239.543.293                      |
| 35   | Viña del Mar    | 280.140   | 136.570      | 0                             | 0                        | 68.285      | 341.425   | 0          | 0          | 9.490           | 365       | 31                              | 90%         | 0           | 211.593.331                      |
| 36   | Zapallar        | 8.455     | 9.057        | 67                            | 0                        | 4.528       | 22.642    | 5.789      | 173.680    | 650             | 25        | 5                               | 79%         | 0           | 80.606.552                       |
| A    | ET-1 San Felipe | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.375     | 804.372    | 6.396           | 123       |                                 | 90%         | 102.336.000 |                                  |
| 2020 | Año 2020        | 1.927.522 | 928.015      | 1.850                         | 41                       | 464.008     | 2.320.039 | 320.796    | 9.623.874  | 64.896          | 2.496     | 347                             | 85%         | 510.536.000 | 5.126.813.325                    |



UNIVERSIDAD TECNICA  
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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°2: ALTERNATIVA 1

| N°   | Comuna          | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección<br>por h | CV Transporte a la<br>ET por km | CF Transporte a la<br>ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec. y<br>Transporte |
|------|-----------------|---------------------------------|--------------------------|-------------------------|---------------------------------|--------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|------------------------------|
|      |                 | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                     | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/ton]                   |
| 1    | Algarrobo       | 164.430.916                     | 11.090.520               | 67.142.119              | 53.658.387                      | 97.288.797                     |                          |                                           |                        | 239.579.823                                           | 33.469                       |
| 2    | Cabildo         | 205.538.645                     | 9.752.456                | 58.728.775              | 85.390.984                      | 146.809.870                    |                          |                                           |                        | 304.218.085                                           | 48.330                       |
| 3    | Calle Larga     | 82.215.458                      | 8.467.790                | 51.403.799              | 14.351.426                      | 30.811.659                     |                          | 20.173.973                                | 10.446.999             | 135.655.646                                           | 24.821                       |
| 4    | Cartagena       | 328.861.832                     | 20.980.422               | 116.306.521             | 131.231.432                     | 212.555.311                    |                          |                                           |                        | 488.769.686                                           | 36.094                       |
| 5    | Casablanca      | 246.646.374                     | 23.325.078               | 120.324.620             | 78.617.908                      | 126.321.754                    |                          |                                           |                        | 361.381.361                                           | 24.004                       |
| 6    | Catemu          | 123.323.187                     | 10.393.670               | 65.599.551              | 28.559.338                      | 57.723.636                     |                          | 24.762.262                                | 12.823.023             | 199.861.480                                           | 29.792                       |
| 7    | Con Con         | 575.508.206                     | 70.732.177               | 390.355.176             | 88.030.052                      | 185.153.030                    |                          |                                           |                        | 734.270.435                                           | 16.084                       |
| 8    | El Quisco       | 205.538.645                     | 13.580.270               | 80.751.939              | 70.704.692                      | 124.786.705                    |                          |                                           |                        | 302.303.607                                           | 34.489                       |
| 9    | El Tabo         | 739.939.122                     | 50.797.388               | 269.322.353             | 303.102.115                     | 470.616.769                    |                          |                                           |                        | 1.093.838.625                                         | 33.362                       |
| 10   | Hijuelas        | 246.646.374                     | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                    |                          |                                           |                        | 371.770.788                                           | 36.530                       |
| 11   | La Calera       | 452.185.019                     | 37.535.922               | 195.316.028             | 163.765.716                     | 256.868.991                    |                          |                                           |                        | 707.566.656                                           | 29.206                       |
| 12   | La Cruz         | 164.430.916                     | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                     |                          |                                           |                        | 243.321.177                                           | 32.480                       |
| 13   | La Ligua        | 534.400.477                     | 35.086.248               | 182.205.584             | 233.449.862                     | 352.194.893                    |                          |                                           |                        | 815.624.586                                           | 36.016                       |
| 14   | Limache         | 328.861.832                     | 31.797.569               | 180.752.995             | 80.248.390                      | 148.108.837                    |                          |                                           |                        | 463.787.791                                           | 22.598                       |
| 15   | Llay Llay       | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                     |                          | 36.596.664                                | 18.951.413             | 274.304.137                                           | 27.667                       |
| 16   | Los Andes       | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                    |                          | 123.294.967                               | 63.847.730             | 713.476.669                                           | 21.360                       |
| 17   | Nogales         | 369.969.561                     | 26.401.398               | 150.516.718             | 129.099.049                     | 219.452.843                    |                          |                                           |                        | 563.742.008                                           | 33.083                       |
| 18   | Olmue           | 123.323.187                     | 11.059.133               | 61.707.017              | 35.001.533                      | 61.616.170                     |                          |                                           |                        | 175.623.853                                           | 24.604                       |
| 19   | Panquehue       | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                     |                          | 10.662.660                                | 5.521.609              | 66.965.930                                            | 23.182                       |
| 20   | Papudo          | 123.323.187                     | 8.222.216                | 42.397.290              | 53.758.050                      | 80.925.897                     |                          |                                           |                        | 185.303.453                                           | 34.917                       |
| 21   | Petorca         | 205.538.645                     | 9.590.458                | 52.650.841              | 98.267.402                      | 152.887.804                    |                          |                                           |                        | 316.932.505                                           | 51.200                       |
| 22   | Puchuncaví      | 452.185.019                     | 39.560.121               | 210.463.100             | 147.987.120                     | 241.721.919                    |                          |                                           |                        | 639.732.260                                           | 25.055                       |
| 23   | Putendo         | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                     |                          | 34.221.787                                | 17.721.595             | 207.370.722                                           | 22.367                       |
| 24   | Quillota        | 986.585.496                     | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                    |                          |                                           |                        | 1.463.487.264                                         | 25.406                       |
| 25   | Quilpué         | 739.939.122                     | 96.841.776               | 516.989.573             | 105.054.830                     | 222.949.549                    |                          |                                           |                        | 959.203.727                                           | 15.346                       |
| 26   | Quintero        | 452.185.019                     | 47.307.678               | 265.685.041             | 98.721.864                      | 186.499.978                    |                          |                                           |                        | 598.214.561                                           | 19.592                       |
| 27   | Rinconada       | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                     |                          | 12.236.751                                | 6.336.745              | 69.912.215                                            | 21.089                       |
| 28   | San Antonio     | 1.520.985.972                   | 101.194.111              | 525.751.329             | 658.570.989                     | 995.234.643                    |                          |                                           |                        | 2.317.151.073                                         | 35.477                       |
| 29   | San Esteban     | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                     |                          | 29.447.646                                | 15.249.328             | 193.360.534                                           | 24.237                       |
| 30   | San Felipe      | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                     |                          | 131.136.737                               | 67.908.554             | 582.950.238                                           | 16.409                       |
| 31   | Santa María     | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                     |                          | 23.399.541                                | 12.117.345             | 139.481.658                                           | 22.003                       |
| 32   | Santo Domingo   | 123.323.187                     | 6.501.211                | 36.948.546              | 52.813.247                      | 86.374.641                     |                          |                                           |                        | 185.133.645                                           | 44.120                       |
| 33   | Valparaíso      | 1.233.231.869                   | 170.737.334              | 886.184.798             | 159.938.669                     | 347.047.071                    |                          |                                           |                        | 1.563.907.873                                         | 14.192                       |
| 34   | Villa Alemana   | 739.939.122                     | 86.293.983               | 457.417.828             | 153.249.310                     | 282.521.294                    |                          |                                           |                        | 1.025.970.414                                         | 18.420                       |
| 35   | Viña del Mar    | 1.274.339.598                   | 211.593.331              | 1.118.846.608           | 0                               | 155.492.990                    |                          |                                           |                        | 1.485.932.929                                         | 10.880                       |
| 36   | Zapallar        | 205.538.645                     | 14.031.881               | 84.863.025              | 66.574.670                      | 120.675.620                    |                          |                                           |                        | 286.145.197                                           | 31.595                       |
| A    | ET-1 San Felipe |                                 |                          |                         |                                 |                                | 6                        | 445.932.989                               | 230.924.340            |                                                       |                              |
| 2020 | Año 2020        | 14.264.381.957                  | 1.437.809.191            | 7.773.511.437           | 3.689.004.134                   | 6.490.870.520                  | 6                        | 445.932.989                               | 230.924.340            | 20.476.252.611                                        | 22.065                       |



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Continuación TABLA N°2: ALTERNATIVA 1

| N°   | Comuna          | Costo/ton<br>Recolector (rec +<br>transp) | Costo/ton<br>Recolección (solo<br>recolección) | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total Rec.<br>+ Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposición<br>por Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+ET+<br>Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|-----------------|-------------------------------------------|------------------------------------------------|----------------------------------------------|-----------------------|-------------|--------------------------|---------------------------------|------------------------------------------------|-----------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|
|      |                 | [Ch\$/ton]                                | [Ch\$/ton]                                     | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                | [Ch\$/año]                       | [Ch\$/año]                             | [Ch\$/ton]                          |
| 1    | Algarrobo       | 32.016                                    | 10.929                                         | 21.087                                       |                       |             |                          | 239.579.823                     | 33.469                                         | 3.842                                   | 27.500.680                       | 267.080.503                            | 37.311                              |
| 2    | Cabildo         | 47.768                                    | 10.879                                         | 36.889                                       |                       |             |                          | 304.218.085                     | 48.330                                         | 3.842                                   | 24.182.740                       | 328.400.824                            | 52.172                              |
| 3    | Calle Larga     | 19.218                                    | 10.955                                         | 8.263                                        | 5.603                 | 12.824.430  | 2.346                    | 148.480.076                     | 27.167                                         | 6.000                                   | 32.792.557                       | 181.272.633                            | 33.167                              |
| 4    | Cartagena       | 35.526                                    | 10.138                                         | 25.388                                       |                       |             |                          | 488.769.686                     | 36.094                                         | 3.842                                   | 52.024.239                       | 540.793.924                            | 39.936                              |
| 5    | Casablanca      | 23.155                                    | 9.542                                          | 13.613                                       |                       |             |                          | 361.381.361                     | 24.004                                         | 3.842                                   | 57.838.181                       | 419.219.542                            | 27.846                              |
| 6    | Catemu          | 24.190                                    | 11.328                                         | 12.862                                       | 5.603                 | 15.741.168  | 2.346                    | 215.602.648                     | 32.139                                         | 6.000                                   | 40.250.767                       | 255.853.415                            | 38.139                              |
| 7    | Con Con         | 16.084                                    | 10.100                                         | 5.984                                        |                       |             |                          | 734.270.435                     | 16.084                                         | 3.842                                   | 175.391.499                      | 909.661.935                            | 19.925                              |
| 8    | El Quisco       | 33.065                                    | 10.762                                         | 22.303                                       |                       |             |                          | 302.303.607                     | 34.489                                         | 3.842                                   | 33.674.404                       | 335.978.010                            | 38.331                              |
| 9    | El Tabo         | 33.362                                    | 9.764                                          | 23.599                                       |                       |             |                          | 1.093.838.625                   | 33.362                                         | 3.842                                   | 125.960.070                      | 1.219.798.695                          | 37.204                              |
| 10   | Hijuelas        | 34.241                                    | 10.822                                         | 23.420                                       |                       |             |                          | 371.770.788                     | 36.530                                         | 3.842                                   | 39.098.471                       | 410.869.259                            | 40.372                              |
| 11   | La Calera       | 26.973                                    | 9.611                                          | 17.362                                       |                       |             |                          | 707.566.656                     | 29.206                                         | 3.842                                   | 93.076.191                       | 800.642.847                            | 33.047                              |
| 12   | La Cruz         | 30.147                                    | 11.083                                         | 19.064                                       |                       |             |                          | 243.321.177                     | 32.480                                         | 3.842                                   | 28.781.009                       | 272.102.186                            | 36.321                              |
| 13   | La Ligua        | 35.456                                    | 9.595                                          | 25.861                                       |                       |             |                          | 815.624.586                     | 36.016                                         | 3.842                                   | 87.001.841                       | 902.626.427                            | 39.858                              |
| 14   | Limache         | 21.483                                    | 10.357                                         | 11.127                                       |                       |             |                          | 463.787.791                     | 22.598                                         | 3.842                                   | 78.847.047                       | 542.634.838                            | 26.440                              |
| 15   | Llay Llay       | 22.064                                    | 10.636                                         | 11.428                                       | 5.603                 | 23.264.200  | 2.346                    | 297.568.337                     | 30.013                                         | 6.000                                   | 59.487.448                       | 357.055.785                            | 36.013                              |
| 16   | Los Andes       | 15.757                                    | 9.917                                          | 5.840                                        | 5.603                 | 78.377.604  | 2.346                    | 791.854.273                     | 23.706                                         | 6.000                                   | 200.414.524                      | 992.268.796                            | 29.706                              |
| 17   | Nogales         | 30.837                                    | 10.382                                         | 20.454                                       |                       |             |                          | 563.742.008                     | 33.083                                         | 3.842                                   | 65.466.398                       | 629.208.406                            | 36.924                              |
| 18   | Olmué           | 23.730                                    | 10.194                                         | 13.536                                       |                       |             |                          | 175.623.853                     | 24.604                                         | 3.842                                   | 27.422.850                       | 203.046.703                            | 28.446                              |
| 19   | Panquehue       | 17.580                                    | 11.316                                         | 6.263                                        | 5.603                 | 6.778.166   | 2.346                    | 73.744.095                      | 25.529                                         | 6.000                                   | 17.332.028                       | 91.076.124                             | 31.529                              |
| 20   | Papudo          | 34.917                                    | 9.538                                          | 25.379                                       |                       |             |                          | 185.303.453                     | 34.917                                         | 3.842                                   | 20.388.272                       | 205.691.725                            | 38.759                              |
| 21   | Petorca         | 50.629                                    | 10.055                                         | 40.574                                       |                       |             |                          | 316.932.505                     | 51.200                                         | 3.842                                   | 23.781.041                       | 340.713.546                            | 55.042                              |
| 22   | Puchuncaví      | 25.055                                    | 9.792                                          | 15.263                                       |                       |             |                          | 639.732.260                     | 25.055                                         | 3.842                                   | 98.095.508                       | 737.827.768                            | 28.896                              |
| 23   | Putendo         | 16.765                                    | 10.580                                         | 6.185                                        | 5.603                 | 21.754.511  | 2.346                    | 229.125.232                     | 24.714                                         | 6.000                                   | 55.627.114                       | 284.752.346                            | 30.714                              |
| 24   | Quillota        | 24.016                                    | 9.833                                          | 14.183                                       |                       |             |                          | 1.463.487.264                   | 25.406                                         | 3.842                                   | 221.301.384                      | 1.684.788.648                          | 29.248                              |
| 25   | Quilpué         | 15.068                                    | 9.820                                          | 5.248                                        |                       |             |                          | 959.203.727                     | 15.346                                         | 3.842                                   | 240.134.334                      | 1.199.338.062                          | 19.188                              |
| 26   | Quintero        | 19.592                                    | 10.251                                         | 9.341                                        |                       |             |                          | 598.214.561                     | 19.592                                         | 3.842                                   | 117.306.789                      | 715.521.350                            | 23.433                              |
| 27   | Rinconada       | 15.486                                    | 10.353                                         | 5.133                                        | 5.603                 | 7.778.803   | 2.346                    | 77.691.017                      | 23.435                                         | 6.000                                   | 19.890.695                       | 97.581.713                             | 29.435                              |
| 28   | San Antonio     | 34.920                                    | 9.599                                          | 25.321                                       |                       |             |                          | 2.317.151.073                   | 35.477                                         | 3.842                                   | 250.926.630                      | 2.568.077.703                          | 39.319                              |
| 29   | San Esteban     | 18.635                                    | 12.387                                         | 6.248                                        | 5.603                 | 18.719.628  | 2.346                    | 212.080.163                     | 26.584                                         | 6.000                                   | 47.866.804                       | 259.946.967                            | 32.584                              |
| 30   | San Felipe      | 10.806                                    | 9.676                                          | 1.130                                        | 5.603                 | 83.362.553  | 2.346                    | 666.312.791                     | 18.755                                         | 6.000                                   | 213.161.230                      | 879.474.021                            | 24.755                              |
| 31   | Santa María     | 16.400                                    | 10.392                                         | 6.008                                        | 5.603                 | 14.874.897  | 2.346                    | 154.356.555                     | 24.349                                         | 6.000                                   | 38.035.680                       | 192.392.236                            | 30.349                              |
| 32   | Santo Domingo   | 43.525                                    | 10.355                                         | 33.171                                       |                       |             |                          | 185.133.645                     | 44.120                                         | 3.842                                   | 16.120.770                       | 201.254.415                            | 47.962                              |
| 33   | Valparaíso      | 14.192                                    | 9.591                                          | 4.601                                        |                       |             |                          | 1.563.907.873                   | 14.192                                         | 3.842                                   | 423.369.931                      | 1.987.277.804                          | 18.033                              |
| 34   | Villa Alemana   | 17.586                                    | 9.762                                          | 7.824                                        |                       |             |                          | 1.025.970.414                   | 18.420                                         | 3.842                                   | 213.979.431                      | 1.239.949.846                          | 22.262                              |
| 35   | Viña del Mar    | 10.880                                    | 9.742                                          | 1.139                                        |                       |             |                          | 1.485.932.929                   | 10.880                                         | 3.842                                   | 524.678.767                      | 2.010.611.696                          | 14.722                              |
| 36   | Zapallar        | 31.595                                    | 10.920                                         | 20.675                                       |                       |             |                          | 286.145.197                     | 31.595                                         | 3.842                                   | 34.794.245                       | 320.939.442                            | 35.437                              |
| A    | ET-1 San Felipe |                                           |                                                |                                              |                       | 283.475.961 | 2.346                    |                                 |                                                |                                         |                                  |                                        |                                     |
| 2020 | Año 2020        | 20.895                                    | 9.926                                          | 10.970                                       |                       | 283.475.961 | 2.346                    | 20.759.728.572                  | 22.370                                         |                                         | 3.826.001.568                    | 24.585.730.140                         | 26.493                              |



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**TABLA N°3: ALTERNATIVA 2a: 2 Rellenos Sanitarios nuevos: RS en Centro de Gravedad Sur y RS en Centro de Gravedad Central, ET en San Felipe a RS Loma los Colorados y ET en Centro de Gravedad Norte a RS Central**

| N°   | Comuna          | Población | Cantidad RSU | Kilometros lineales a ET o RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Camiones Recolectores | Ocupaciones | Peaje       | Costo Variable Recolectores + TD |
|------|-----------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|---------------------------------|-------------|-------------|----------------------------------|
|      |                 | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs/año]   | [km/año]  | [h/año]    | [km/año]                        | [hrs/año]       | semanales | Unidades                        | %           | [Ch\$/año]  | [Ch\$/año]                       |
| 1    | Algarrobo       | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                               | 87%         | 0           | 19.812.998                       |
| 2    | Cabildo         | 21.804    | 6.295        | 63                            | 1                        | 3.147       | 15.736    | 3.713      | 111.384                         | 442             | 17        | 3                               | 88%         | 3.536.000   | 52.447.948                       |
| 3    | Calle Larga     | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                               | 73%         | 0           | 19.051.966                       |
| 4    | Cartagena       | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                               | 79%         | 0           | 83.078.245                       |
| 5    | Casablanca      | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                               | 87%         | 0           | 92.136.179                       |
| 6    | Catemu          | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                               | 85%         | 0           | 20.583.183                       |
| 7    | Con Con         | 93.336    | 45.653       | 18                            | 0                        | 22.827      | 114.133   | 7.655      | 229.653                         | 3.172           | 122       | 14                              | 87%         | 0           | 158.762.229                      |
| 8    | El Quisco       | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                               | 69%         | 4.992.000   | 21.999.773                       |
| 9    | El Tabo         | 16.217    | 32.787       | 0                             | 0                        | 16.393      | 81.966    | 0          | 0                               | 2.288           | 88        | 8                               | 84%         | 0           | 50.797.388                       |
| 10   | Hijuelas        | 20.641    | 10.177       | 77                            | 4                        | 5.089       | 25.443    | 7.484      | 224.515                         | 728             | 28        | 6                               | 80%         | 23.296.000  | 101.828.414                      |
| 11   | La Calera       | 56.954    | 24.227       | 8                             | 0                        | 12.114      | 60.568    | 1.848      | 55.432                          | 1.690           | 65        | 7                               | 81%         | 0           | 58.784.005                       |
| 12   | La Cruz         | 18.230    | 7.491        | 60                            | 4                        | 3.746       | 18.729    | 4.332      | 129.948                         | 546             | 21        | 4                               | 78%         | 17.472.000  | 61.418.261                       |
| 13   | La Ligua        | 41.747    | 22.646       | 35                            | 0                        | 11.323      | 56.615    | 7.465      | 223.943                         | 1.586           | 61        | 8                               | 92%         | 0           | 120.927.707                      |
| 14   | Limache         | 48.868    | 20.523       | 37                            | 2                        | 10.262      | 51.308    | 6.978      | 209.352                         | 1.430           | 55        | 8                               | 84%         | 17.160.000  | 112.045.959                      |
| 15   | Llay Llay       | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                               | 81%         | 5.616.000   | 54.325.144                       |
| 16   | Los Andes       | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                              | 88%         | 0           | 115.256.683                      |
| 17   | Nogales         | 28.752    | 17.040       | 0                             | 0                        | 8.520       | 42.601    | 0          | 0                               | 1.196           | 46        | 4                               | 87%         | 0           | 26.401.398                       |
| 18   | Olmué           | 17.216    | 7.138        | 44                            | 2                        | 3.569       | 17.845    | 3.044      | 91.312                          | 520             | 20        | 3                               | 86%         | 8.320.000   | 46.060.666                       |
| 19   | Panquehue       | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                               | 76%         | 0           | 9.673.932                        |
| 20   | Papudo          | 6.174     | 5.307        | 65                            | 1                        | 2.653       | 13.267    | 3.401      | 102.024                         | 390             | 15        | 3                               | 77%         | 3.120.000   | 47.329.852                       |
| 21   | Petorca         | 9.680     | 6.190        | 82                            | 1                        | 3.095       | 15.475    | 4.833      | 144.976                         | 442             | 17        | 4                               | 75%         | 3.536.000   | 65.162.368                       |
| 22   | Puchuncaví      | 18.741    | 25.534       | 54                            | 0                        | 12.767      | 63.834    | 12.869     | 386.069                         | 1.794           | 69        | 11                              | 90%         | 0           | 187.547.241                      |
| 23   | Putendo         | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                               | 82%         | 0           | 32.104.153                       |
| 24   | Quillota        | 94.718    | 57.603       | 50                            | 3                        | 28.802      | 144.008   | 26.747     | 802.402                         | 4.004           | 154       | 24                              | 89%         | 80.080.000  | 396.821.769                      |
| 25   | Quilpué         | 185.176   | 62.505       | 16                            | 1                        | 31.253      | 156.263   | 9.136      | 274.067                         | 4.342           | 167       | 18                              | 89%         | 17.368.000  | 201.896.606                      |
| 26   | Quintero        | 29.063    | 30.534       | 30                            | 0                        | 15.267      | 76.335    | 8.585      | 257.546                         | 2.132           | 82        | 11                              | 85%         | 0           | 146.029.542                      |
| 27   | Rinconada       | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                               | 84%         | 0           | 10.230.990                       |
| 28   | San Antonio     | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                              | 91%         | 0           | 256.069.916                      |
| 29   | San Esteban     | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                               | 68%         | 0           | 25.340.373                       |
| 30   | San Felipe      | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                               | 91%         | 0           | 55.043.114                       |
| 31   | Santa María     | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                               | 84%         | 0           | 21.749.314                       |
| 32   | Santo Domingo   | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                               | 71%         | 0           | 24.009.951                       |
| 33   | Valparaíso      | 253.877   | 110.200      | 14                            | 0                        | 55.100      | 275.501   | 13.908     | 417.248                         | 7.670           | 295       | 30                              | 92%         | 0           | 330.676.003                      |
| 34   | Villa Alemana   | 163.329   | 55.697       | 26                            | 2                        | 27.849      | 139.243   | 13.327     | 399.797                         | 3.874           | 149       | 18                              | 90%         | 46.488.000  | 239.543.293                      |
| 35   | Viña del Mar    | 280.140   | 136.570      | 0                             | 1                        | 68.285      | 341.425   | 0          | 0                               | 9.490           | 365       | 31                              | 90%         | 75.920.000  | 211.593.331                      |
| 36   | Zapallar        | 8.455     | 9.057        | 42                            | 1                        | 4.528       | 22.642    | 3.657      | 109.720                         | 650             | 25        | 4                               | 80%         | 5.200.000   | 56.089.532                       |
| A    | ET-1 San Felipe | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.375     | 804.372                         | 6.396           | 123       |                                 | 90%         | 102.336.000 |                                  |
| B    | ET-2a Norte     | 173.566   | 90.762       | 70                            | 3                        |             |           | 10.476     | 680.909                         | 4.836           | 93        |                                 | 88%         | 58.032.000  |                                  |
| 2020 | Año 2020        | 1.927.522 | 928.015      | 1.183                         | 30                       | 464.008     | 1.085.485 |            | 6.950.248                       | 76.128          | 2.712     | 294                             | 84%         | 472.472.000 | 3.532.629.427                    |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°3: ALTERNATIVA 2ª

| N°   | Comuna          | Costo Fijo<br>Recolectores +<br>TD | CV Recolección<br>por km | CF Recolección<br>por h | CV Transporte a<br>RS/ET por km | CF Transporte<br>la RS/ET por h | Numero<br>Amplirol 70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo<br>Rec.+ Transport<br>+Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte | Costo/ton<br>Recolector |
|------|-----------------|------------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|----------------------------------------------------------|------------------------------|-------------------------|
|      |                 | [Ch\$/año]                         | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                               | [Ch\$/año]                   | [Ch\$/ton]              |
| 1    | Algarrobo       | 82.215.458                         | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                           |                        | 102.028.456                                              | 14.253                       | 14.253                  |
| 2    | Cabildo         | 123.323.187                        | 9.752.456                | 53.153.883              | 42.695.492                      | 70.169.304                      |                          | 24.196.573                                | 13.346.075             | 216.849.783                                              | 34.450                       | 27.924                  |
| 3    | Calle Larga     | 82.215.458                         | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.173.973                                | 10.446.999             | 131.888.397                                              | 24.131                       | 18.529                  |
| 4    | Cartagena       | 246.646.374                        | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                           |                        | 329.724.619                                              | 24.349                       | 24.349                  |
| 5    | Casablanca      | 246.646.374                        | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                           |                        | 338.782.553                                              | 22.503                       | 22.503                  |
| 6    | Catemu          | 82.215.458                         | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.762.262                                | 12.823.023             | 140.383.926                                              | 20.926                       | 15.324                  |
| 7    | Con Con         | 575.508.206                        | 70.732.177               | 390.355.176             | 88.030.052                      | 185.153.030                     |                          |                                           |                        | 734.270.435                                              | 16.084                       | 16.084                  |
| 8    | El Quisco       | 123.323.187                        | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                           |                        | 150.314.960                                              | 17.149                       | 16.580                  |
| 9    | El Tabo         | 328.861.832                        | 50.797.388               | 288.584.258             | 0                               | 40.277.574                      |                          |                                           |                        | 379.659.220                                              | 11.580                       | 11.580                  |
| 10   | Hijuelas        | 246.646.374                        | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                     |                          |                                           |                        | 371.770.788                                              | 36.530                       | 34.241                  |
| 11   | La Calera       | 287.754.103                        | 37.535.922               | 222.711.643             | 21.248.083                      | 65.042.460                      |                          | 93.129.435                                | 51.367.292             | 491.034.835                                              | 20.268                       | 14.304                  |
| 12   | La Cruz         | 164.430.916                        | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                      |                          |                                           |                        | 243.321.177                                              | 32.480                       | 30.147                  |
| 13   | La Ligua        | 328.861.832                        | 35.086.248               | 182.769.296             | 85.841.460                      | 146.092.536                     |                          | 87.051.610                                | 48.014.953             | 584.856.102                                              | 25.826                       | 19.862                  |
| 14   | Limache         | 328.861.832                        | 31.797.569               | 180.752.995             | 80.248.390                      | 148.108.837                     |                          |                                           |                        | 458.067.791                                              | 22.319                       | 21.483                  |
| 15   | Llay Llay       | 164.430.916                        | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.596.664                                | 18.951.413             | 279.920.137                                              | 28.233                       | 22.064                  |
| 16   | Los Andes       | 411.077.290                        | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.294.967                               | 63.847.730             | 713.476.669                                              | 21.360                       | 15.757                  |
| 17   | Nogales         | 164.430.916                        | 26.401.398               | 144.190.602             | 0                               | 20.240.313                      |                          | 65.503.848                                | 36.129.879             | 292.466.041                                              | 17.163                       | 11.199                  |
| 18   | Olmué           | 123.323.187                        | 11.059.133               | 61.707.017              | 35.001.533                      | 61.616.170                      |                          |                                           |                        | 177.703.853                                              | 24.896                       | 23.730                  |
| 19   | Panquehue       | 41.107.729                         | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.662.660                                | 5.521.609              | 66.965.930                                               | 23.182                       | 17.580                  |
| 20   | Papudo          | 123.323.187                        | 8.222.216                | 50.779.033              | 39.107.636                      | 72.544.154                      |                          | 20.399.935                                | 11.251.968             | 205.424.942                                              | 38.709                       | 32.157                  |
| 21   | Petorca         | 164.430.916                        | 9.590.458                | 60.805.738              | 55.571.910                      | 103.625.178                     |                          | 23.794.645                                | 13.124.384             | 270.048.313                                              | 43.626                       | 37.091                  |
| 22   | Pichuncaví      | 452.185.019                        | 39.560.121               | 210.463.100             | 147.987.120                     | 241.721.919                     |                          |                                           |                        | 639.732.260                                              | 25.055                       | 25.055                  |
| 23   | Putendo         | 123.323.187                        | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.221.787                                | 17.721.595             | 207.370.722                                              | 22.367                       | 16.765                  |
| 24   | Quillota        | 986.585.496                        | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                     |                          |                                           |                        | 1.463.487.264                                            | 25.406                       | 24.016                  |
| 25   | Quilpué         | 739.939.122                        | 96.841.776               | 516.989.573             | 105.054.830                     | 222.949.549                     |                          |                                           |                        | 959.203.727                                              | 15.346                       | 15.068                  |
| 26   | Quintero        | 452.185.019                        | 47.307.678               | 265.685.041             | 98.721.864                      | 186.499.978                     |                          |                                           |                        | 598.214.561                                              | 19.592                       | 19.592                  |
| 27   | Rinconada       | 41.107.729                         | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.236.751                                | 6.336.745              | 69.912.215                                               | 21.089                       | 15.486                  |
| 28   | San Antonio     | 822.154.580                        | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                            | 16.508                       | 16.508                  |
| 29   | San Esteban     | 123.323.187                        | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.447.646                                | 15.249.328             | 193.360.534                                              | 24.237                       | 18.635                  |
| 30   | San Felipe      | 328.861.832                        | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.136.737                               | 67.908.554             | 582.950.238                                              | 16.409                       | 10.806                  |
| 31   | Santa María     | 82.215.458                         | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.399.541                                | 12.117.345             | 139.481.658                                              | 22.003                       | 16.400                  |
| 32   | Santo Domingo   | 82.215.458                         | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                           |                        | 106.225.409                                              | 25.315                       | 25.315                  |
| 33   | Valparaíso      | 1.233.231.869                      | 170.737.334              | 886.184.798             | 159.938.669                     | 347.047.071                     |                          |                                           |                        | 1.563.907.873                                            | 14.192                       | 14.192                  |
| 34   | Villa Alemana   | 739.939.122                        | 86.293.983               | 457.417.828             | 153.249.310                     | 282.521.294                     |                          |                                           |                        | 1.025.970.414                                            | 18.420                       | 17.586                  |
| 35   | Viña del Mar    | 1.274.339.598                      | 211.593.331              | 1.118.846.608           | 0                               | 155.492.990                     |                          |                                           |                        | 1.561.852.929                                            | 11.436                       | 10.880                  |
| 36   | Zapallar        | 164.430.916                        | 14.031.881               | 84.271.993              | 42.057.651                      | 80.158.923                      |                          | 34.814.149                                | 19.202.399             | 279.736.996                                              | 30.887                       | 24.349                  |
| A    | ET-1 San Felipe |                                    |                          |                         |                                 |                                 | 6                        | 445.932.989                               | 230.924.340            |                                                          |                              |                         |
| B    | ET-2a Norte     |                                    |                          |                         |                                 |                                 | 5                        | 348.890.195                               | 192.436.950            |                                                          |                              |                         |
| 2020 | Año 2020        | 12.085.672.321                     | 1.437.809.191            | 7.857.663.311           | 2.094.820.236                   | 4.228.009.010                   | 11                       | 794.823.184                               | 423.361.291            | 17.148.590.222                                           | 18.479                       | 16.830                  |



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Continuación TABLA N°3: ALTERNATIVA 2ª

| N°   | Comuna          | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total<br>Rec. +<br>Trans.+ET | Costo<br>Total/T Rec.<br>+<br>Transporte<br>+ ETs | Costo de<br>Disposición<br>por<br>Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+<br>ET+Dis. | Costo/T<br>Rec.+Trans<br>.+ET+Disp. |
|------|-----------------|------------------------|-------------------------------------------------|-----------------------|-------------|--------------------------|------------------------------------|---------------------------------------------------|--------------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|
|      |                 | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                         | [Ch\$/t]                                          | [Ch\$/t]                                   | [Ch\$/año]                       | [Ch\$/año]                             | [Ch\$/ton]                          |
| 1    | Algarrobo       | 10.012                 | 4.241                                           |                       |             |                          | 102.028.456                        | 14.253                                            | 9.396                                      | 67.256.957                       | 169.285.413                            | 23.649                              |
| 2    | Cabildo         | 9.994                  | 17.930                                          | 5.964                 | 17.927.594  | 2.848                    | 234.777.377                        | 37.298                                            | 4.136                                      | 26.032.424                       | 260.809.801                            | 41.434                              |
| 3    | Calle Larga     | 11.717                 | 6.812                                           | 5.603                 | 12.537.275  | 2.294                    | 144.425.671                        | 26.425                                            | 6.000                                      | 32.792.557                       | 177.218.228                            | 32.425                              |
| 4    | Cartagena       | 10.940                 | 13.409                                          |                       |             |                          | 329.724.619                        | 24.349                                            | 9.396                                      | 127.232.928                      | 456.957.546                            | 33.745                              |
| 5    | Casablanca      | 10.009                 | 12.494                                          |                       |             |                          | 338.782.553                        | 22.503                                            | 9.396                                      | 141.451.779                      | 480.234.332                            | 31.899                              |
| 6    | Catemu          | 10.280                 | 5.044                                           | 5.603                 | 15.388.703  | 2.294                    | 155.772.629                        | 23.220                                            | 6.000                                      | 40.250.767                       | 196.023.396                            | 29.220                              |
| 7    | Con Con         | 10.100                 | 5.984                                           |                       |             |                          | 734.270.435                        | 16.084                                            | 4.136                                      | 188.806.808                      | 923.077.243                            | 20.219                              |
| 8    | El Quisco       | 12.294                 | 4.285                                           |                       |             |                          | 150.314.960                        | 17.149                                            | 9.396                                      | 82.355.708                       | 232.670.668                            | 26.545                              |
| 9    | El Tabo         | 10.351                 | 1.228                                           |                       |             |                          | 379.659.220                        | 11.580                                            | 9.396                                      | 308.053.878                      | 687.713.097                            | 20.975                              |
| 10   | Hijuelas        | 10.822                 | 23.420                                          |                       |             |                          | 371.770.788                        | 36.530                                            | 4.136                                      | 42.089.026                       | 413.859.815                            | 40.666                              |
| 11   | La Calera       | 10.742                 | 3.562                                           | 5.964                 | 69.000.957  | 2.848                    | 560.035.792                        | 23.116                                            | 4.136                                      | 100.195.383                      | 660.231.175                            | 27.252                              |
| 12   | La Cruz         | 11.083                 | 19.064                                          |                       |             |                          | 243.321.177                        | 32.480                                            | 4.136                                      | 30.982.405                       | 274.303.582                            | 36.615                              |
| 13   | La Ligua        | 9.620                  | 10.242                                          | 5.964                 | 64.497.808  | 2.848                    | 649.353.910                        | 28.674                                            | 4.136                                      | 93.656.419                       | 743.010.329                            | 32.810                              |
| 14   | Limache         | 10.357                 | 11.127                                          |                       |             |                          | 458.067.791                        | 22.319                                            | 4.136                                      | 84.877.884                       | 542.945.675                            | 26.455                              |
| 15   | Llay Llay       | 10.636                 | 11.428                                          | 5.603                 | 22.743.285  | 2.294                    | 302.663.422                        | 30.527                                            | 6.000                                      | 59.487.448                       | 362.150.870                            | 36.527                              |
| 16   | Los Andes       | 9.917                  | 5.840                                           | 5.603                 | 76.622.628  | 2.294                    | 790.099.297                        | 23.654                                            | 6.000                                      | 200.414.524                      | 990.513.820                            | 29.654                              |
| 17   | Nogales         | 10.011                 | 1.188                                           | 5.964                 | 48.532.757  | 2.848                    | 340.998.798                        | 20.011                                            | 4.136                                      | 70.473.778                       | 411.472.576                            | 24.147                              |
| 18   | Olmué           | 10.194                 | 13.536                                          |                       |             |                          | 177.703.853                        | 24.896                                            | 4.136                                      | 29.520.363                       | 207.224.216                            | 29.031                              |
| 19   | Panquehue       | 11.316                 | 6.263                                           | 5.603                 | 6.626.394   | 2.294                    | 73.592.324                         | 25.476                                            | 6.000                                      | 17.332.028                       | 90.924.352                             | 31.476                              |
| 20   | Papudo          | 11.118                 | 21.039                                          | 5.964                 | 15.114.610  | 2.848                    | 220.539.552                        | 41.557                                            | 4.136                                      | 21.947.726                       | 242.487.278                            | 45.693                              |
| 21   | Petorca         | 11.372                 | 25.718                                          | 5.964                 | 17.629.800  | 2.848                    | 287.678.113                        | 46.474                                            | 4.136                                      | 25.600.000                       | 313.278.113                            | 50.610                              |
| 22   | Puchuncaví      | 9.792                  | 15.263                                          |                       |             |                          | 639.732.260                        | 25.055                                            | 4.136                                      | 105.598.617                      | 745.330.877                            | 29.190                              |
| 23   | Putendo         | 10.580                 | 6.185                                           | 5.603                 | 21.267.399  | 2.294                    | 228.638.121                        | 24.661                                            | 6.000                                      | 55.627.114                       | 284.265.235                            | 30.661                              |
| 24   | Quillota        | 9.833                  | 14.183                                          |                       |             |                          | 1.463.487.264                      | 25.406                                            | 4.136                                      | 238.228.238                      | 1.701.715.502                          | 29.542                              |
| 25   | Quilpué         | 9.820                  | 5.248                                           |                       |             |                          | 959.203.727                        | 15.346                                            | 4.136                                      | 258.501.679                      | 1.217.705.406                          | 19.482                              |
| 26   | Quintero        | 10.251                 | 9.341                                           |                       |             |                          | 598.214.561                        | 19.592                                            | 4.136                                      | 126.279.326                      | 724.493.887                            | 23.727                              |
| 27   | Rinconada       | 10.353                 | 5.133                                           | 5.603                 | 7.604.625   | 2.294                    | 77.516.840                         | 23.383                                            | 6.000                                      | 19.890.695                       | 97.407.535                             | 29.383                              |
| 28   | San Antonio     | 9.661                  | 6.847                                           |                       |             |                          | 1.078.224.496                      | 16.508                                            | 9.396                                      | 613.677.982                      | 1.691.902.477                          | 25.904                              |
| 29   | San Esteban     | 12.387                 | 6.248                                           | 5.603                 | 18.300.472  | 2.294                    | 211.661.006                        | 26.531                                            | 6.000                                      | 47.866.804                       | 259.527.810                            | 32.531                              |
| 30   | San Felipe      | 9.676                  | 1.130                                           | 5.603                 | 81.495.958  | 2.294                    | 664.446.196                        | 18.703                                            | 6.000                                      | 213.161.230                      | 877.607.425                            | 24.703                              |
| 31   | Santa María     | 10.392                 | 6.008                                           | 5.603                 | 14.541.829  | 2.294                    | 154.023.487                        | 24.297                                            | 6.000                                      | 38.035.680                       | 192.059.167                            | 30.297                              |
| 32   | Santo Domingo   | 12.002                 | 13.313                                          |                       |             |                          | 106.225.409                        | 25.315                                            | 9.396                                      | 39.425.713                       | 145.651.122                            | 34.711                              |
| 33   | Valparaíso      | 9.591                  | 4.601                                           |                       |             |                          | 1.563.907.873                      | 14.192                                            | 4.136                                      | 455.752.562                      | 2.019.660.434                          | 18.327                              |
| 34   | Villa Alemana   | 9.762                  | 7.824                                           |                       |             |                          | 1.025.970.414                      | 18.420                                            | 4.136                                      | 230.346.245                      | 1.256.316.660                          | 22.556                              |
| 35   | Viña del Mar    | 9.742                  | 1.139                                           |                       |             |                          | 1.561.852.929                      | 11.436                                            | 4.136                                      | 564.810.287                      | 2.126.663.216                          | 15.572                              |
| 36   | Zapallar        | 10.854                 | 13.495                                          | 5.964                 | 25.794.311  | 2.848                    | 305.531.307                        | 33.735                                            | 4.136                                      | 37.455.580                       | 342.986.887                            | 37.871                              |
| A    | ET-1 San Felipe |                        |                                                 |                       | 277.128.567 | 2.294                    |                                    |                                                   |                                            |                                  |                                        |                                     |
| B    | ET-2a Norte     |                        |                                                 |                       | 258.497.837 | 2.848                    |                                    |                                                   |                                            |                                  |                                        |                                     |
| 2020 | Año 2020        | 10.017                 | 6.813                                           |                       | 535.626.404 |                          | 17.684.216.626                     | 19.056                                            |                                            | 4.835.468.542                    | 22.519.685.168                         | 24.266                              |



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**TABLA N°4: ALTERNATIVA 2b: 2 Rellenos Sanitarios nuevos: RS Centro de Gravedad Norte y RS en Centro de Gravedad Central, ET en San Felipe a RS Loma los Colorados y ET Sur a RS Centro**

| N°   | Comuna          | Población | Cantidad RSU | Kilometros lineales a ET o RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET o a RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Camiones Recolectores | Ocupaciones | Peaje       |
|------|-----------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|-------------------------------------|-----------------|-----------|---------------------------------|-------------|-------------|
|      |                 | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                            | [hrs./año]      | semanales | Unidades                        | %           | [Ch\$/año]  |
| 1    | Algarrobo       | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                              | 520             | 20        | 2                               | 87%         | 0           |
| 2    | Cabildo         | 21.804    | 6.295        | 63                            | 1                        | 3.147       | 15.736    | 3.713      | 111.384                             | 442             | 17        | 3                               | 88%         | 3.536.000   |
| 3    | Calle Larga     | 11.086    | 5.465        | 24                            | 0                        | 2.733       | 13.664    | 1.248      | 37.440                              | 390             | 15        | 2                               | 79%         | 0           |
| 4    | Cartagena       | 32.953    | 13.542       | 13                            | 0                        | 6.771       | 33.854    | 1.661      | 49.832                              | 962             | 37        | 4                               | 85%         | 0           |
| 5    | Casablanca      | 36.634    | 15.055       | 42                            | 1                        | 7.527       | 37.637    | 5.984      | 179.514                             | 1.066           | 41        | 6                               | 87%         | 8.528.000   |
| 6    | Catemu          | 13.606    | 6.708        | 40                            | 0                        | 3.354       | 16.771    | 2.484      | 74.506                              | 468             | 18        | 3                               | 76%         | 0           |
| 7    | Con Con         | 93.336    | 45.653       | 18                            | 0                        | 22.827      | 114.133   | 7.655      | 229.653                             | 3.172           | 122       | 14                              | 87%         | 0           |
| 8    | El Quisco       | 21.332    | 8.765        | 9                             | 0                        | 4.383       | 21.913    | 732        | 21.965                              | 624             | 24        | 3                               | 69%         | 0           |
| 9    | El Tabo         | 16.217    | 32.787       | 0                             | 0                        | 16.393      | 81.966    | 0          | 0                                   | 2.288           | 88        | 8                               | 84%         | 0           |
| 10   | Hijuelas        | 20.641    | 10.177       | 77                            | 4                        | 5.089       | 25.443    | 7.484      | 224.515                             | 728             | 28        | 6                               | 80%         | 23.296.000  |
| 11   | La Calera       | 56.954    | 24.227       | 8                             | 0                        | 12.114      | 60.568    | 1.848      | 55.432                              | 1.690           | 65        | 7                               | 81%         | 0           |
| 12   | La Cruz         | 18.230    | 7.491        | 60                            | 4                        | 3.746       | 18.729    | 4.332      | 129.948                             | 546             | 21        | 4                               | 78%         | 17.472.000  |
| 13   | La Ligua        | 41.747    | 22.646       | 35                            | 1                        | 11.323      | 56.615    | 7.465      | 223.943                             | 1.586           | 61        | 8                               | 92%         | 12.688.000  |
| 14   | Limache         | 48.868    | 20.523       | 37                            | 2                        | 10.262      | 51.308    | 6.978      | 209.352                             | 1.430           | 55        | 8                               | 84%         | 17.160.000  |
| 15   | Llay Llay       | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                             | 702             | 27        | 4                               | 81%         | 5.616.000   |
| 16   | Los Andes       | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                             | 2.340           | 90        | 10                              | 88%         | 0           |
| 17   | Nogales         | 28.752    | 17.040       | 0                             | 0                        | 8.520       | 42.601    | 0          | 0                                   | 1.196           | 46        | 4                               | 87%         | 0           |
| 18   | Olmué           | 17.216    | 7.138        | 44                            | 2                        | 3.569       | 17.845    | 3.044      | 91.312                              | 520             | 20        | 3                               | 86%         | 8.320.000   |
| 19   | Panquehue       | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                              | 208             | 8         | 1                               | 76%         | 0           |
| 20   | Papudo          | 6.174     | 5.307        | 65                            | 1                        | 2.653       | 13.267    | 3.401      | 102.024                             | 390             | 15        | 3                               | 77%         | 3.120.000   |
| 21   | Petorca         | 9.680     | 6.190        | 82                            | 1                        | 3.095       | 15.475    | 4.833      | 144.976                             | 442             | 17        | 4                               | 75%         | 3.536.000   |
| 22   | Puchuncavi      | 18.741    | 25.534       | 54                            | 0                        | 12.767      | 63.834    | 12.869     | 386.069                             | 1.794           | 69        | 11                              | 90%         | 0           |
| 23   | Putendo         | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                              | 650             | 25        | 3                               | 82%         | 0           |
| 24   | Quillota        | 94.718    | 57.603       | 50                            | 3                        | 28.802      | 144.008   | 26.747     | 802.402                             | 4.004           | 154       | 24                              | 89%         | 80.080.000  |
| 25   | Quilpué         | 185.176   | 62.505       | 16                            | 1                        | 31.253      | 156.263   | 9.136      | 274.067                             | 4.342           | 167       | 18                              | 89%         | 17.368.000  |
| 26   | Quintero        | 29.063    | 30.534       | 30                            | 0                        | 15.267      | 76.335    | 8.585      | 257.546                             | 2.132           | 82        | 11                              | 85%         | 0           |
| 27   | Rinconada       | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                              | 234             | 9         | 1                               | 84%         | 0           |
| 28   | San Antonio     | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                             | 4.550           | 175       | 20                              | 91%         | 0           |
| 29   | San Esteban     | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                              | 572             | 22        | 3                               | 68%         | 0           |
| 30   | San Felipe      | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                                   | 2.470           | 95        | 8                               | 91%         | 0           |
| 31   | Santa María     | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                              | 442             | 17        | 2                               | 84%         | 0           |
| 32   | Santo Domingo   | 10.213    | 4.196        | 36                            | 0                        | 2.098       | 10.490    | 1.510      | 45.302                              | 312             | 12        | 2                               | 71%         | 0           |
| 33   | Valparaíso      | 253.877   | 110.200      | 14                            | 0                        | 55.100      | 275.501   | 13.908     | 417.248                             | 7.670           | 295       | 30                              | 92%         | 0           |
| 34   | Villa Alemana   | 163.329   | 55.697       | 26                            | 2                        | 27.849      | 139.243   | 13.327     | 399.797                             | 3.874           | 149       | 18                              | 90%         | 46.488.000  |
| 35   | Viña del Mar    | 280.140   | 136.570      | 1                             | 2                        | 68.285      | 341.425   | 1.265      | 37.960                              | 9.490           | 365       | 31                              | 92%         | 151.840.000 |
| 36   | Zapallar        | 8.455     | 9.057        | 42                            | 1                        | 4.528       | 22.642    | 3.657      | 109.720                             | 650             | 25        | 4                               | 80%         | 5.200.000   |
| A    | ET-1 San Felipe | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.375     | 804.372                             | 6.396           | 123       |                                 | 90%         | 102.336.000 |
| B    | ET-2b Sur       | 239.646   | 146.817      | 86                            | 4                        |             |           | 20.747     | 1.348.573                           | 7.800           | 150       |                                 | 91%         | 124.800.000 |
| 2020 | Año 2020        | 1.927.522 | 928.015      | 1.203                         | 33                       | 464.008     | 1.085.485 | 82.867     | 7.601.080                           | 79.092          | 2.769     | 293                             | 84%         | 631.364.000 |



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Continuación TABLA N°4: ALTERNATIVA 2b

| N°   | Comuna          | Costo Variable<br>Recolectores +<br>TD | Costo Fijo<br>Recolectores +<br>TD | CV Recolección<br>por km | CF Recolección<br>por h | CV Transporte a<br>RS/ET por km | CF Transporte<br>la RS/ET por h | Numero<br>Amplirol 70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo<br>Rec.+ Transport<br>+ Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|------|-----------------|----------------------------------------|------------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-----------------------------------------------------------|------------------------------|
|      |                 | [Ch\$/año]                             | [Ch\$/año]                         | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                                | [Ch\$/año]                   |
| 1    | Algarrobo       | 19.812.998                             | 82.215.458                         | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          | 34.171.204                                | 16.888.484             | 153.088.144                                               | 21.386                       |
| 2    | Cabildo         | 52.447.948                             | 123.323.187                        | 9.752.456                | 53.153.883              | 42.695.492                      | 70.169.304                      |                          |                                           |                        | 179.307.135                                               | 28.486                       |
| 3    | Calle Larga     | 22.819.216                             | 82.215.458                         | 8.467.790                | 51.403.799              | 14.351.426                      | 30.811.659                      |                          | 20.173.973                                | 10.446.999             | 135.655.646                                               | 24.821                       |
| 4    | Cartagena       | 40.081.771                             | 164.430.916                        | 20.980.422               | 118.516.600             | 19.101.349                      | 45.914.316                      |                          | 64.643.161                                | 31.948.684             | 301.104.532                                               | 22.236                       |
| 5    | Casablanca      | 92.136.179                             | 246.646.374                        | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          | 71.867.325                                | 35.519.093             | 454.696.971                                               | 30.203                       |
| 6    | Catemu          | 38.953.008                             | 123.323.187                        | 10.393.670               | 65.599.551              | 28.559.338                      | 57.723.636                      |                          | 24.762.262                                | 12.823.023             | 199.861.480                                               | 29.792                       |
| 7    | Con Con         | 158.762.229                            | 575.508.206                        | 70.732.177               | 390.355.176             | 88.030.052                      | 185.153.030                     |                          |                                           |                        | 734.270.435                                               | 16.084                       |
| 8    | El Quisco       | 21.999.773                             | 123.323.187                        | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          | 41.842.417                                | 20.679.839             | 207.845.217                                               | 23.713                       |
| 9    | El Tabo         | 50.797.388                             | 328.861.832                        | 50.797.388               | 288.584.258             | 0                               | 40.277.574                      |                          | 156.512.758                               | 77.353.529             | 613.525.507                                               | 18.713                       |
| 10   | Hijuelas        | 101.828.414                            | 246.646.374                        | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                     |                          |                                           |                        | 371.770.788                                               | 36.530                       |
| 11   | La Calera       | 58.784.005                             | 287.754.103                        | 37.535.922               | 222.711.643             | 21.248.083                      | 65.042.460                      |                          |                                           |                        | 346.538.108                                               | 14.304                       |
| 12   | La Cruz         | 61.418.261                             | 164.430.916                        | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                      |                          |                                           |                        | 243.321.177                                               | 32.480                       |
| 13   | La Ligua        | 120.927.707                            | 328.861.832                        | 35.086.248               | 182.769.296             | 85.841.460                      | 146.092.536                     |                          |                                           |                        | 462.477.539                                               | 20.422                       |
| 14   | Limache         | 112.045.959                            | 328.861.832                        | 31.797.569               | 180.752.995             | 80.248.390                      | 148.108.837                     |                          |                                           |                        | 458.067.791                                               | 22.319                       |
| 15   | Llay Llay       | 54.325.144                             | 164.430.916                        | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.596.664                                | 18.951.413             | 279.920.137                                               | 28.233                       |
| 16   | Los Andes       | 115.256.683                            | 411.077.290                        | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.294.967                               | 63.847.730             | 713.476.669                                               | 21.360                       |
| 17   | Nogales         | 26.401.398                             | 164.430.916                        | 26.401.398               | 144.190.602             | 0                               | 20.240.313                      |                          |                                           |                        | 190.832.314                                               | 11.199                       |
| 18   | Olmue           | 46.060.666                             | 123.323.187                        | 11.059.133               | 61.707.017              | 35.001.533                      | 61.616.170                      |                          |                                           |                        | 177.703.853                                               | 24.896                       |
| 19   | Panquehue       | 9.673.932                              | 41.107.729                         | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.662.660                                | 5.521.609              | 66.965.930                                                | 23.182                       |
| 20   | Papudo          | 47.329.852                             | 123.323.187                        | 8.222.216                | 50.779.033              | 39.107.636                      | 72.544.154                      |                          |                                           |                        | 173.773.039                                               | 32.745                       |
| 21   | Petorca         | 65.162.368                             | 164.430.916                        | 9.590.458                | 60.805.738              | 55.571.910                      | 103.625.178                     |                          |                                           |                        | 233.129.284                                               | 37.662                       |
| 22   | Puchuncaví      | 187.547.241                            | 452.185.019                        | 39.560.121               | 210.463.100             | 147.987.120                     | 241.721.919                     |                          |                                           |                        | 639.732.260                                               | 25.055                       |
| 23   | Putendo         | 32.104.153                             | 123.323.187                        | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.221.787                                | 17.721.595             | 207.370.722                                               | 22.367                       |
| 24   | Quillota        | 396.821.769                            | 986.585.496                        | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                     |                          |                                           |                        | 1.463.487.264                                             | 25.406                       |
| 25   | Quilpué         | 201.896.606                            | 739.939.122                        | 96.841.776               | 516.989.573             | 105.054.830                     | 222.949.549                     |                          |                                           |                        | 959.203.727                                               | 15.346                       |
| 26   | Quintero        | 146.029.542                            | 452.185.019                        | 47.307.678               | 265.685.041             | 98.721.864                      | 186.499.978                     |                          |                                           |                        | 598.214.561                                               | 19.592                       |
| 27   | Rinconada       | 10.230.990                             | 41.107.729                         | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.236.751                                | 6.336.745              | 69.912.215                                                | 21.089                       |
| 28   | San Antonio     | 256.069.916                            | 822.154.580                        | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          | 311.791.023                               | 154.096.932            | 1.544.112.450                                             | 23.641                       |
| 29   | San Esteban     | 25.340.373                             | 123.323.187                        | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.447.646                                | 15.249.328             | 193.360.534                                               | 24.237                       |
| 30   | San Felipe      | 55.043.114                             | 328.861.832                        | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.136.737                               | 67.908.554             | 582.950.238                                               | 16.409                       |
| 31   | Santa María     | 21.749.314                             | 82.215.458                         | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.399.541                                | 12.117.345             | 139.481.658                                               | 22.003                       |
| 32   | Santo Domingo   | 23.866.436                             | 82.215.458                         | 6.501.211                | 44.001.751              | 17.365.225                      | 38.213.707                      |                          | 20.031.000                                | 9.899.950              | 136.012.844                                               | 32.414                       |
| 33   | Valparaíso      | 330.676.003                            | 1.233.231.869                      | 170.737.334              | 886.184.798             | 159.938.669                     | 347.047.071                     |                          |                                           |                        | 1.563.907.873                                             | 14.192                       |
| 34   | Villa Alemana   | 239.543.293                            | 739.939.122                        | 86.293.983               | 457.417.828             | 153.249.310                     | 282.521.294                     |                          |                                           |                        | 1.025.970.414                                             | 18.420                       |
| 35   | Viña del Mar    | 226.144.082                            | 1.274.339.598                      | 211.593.331              | 1.100.935.346           | 14.550.751                      | 173.404.252                     |                          |                                           |                        | 1.652.323.681                                             | 12.099                       |
| 36   | Zapallar        | 56.089.532                             | 164.430.916                        | 14.031.881               | 84.271.993              | 42.057.651                      | 80.158.923                      |                          |                                           |                        | 225.720.448                                               | 24.923                       |
| A    | ET-1 San Felipe |                                        |                                    |                          |                         |                                 |                                 | 6                        | 445.932.989                               | 230.924.340            |                                                           |                              |
| B    | ET-2b Sur       |                                        |                                    |                          |                         |                                 |                                 | 9                        | 700.858.888                               | 346.386.510            |                                                           |                              |
| 2020 | Año 2020        | 3.526.177.265                          | 12.044.564.592                     | 1.437.809.191            | 7.834.110.441           | 2.088.368.074                   | 4.210.454.151                   | 15                       | 1.146.791.877                             | 577.310.851            | 17.699.092.585                                            | 19.072                       |



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Continuación TABLA N°4: ALTERNATIVA 2b

| N°   | Comuna          | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total<br>Rec. +<br>Trans.+ET | Costo<br>Total/T Rec.<br>+<br>Transporte<br>+ ETs | Costo de<br>Disposición<br>por<br>Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+<br>ET+Dis. | Costo/T<br>Rec.+Trans.<br>+ET+Disp. |
|------|-----------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|-------------|--------------------------|------------------------------------|---------------------------------------------------|--------------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|
|      |                 | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                         | [Ch\$/t]                                          | [Ch\$/t]                                   | [Ch\$/año]                       | [Ch\$/año]                             | [Ch\$/ton]                          |
| 1    | Algarrobo       | 14.253                  | 10.012                 | 4.241                                           | 7.133                 | 17.793.172  | 2.486                    | 170.881.316                        | 23.872                                            | 4.048                                      | 28.974.005                       | 199.855.321                            | 27.920                              |
| 2    | Cabildo         | 27.924                  | 9.994                  | 17.930                                          |                       |             |                          | 179.307.135                        | 28.486                                            | 10.918                                     | 68.725.579                       | 248.032.714                            | 39.404                              |
| 3    | Calle Larga     | 19.218                  | 10.955                 | 8.263                                           | 5.603                 | 12.523.402  | 2.291                    | 148.179.048                        | 27.112                                            | 6.000                                      | 32.792.557                       | 180.971.605                            | 33.112                              |
| 4    | Cartagena       | 15.103                  | 10.301                 | 4.801                                           | 7.133                 | 33.660.122  | 2.486                    | 334.764.654                        | 24.721                                            | 4.048                                      | 54.811.392                       | 389.576.047                            | 28.769                              |
| 5    | Casablanca      | 22.503                  | 10.009                 | 12.494                                          | 7.133                 | 37.421.792  | 2.486                    | 492.118.763                        | 32.688                                            | 6.000                                      | 90.329.235                       | 582.447.997                            | 38.688                              |
| 6    | Catemu          | 24.190                  | 11.328                 | 12.862                                          | 5.603                 | 15.371.675  | 2.291                    | 215.233.155                        | 32.084                                            | 6.000                                      | 40.250.767                       | 255.483.922                            | 38.084                              |
| 7    | Con Con         | 16.084                  | 10.100                 | 5.984                                           |                       |             |                          | 734.270.435                        | 16.084                                            | 4.048                                      | 184.787.947                      | 919.058.382                            | 20.131                              |
| 8    | El Quisco       | 16.580                  | 12.294                 | 4.285                                           | 7.133                 | 21.787.624  | 2.486                    | 229.632.840                        | 26.198                                            | 4.048                                      | 35.478.481                       | 265.111.321                            | 30.246                              |
| 9    | El Tabo         | 11.580                  | 10.351                 | 1.228                                           | 7.133                 | 81.497.230  | 2.486                    | 695.022.736                        | 21.198                                            | 4.048                                      | 132.708.272                      | 827.731.008                            | 25.246                              |
| 10   | Hijuelas        | 34.241                  | 10.822                 | 23.420                                          |                       |             |                          | 371.770.788                        | 36.530                                            | 4.048                                      | 41.193.138                       | 412.963.926                            | 40.578                              |
| 11   | La Calera       | 14.304                  | 10.742                 | 3.562                                           |                       |             |                          | 346.538.108                        | 14.304                                            | 10.918                                     | 264.515.735                      | 611.053.844                            | 25.222                              |
| 12   | La Cruz         | 30.147                  | 11.083                 | 19.064                                          |                       |             |                          | 243.321.177                        | 32.480                                            | 4.048                                      | 30.322.927                       | 273.644.104                            | 36.527                              |
| 13   | La Ligua        | 19.862                  | 9.620                  | 10.242                                          |                       |             |                          | 462.477.539                        | 20.422                                            | 10.918                                     | 247.252.876                      | 709.730.415                            | 31.340                              |
| 14   | Limache         | 21.483                  | 10.357                 | 11.127                                          |                       |             |                          | 458.067.791                        | 22.319                                            | 4.048                                      | 83.071.210                       | 541.139.001                            | 26.367                              |
| 15   | Llay Llay       | 22.064                  | 10.636                 | 11.428                                          | 5.603                 | 22.718.119  | 2.291                    | 302.638.256                        | 30.525                                            | 6.000                                      | 59.487.448                       | 362.125.704                            | 36.525                              |
| 16   | Los Andes       | 15.757                  | 9.917                  | 5.840                                           | 5.603                 | 76.537.844  | 2.291                    | 790.014.513                        | 23.651                                            | 6.000                                      | 200.414.524                      | 990.429.036                            | 29.651                              |
| 17   | Nogales         | 11.199                  | 10.011                 | 1.188                                           |                       |             |                          | 190.832.314                        | 11.199                                            | 10.918                                     | 186.050.721                      | 376.883.035                            | 22.117                              |
| 18   | Olmé            | 23.730                  | 10.194                 | 13.536                                          |                       |             |                          | 177.703.853                        | 24.896                                            | 4.048                                      | 28.892.006                       | 206.595.859                            | 28.943                              |
| 19   | Panquehue       | 17.580                  | 11.316                 | 6.263                                           | 5.603                 | 6.619.062   | 2.291                    | 73.584.991                         | 25.474                                            | 6.000                                      | 17.332.028                       | 90.917.019                             | 31.474                              |
| 20   | Papudo          | 32.157                  | 11.118                 | 21.039                                          |                       |             |                          | 173.773.039                        | 32.745                                            | 10.918                                     | 57.941.980                       | 231.715.019                            | 43.663                              |
| 21   | Petorca         | 37.091                  | 11.372                 | 25.718                                          |                       |             |                          | 233.129.284                        | 37.662                                            | 10.918                                     | 67.583.982                       | 300.713.266                            | 48.580                              |
| 22   | Puchuncavi      | 25.055                  | 9.792                  | 15.263                                          |                       |             |                          | 639.732.260                        | 25.055                                            | 4.048                                      | 103.350.890                      | 743.083.150                            | 29.102                              |
| 23   | Putendo         | 16.765                  | 10.580                 | 6.185                                           | 5.603                 | 21.243.866  | 2.291                    | 228.614.588                        | 24.659                                            | 6.000                                      | 55.627.114                       | 284.241.702                            | 30.659                              |
| 24   | Quillota        | 24.016                  | 9.833                  | 14.183                                          |                       |             |                          | 1.463.487.264                      | 25.406                                            | 4.048                                      | 233.157.414                      | 1.696.644.679                          | 29.454                              |
| 25   | Quilpué         | 15.068                  | 9.820                  | 5.248                                           |                       |             |                          | 959.203.727                        | 15.346                                            | 4.048                                      | 252.999.323                      | 1.212.203.051                          | 19.394                              |
| 26   | Quintero        | 19.592                  | 10.251                 | 9.341                                           |                       |             |                          | 598.214.561                        | 19.592                                            | 4.048                                      | 123.591.399                      | 721.805.960                            | 23.639                              |
| 27   | Rinconada       | 15.486                  | 10.353                 | 5.133                                           | 5.603                 | 7.596.211   | 2.291                    | 77.508.425                         | 23.380                                            | 6.000                                      | 19.890.695                       | 97.399.121                             | 29.380                              |
| 28   | San Antonio     | 16.508                  | 9.661                  | 6.847                                           | 7.133                 | 162.351.650 | 2.486                    | 1.706.464.101                      | 26.127                                            | 4.048                                      | 264.369.807                      | 1.970.833.908                          | 30.175                              |
| 29   | San Esteban     | 18.635                  | 12.387                 | 6.248                                           | 5.603                 | 18.280.222  | 2.291                    | 211.640.756                        | 26.529                                            | 6.000                                      | 47.866.804                       | 259.507.560                            | 32.529                              |
| 30   | San Felipe      | 10.806                  | 9.676                  | 1.130                                           | 5.603                 | 81.405.781  | 2.291                    | 664.356.019                        | 18.700                                            | 6.000                                      | 213.161.230                      | 877.517.249                            | 24.700                              |
| 31   | Santa María     | 16.400                  | 10.392                 | 6.008                                           | 5.603                 | 14.525.739  | 2.291                    | 154.007.396                        | 24.294                                            | 6.000                                      | 38.035.680                       | 192.043.077                            | 30.294                              |
| 32   | Santo Domingo   | 25.281                  | 12.036                 | 13.245                                          | 7.133                 | 10.430.274  | 2.486                    | 146.443.118                        | 34.900                                            | 6.000                                      | 25.176.739                       | 171.619.857                            | 40.900                              |
| 33   | Valparaíso      | 14.192                  | 9.591                  | 4.601                                           |                       |             |                          | 1.563.907.873                      | 14.192                                            | 4.048                                      | 446.051.609                      | 2.009.959.482                          | 18.239                              |
| 34   | Villa Alemana   | 17.586                  | 9.762                  | 7.824                                           |                       |             |                          | 1.025.970.414                      | 18.420                                            | 4.048                                      | 225.443.194                      | 1.251.413.608                          | 22.468                              |
| 35   | Viña del Mar    | 10.987                  | 9.611                  | 1.376                                           |                       |             |                          | 1.652.323.681                      | 12.099                                            | 4.048                                      | 552.787.978                      | 2.205.111.659                          | 16.146                              |
| 36   | Zapallar        | 24.349                  | 10.854                 | 13.495                                          |                       |             |                          | 225.720.448                        | 24.923                                            | 10.918                                     | 98.882.703                       | 324.603.151                            | 35.841                              |
| A    | ET-1 San Felipe |                         |                        |                                                 |                       | 276.821.920 | 2.291                    |                                    |                                                   |                                            |                                  |                                        |                                     |
| B    | ET-2b Sur       |                         |                        |                                                 |                       | 364.941.865 | 2.486                    |                                    |                                                   |                                            |                                  |                                        |                                     |
| 2020 | Año 2020        | 16.779                  | 9.991                  | 6.787                                           |                       | 641.763.785 |                          | 18.340.856.370                     | 19.764                                            |                                            | 4.653.309.388                    | 22.994.165.758                         | 24.778                              |



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**TABLA N°5: ALTERNATIVA 3: 3 Rellenos Sanitarios nuevos: en Centro de Gravedad Central, Centro de Gravedad Sur y Centro de Gravedad Norte, ET en San Felipe a RS Loma los Colorados**

| N°   | Comuna          | Población | Cantidad RSU | Kilometros ida + regreso | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET o a RS o de ET a RS | Tiempos muertos | Vueltas   | Numero de Camiones Recolectores | Ocupaciones | Peaje       |
|------|-----------------|-----------|--------------|--------------------------|--------------------------|-------------|-----------|------------|-------------------------------------|-----------------|-----------|---------------------------------|-------------|-------------|
|      |                 | [hab.]    | [ton/año]    | [km]                     | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                            | [hrs./año]      | semanales | Unidades                        | %           | [Ch\$/año]  |
| 1    | Algarrobo       | 17.420    | 7.158        | 11                       | 0                        | 3.579       | 17.896    | 759        | 22.755                              | 520             | 20        | 2                               | 87%         | 0           |
| 2    | Cabildo         | 21.804    | 6.295        | 63                       | 1                        | 3.147       | 15.736    | 3.713      | 111.384                             | 442             | 17        | 3                               | 88%         | 3.536.000   |
| 3    | Calle Larga     | 11.086    | 5.465        | 24                       | 0                        | 2.733       | 13.664    | 1.248      | 37.440                              | 390             | 15        | 2                               | 79%         | 0           |
| 4    | Cartagena       | 32.953    | 13.542       | 13                       | 0                        | 6.771       | 33.854    | 1.661      | 49.832                              | 962             | 37        | 4                               | 85%         | 0           |
| 5    | Casablanca      | 36.634    | 15.055       | 42                       | 1                        | 7.527       | 37.637    | 5.984      | 179.514                             | 1.066           | 41        | 6                               | 87%         | 8.528.000   |
| 6    | Catemu          | 13.606    | 6.708        | 40                       | 0                        | 3.354       | 16.771    | 2.484      | 74.506                              | 468             | 18        | 3                               | 76%         | 0           |
| 7    | Con Con         | 93.336    | 45.653       | 18                       | 0                        | 22.827      | 114.133   | 7.655      | 229.653                             | 3.172           | 122       | 14                              | 87%         | 0           |
| 8    | El Quisco       | 21.332    | 8.765        | 9                        | 0                        | 4.383       | 21.913    | 732        | 21.965                              | 624             | 24        | 3                               | 69%         | 0           |
| 9    | El Tabo         | 16.217    | 32.787       | 0                        | 0                        | 16.393      | 81.966    | 0          | 0                                   | 2.288           | 88        | 8                               | 84%         | 0           |
| 10   | Hijuelas        | 20.641    | 10.177       | 77                       | 4                        | 5.089       | 25.443    | 7.484      | 224.515                             | 728             | 28        | 6                               | 80%         | 23.296.000  |
| 11   | La Calera       | 56.954    | 24.227       | 8                        | 0                        | 12.114      | 60.568    | 1.848      | 55.432                              | 1.690           | 65        | 7                               | 81%         | 0           |
| 12   | La Cruz         | 18.230    | 7.491        | 60                       | 4                        | 3.746       | 18.729    | 4.332      | 129.948                             | 546             | 21        | 4                               | 78%         | 17.472.000  |
| 13   | La Ligua        | 41.747    | 22.646       | 35                       | 1                        | 11.323      | 56.615    | 7.465      | 223.943                             | 1.586           | 61        | 8                               | 92%         | 12.688.000  |
| 14   | Limache         | 48.868    | 20.523       | 37                       | 2                        | 10.262      | 51.308    | 6.978      | 209.352                             | 1.430           | 55        | 8                               | 84%         | 17.160.000  |
| 15   | Llay Llay       | 24.125    | 9.915        | 36                       | 1                        | 4.957       | 24.786    | 3.388      | 101.650                             | 702             | 27        | 4                               | 81%         | 5.616.000   |
| 16   | Los Andes       | 85.279    | 33.402       | 18                       | 0                        | 16.701      | 83.506    | 5.522      | 165.672                             | 2.340           | 90        | 10                              | 88%         | 0           |
| 17   | Nogales         | 28.752    | 17.040       | 0                        | 1                        | 8.520       | 42.601    | 0          | 0                                   | 1.196           | 46        | 4                               | 87%         | 9.568.000   |
| 18   | Olmué           | 17.216    | 7.138        | 44                       | 2                        | 3.569       | 17.845    | 3.044      | 91.312                              | 520             | 20        | 3                               | 86%         | 8.320.000   |
| 19   | Panquehue       | 8.010     | 2.889        | 16                       | 0                        | 1.444       | 7.222     | 452        | 13.562                              | 208             | 8         | 1                               | 76%         | 0           |
| 20   | Papudo          | 6.174     | 5.307        | 65                       | 1                        | 2.653       | 13.267    | 3.401      | 102.024                             | 390             | 15        | 3                               | 77%         | 3.120.000   |
| 21   | Petorca         | 9.680     | 6.190        | 82                       | 1                        | 3.095       | 15.475    | 4.833      | 144.976                             | 442             | 17        | 4                               | 75%         | 3.536.000   |
| 22   | Puchuncaví      | 18.741    | 25.534       | 54                       | 0                        | 12.767      | 63.834    | 12.869     | 386.069                             | 1.794           | 69        | 11                              | 90%         | 0           |
| 23   | Putendo         | 18.803    | 9.271        | 18                       | 0                        | 4.636       | 23.178    | 1.543      | 46.280                              | 650             | 25        | 3                               | 82%         | 0           |
| 24   | Quillota        | 94.718    | 57.603       | 50                       | 3                        | 28.802      | 144.008   | 26.747     | 802.402                             | 4.004           | 154       | 24                              | 89%         | 80.080.000  |
| 25   | Quilpué         | 185.176   | 62.505       | 16                       | 1                        | 31.253      | 156.263   | 9.136      | 274.067                             | 4.342           | 167       | 18                              | 89%         | 17.368.000  |
| 26   | Quintero        | 29.063    | 30.534       | 30                       | 0                        | 15.267      | 76.335    | 8.585      | 257.546                             | 2.132           | 82        | 11                              | 85%         | 0           |
| 27   | Rinconada       | 8.775     | 3.315        | 14                       | 0                        | 1.658       | 8.288     | 443        | 13.291                              | 234             | 9         | 1                               | 84%         | 0           |
| 28   | San Antonio     | 104.877   | 65.314       | 22                       | 0                        | 32.657      | 163.286   | 13.468     | 404.040                             | 4.550           | 175       | 20                              | 91%         | 0           |
| 29   | San Esteban     | 19.414    | 7.978        | 15                       | 0                        | 3.989       | 19.945    | 1.129      | 33.862                              | 572             | 22        | 3                               | 68%         | 0           |
| 30   | San Felipe      | 86.449    | 35.527       | 0                        | 0                        | 17.763      | 88.817    | 0          | 0                                   | 2.470           | 95        | 8                               | 91%         | 0           |
| 31   | Santa María     | 15.428    | 6.339        | 18                       | 0                        | 3.170       | 15.848    | 1.037      | 31.117                              | 442             | 17        | 2                               | 84%         | 0           |
| 32   | Santo Domingo   | 10.213    | 4.196        | 36                       | 0                        | 2.098       | 10.490    | 1.510      | 45.302                              | 312             | 12        | 2                               | 71%         | 0           |
| 33   | Valparaíso      | 253.877   | 110.200      | 14                       | 0                        | 55.100      | 275.501   | 13.908     | 417.248                             | 7.670           | 295       | 30                              | 92%         | 0           |
| 34   | Villa Alemana   | 163.329   | 55.697       | 26                       | 2                        | 27.849      | 139.243   | 13.327     | 399.797                             | 3.874           | 149       | 18                              | 90%         | 46.488.000  |
| 35   | Viña del Mar    | 280.140   | 136.570      | 2                        | 2                        | 68.285      | 341.425   | 2.531      | 75.920                              | 9.490           | 365       | 32                              | 90%         | 151.840.000 |
| 36   | Zapallar        | 8.455     | 9.057        | 42                       | 1                        | 4.528       | 22.642    | 3.657      | 109.720                             | 650             | 25        | 4                               | 80%         | 5.200.000   |
| A    | ET-1 San Felipe | 290.975   | 120.810      | 63                       | 4                        |             |           | 12.375     | 804.372                             | 6.396           | 123       |                                 | 90%         | 102.336.000 |
| 2020 | Año 2020        | 1.927.522 | 928.015      | 1.117                    | 30                       | 464.008     | 2.320.039 | 195.245    | 6.290.467                           | 71.292          | 2.619     | 294                             | 84%         | 516.152.000 |



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Continuación TABLA N°5: ALTERNATIVA 3

| N°   | Comuna          | Costo Variable<br>Recolectores +<br>TD | Costo Fijo<br>Recolectores +<br>TD | CV Recolección<br>por km | CF Recolección<br>por h | CV Transporte a<br>la ET por km | CF Transporte<br>a la ET por h | Numero<br>Amplirol 70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo<br>Rec.+ Transport<br>+ Peaje<br>Recolector | Costo/T Rec.<br>y Transporte |
|------|-----------------|----------------------------------------|------------------------------------|--------------------------|-------------------------|---------------------------------|--------------------------------|--------------------------|-------------------------------------------|------------------------|---------------------------------------------------------|------------------------------|
|      |                 | [Ch\$/año]                             | [Ch\$/año]                         | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                     | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                              | [Ch\$/año]                   |
| 1    | Algarrobo       | 19.812.998                             | 82.215.458                         | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                     |                          |                                           |                        | 102.028.456                                             | 14.253                       |
| 2    | Cabildo         | 52.447.948                             | 123.323.187                        | 9.752.456                | 53.153.883              | 42.695.492                      | 70.169.304                     |                          |                                           |                        | 179.307.135                                             | 28.486                       |
| 3    | Calle Larga     | 22.819.216                             | 82.215.458                         | 8.467.790                | 51.403.799              | 14.351.426                      | 30.811.659                     |                          | 20.173.973                                | 10.446.999             | 135.655.646                                             | 24.821                       |
| 4    | Cartagena       | 40.081.771                             | 164.430.916                        | 20.980.422               | 118.516.600             | 19.101.349                      | 45.914.316                     |                          |                                           |                        | 204.512.687                                             | 15.103                       |
| 5    | Casablanca      | 92.136.179                             | 246.646.374                        | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                    |                          |                                           |                        | 347.310.553                                             | 23.070                       |
| 6    | Catemu          | 38.953.008                             | 123.323.187                        | 10.393.670               | 65.599.551              | 28.559.338                      | 57.723.636                     |                          | 24.762.262                                | 12.823.023             | 199.861.480                                             | 29.792                       |
| 7    | Con Con         | 158.762.229                            | 575.508.206                        | 70.732.177               | 390.355.176             | 88.030.052                      | 185.153.030                    |                          |                                           |                        | 734.270.435                                             | 16.084                       |
| 8    | El Quisco       | 21.999.773                             | 123.323.187                        | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                     |                          |                                           |                        | 145.322.960                                             | 16.580                       |
| 9    | El Tabo         | 50.797.388                             | 328.861.832                        | 50.797.388               | 288.584.258             | 0                               | 40.277.574                     |                          |                                           |                        | 379.659.220                                             | 11.580                       |
| 10   | Hijuelas        | 101.828.414                            | 246.646.374                        | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                    |                          |                                           |                        | 371.770.788                                             | 36.530                       |
| 11   | La Calera       | 58.784.005                             | 287.754.103                        | 37.535.922               | 222.711.643             | 21.248.083                      | 65.042.460                     |                          |                                           |                        | 346.538.108                                             | 14.304                       |
| 12   | La Cruz         | 61.418.261                             | 164.430.916                        | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                     |                          |                                           |                        | 243.321.177                                             | 32.480                       |
| 13   | La Ligua        | 120.927.707                            | 328.861.832                        | 35.086.248               | 182.769.296             | 85.841.460                      | 146.092.536                    |                          |                                           |                        | 462.477.539                                             | 20.422                       |
| 14   | Limache         | 112.045.959                            | 328.861.832                        | 31.797.569               | 180.752.995             | 80.248.390                      | 148.108.837                    |                          |                                           |                        | 458.067.791                                             | 22.319                       |
| 15   | Llay Llay       | 54.325.144                             | 164.430.916                        | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                     |                          | 36.596.664                                | 18.951.413             | 279.920.137                                             | 28.233                       |
| 16   | Los Andes       | 115.256.683                            | 411.077.290                        | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                    |                          | 123.294.967                               | 63.847.730             | 713.476.669                                             | 21.360                       |
| 17   | Nogales         | 26.401.398                             | 164.430.916                        | 26.401.398               | 144.190.602             | 0                               | 20.240.313                     |                          |                                           |                        | 200.400.314                                             | 11.760                       |
| 18   | Olmué           | 46.060.666                             | 123.323.187                        | 11.059.133               | 61.707.017              | 35.001.533                      | 61.616.170                     |                          |                                           |                        | 177.703.853                                             | 24.896                       |
| 19   | Panquehue       | 9.673.932                              | 41.107.729                         | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                     |                          | 10.662.660                                | 5.521.609              | 66.965.930                                              | 23.182                       |
| 20   | Papudo          | 47.329.852                             | 123.323.187                        | 8.222.216                | 50.779.033              | 39.107.636                      | 72.544.154                     |                          |                                           |                        | 173.773.039                                             | 32.745                       |
| 21   | Petorca         | 65.162.368                             | 164.430.916                        | 9.590.458                | 60.805.738              | 55.571.910                      | 103.625.178                    |                          |                                           |                        | 233.129.284                                             | 37.662                       |
| 22   | Ruchuncaví      | 187.547.241                            | 452.185.019                        | 39.560.121               | 210.463.100             | 147.987.120                     | 241.721.919                    |                          |                                           |                        | 639.732.260                                             | 25.055                       |
| 23   | Putendo         | 32.104.153                             | 123.323.187                        | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                     |                          | 34.221.787                                | 17.721.595             | 207.370.722                                             | 22.367                       |
| 24   | Quillota        | 396.821.769                            | 986.585.496                        | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                    |                          |                                           |                        | 1.463.487.264                                           | 25.406                       |
| 25   | Quilpué         | 201.896.606                            | 739.939.122                        | 96.841.776               | 516.989.573             | 105.054.830                     | 222.949.549                    |                          |                                           |                        | 959.203.727                                             | 15.346                       |
| 26   | Quintero        | 146.029.542                            | 452.185.019                        | 47.307.678               | 252.728.683             | 98.721.864                      | 186.499.978                    |                          |                                           |                        | 598.214.561                                             | 19.592                       |
| 27   | Rinconada       | 10.230.990                             | 41.107.729                         | 5.136.233                | 27.763.073              | 5.094.756                       | 11.921.358                     |                          | 12.236.751                                | 6.336.745              | 69.912.215                                              | 21.089                       |
| 28   | San Antonio     | 256.069.916                            | 822.154.580                        | 101.194.111              | 503.992.973             | 154.875.805                     | 292.323.965                    |                          |                                           |                        | 1.078.224.496                                           | 16.508                       |
| 29   | San Esteban     | 25.340.373                             | 123.323.187                        | 12.360.306               | 82.243.206              | 12.980.067                      | 36.863.710                     |                          | 29.447.646                                | 15.249.328             | 193.360.534                                             | 24.237                       |
| 30   | San Felipe      | 55.043.114                             | 328.861.832                        | 55.043.114               | 274.636.489             | 0                               | 40.145.862                     |                          | 131.136.737                               | 67.908.554             | 582.950.238                                             | 16.409                       |
| 31   | Santa María     | 21.749.314                             | 82.215.458                         | 9.821.684                | 53.321.672              | 11.927.630                      | 26.160.203                     |                          | 23.399.541                                | 12.117.345             | 139.481.658                                             | 22.003                       |
| 32   | Santo Domingo   | 23.866.436                             | 82.215.458                         | 6.501.211                | 41.855.968              | 17.365.225                      | 38.213.707                     |                          |                                           |                        | 106.081.894                                             | 25.281                       |
| 33   | Valparaíso      | 330.676.003                            | 1.233.231.869                      | 170.737.334              | 842.969.241             | 159.938.669                     | 347.047.071                    |                          |                                           |                        | 1.563.907.873                                           | 14.192                       |
| 34   | Villa Alemana   | 239.543.293                            | 739.939.122                        | 86.293.983               | 435.111.457             | 153.249.310                     | 282.521.294                    |                          |                                           |                        | 1.025.970.414                                           | 18.420                       |
| 35   | Viña del Mar    | 240.694.834                            | 1.315.447.327                      | 211.593.331              | 1.063.996.285           | 29.101.503                      | 196.904.339                    |                          |                                           |                        | 1.707.982.161                                           | 12.506                       |
| 36   | Zapallar        | 56.089.532                             | 164.430.916                        | 14.031.881               | 80.162.398              | 42.057.651                      | 80.158.923                     |                          |                                           |                        | 225.720.448                                             | 24.923                       |
| A    | ET-1 San Felipe |                                        |                                    |                          |                         |                                 |                                | 6                        | 445.932.989                               | 230.924.340            |                                                         |                              |
| 2020 | Año 2020        | 3.540.728.016                          | 12.085.672.321                     | 1.437.809.391            | 7.664.147.443           | 2.102.918.825                   | 4.233.954.238                  | 6                        | 445.932.989                               | 230.924.340            | 16.717.073.667                                          | 18.014                       |



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Continuación TABLA N°5: ALTERNATIVA 3

| N°   | Comuna          | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total<br>Rec. +<br>Trans.+ET | Costo<br>Total/T Rec.<br>+<br>Transporte<br>+ ETs | Costo de<br>Disposición<br>por<br>Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+<br>ET+Dis. | Costo/T<br>Rec.+Trans.<br>+ET+Disp. |
|------|-----------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|-------------|--------------------------|------------------------------------|---------------------------------------------------|--------------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|
|      |                 | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                         | [Ch\$/t]                                          | [Ch\$/t]                                   | [Ch\$/año]                       | [Ch\$/año]                             | [Ch\$/ton]                          |
| 1    | Algarrobo       | 14.253                  | 10.012                 | 4.241                                           |                       |             |                          | 102.028.456                        | 14.253                                            | 9.396                                      | 67.256.957                       | 169.285.413                            | 23.649                              |
| 2    | Cabildo         | 27.924                  | 9.994                  | 17.930                                          |                       |             |                          | 179.307.135                        | 28.486                                            | 10.918                                     | 68.725.579                       | 248.032.714                            | 39.404                              |
| 3    | Calle Larga     | 19.218                  | 10.955                 | 8.263                                           | 5.603                 | 12.537.275  | 2.294                    | 148.192.920                        | 27.115                                            | 6.000                                      | 32.792.557                       | 180.985.477                            | 33.115                              |
| 4    | Cartagena       | 15.103                  | 10.301                 | 4.801                                           |                       |             |                          | 204.512.687                        | 15.103                                            | 9.396                                      | 127.232.928                      | 331.745.615                            | 24.498                              |
| 5    | Casablanca      | 22.503                  | 10.009                 | 12.494                                          |                       |             |                          | 347.310.553                        | 23.070                                            | 9.396                                      | 141.451.779                      | 488.762.332                            | 32.465                              |
| 6    | Catemu          | 24.190                  | 11.328                 | 12.862                                          | 5.603                 | 15.388.703  | 2.294                    | 215.250.183                        | 32.086                                            | 6.000                                      | 40.250.767                       | 255.500.950                            | 38.086                              |
| 7    | Con Con         | 16.084                  | 10.100                 | 5.984                                           |                       |             |                          | 734.270.435                        | 16.084                                            | 4.399                                      | 200.835.215                      | 935.105.650                            | 20.483                              |
| 8    | El Quisco       | 16.580                  | 12.294                 | 4.285                                           |                       |             |                          | 145.322.960                        | 16.580                                            | 9.396                                      | 82.355.708                       | 227.678.668                            | 25.975                              |
| 9    | El Tabo         | 11.580                  | 10.351                 | 1.228                                           |                       |             |                          | 379.659.220                        | 11.580                                            | 9.396                                      | 308.053.878                      | 687.713.097                            | 20.975                              |
| 10   | Hijuelas        | 34.241                  | 10.822                 | 23.420                                          |                       |             |                          | 371.770.788                        | 36.530                                            | 4.399                                      | 44.770.413                       | 416.541.201                            | 40.929                              |
| 11   | La Calera       | 14.304                  | 10.742                 | 3.562                                           |                       |             |                          | 346.538.108                        | 14.304                                            | 10.918                                     | 264.515.735                      | 611.053.844                            | 25.222                              |
| 12   | La Cruz         | 30.147                  | 11.083                 | 19.064                                          |                       |             |                          | 243.321.177                        | 32.480                                            | 4.399                                      | 32.956.216                       | 276.277.393                            | 36.879                              |
| 13   | La Ligua        | 19.862                  | 9.620                  | 10.242                                          |                       |             |                          | 462.477.539                        | 20.422                                            | 10.918                                     | 247.252.876                      | 709.730.415                            | 31.340                              |
| 14   | Limache         | 21.483                  | 10.357                 | 11.127                                          |                       |             |                          | 458.067.791                        | 22.319                                            | 4.399                                      | 90.285.241                       | 548.353.032                            | 26.719                              |
| 15   | Llay Llay       | 22.064                  | 10.636                 | 11.428                                          | 5.603                 | 22.743.285  | 2.294                    | 302.663.422                        | 30.527                                            | 6.000                                      | 59.487.448                       | 362.150.870                            | 36.527                              |
| 16   | Los Andes       | 15.757                  | 9.917                  | 5.840                                           | 5.603                 | 76.622.628  | 2.294                    | 790.099.297                        | 23.654                                            | 6.000                                      | 200.414.524                      | 990.513.820                            | 29.654                              |
| 17   | Nogales         | 11.199                  | 10.011                 | 1.188                                           |                       |             |                          | 200.400.314                        | 11.760                                            | 10.918                                     | 186.050.721                      | 386.451.035                            | 22.678                              |
| 18   | Olnué           | 23.730                  | 10.194                 | 13.536                                          |                       |             |                          | 177.703.853                        | 24.896                                            | 4.399                                      | 31.401.031                       | 209.104.895                            | 29.295                              |
| 19   | Panquehue       | 17.580                  | 11.316                 | 6.263                                           | 5.603                 | 6.626.394   | 2.294                    | 73.592.324                         | 25.476                                            | 6.000                                      | 17.332.028                       | 90.924.352                             | 31.476                              |
| 20   | Papudo          | 32.157                  | 11.118                 | 21.039                                          |                       |             |                          | 173.773.039                        | 32.745                                            | 10.918                                     | 57.941.980                       | 231.715.019                            | 43.663                              |
| 21   | Petorca         | 37.091                  | 11.372                 | 25.718                                          |                       |             |                          | 233.129.284                        | 37.662                                            | 10.918                                     | 67.583.982                       | 300.713.266                            | 48.580                              |
| 22   | Puchuncavi      | 25.055                  | 9.792                  | 15.263                                          |                       |             |                          | 639.732.260                        | 25.055                                            | 4.399                                      | 112.326.039                      | 752.058.299                            | 29.454                              |
| 23   | Putendo         | 16.765                  | 10.580                 | 6.185                                           | 5.603                 | 21.267.399  | 2.294                    | 228.638.121                        | 24.661                                            | 6.000                                      | 55.627.114                       | 284.265.235                            | 30.661                              |
| 24   | Quillota        | 24.016                  | 9.833                  | 14.183                                          |                       |             |                          | 1.463.487.264                      | 25.406                                            | 4.399                                      | 253.405.160                      | 1.716.892.424                          | 29.806                              |
| 25   | Quilpué         | 15.068                  | 9.820                  | 5.248                                           |                       |             |                          | 959.203.727                        | 15.346                                            | 4.399                                      | 274.970.171                      | 1.234.173.898                          | 19.745                              |
| 26   | Quintero        | 19.592                  | 9.826                  | 9.341                                           |                       |             |                          | 598.214.561                        | 19.592                                            | 4.399                                      | 134.324.265                      | 732.538.826                            | 23.991                              |
| 27   | Rinconada       | 15.486                  | 9.924                  | 5.133                                           | 5.603                 | 7.604.625   | 2.294                    | 77.516.840                         | 23.383                                            | 6.000                                      | 19.890.695                       | 97.407.535                             | 29.383                              |
| 28   | San Antonio     | 16.508                  | 9.266                  | 6.847                                           |                       |             |                          | 1.078.224.496                      | 16.508                                            | 9.396                                      | 613.677.982                      | 1.691.902.477                          | 25.904                              |
| 29   | San Esteban     | 18.635                  | 11.858                 | 6.248                                           | 5.603                 | 18.300.472  | 2.294                    | 211.661.006                        | 26.531                                            | 6.000                                      | 47.866.804                       | 259.527.810                            | 32.531                              |
| 30   | San Felipe      | 10.806                  | 9.280                  | 1.130                                           | 5.603                 | 81.495.958  | 2.294                    | 664.446.196                        | 18.703                                            | 6.000                                      | 213.161.230                      | 877.607.425                            | 24.703                              |
| 31   | Santa María     | 16.400                  | 9.961                  | 6.008                                           | 5.603                 | 14.541.829  | 2.294                    | 154.023.487                        | 24.297                                            | 6.000                                      | 38.035.680                       | 192.059.167                            | 30.297                              |
| 32   | Santo Domingo   | 25.281                  | 11.524                 | 13.245                                          |                       |             |                          | 106.081.894                        | 25.281                                            | 9.396                                      | 39.425.713                       | 145.507.607                            | 34.677                              |
| 33   | Valparaíso      | 14.192                  | 9.199                  | 4.601                                           |                       |             |                          | 1.563.907.873                      | 14.192                                            | 4.399                                      | 484.787.412                      | 2.048.695.284                          | 18.591                              |
| 34   | Villa Alemana   | 17.586                  | 9.361                  | 7.824                                           |                       |             |                          | 1.025.970.414                      | 18.420                                            | 4.399                                      | 245.021.025                      | 1.270.991.440                          | 22.820                              |
| 35   | Viña del Mar    | 11.394                  | 9.340                  | 1.655                                           |                       |             |                          | 1.707.982.161                      | 12.506                                            | 4.399                                      | 600.792.930                      | 2.308.775.091                          | 16.905                              |
| 36   | Zapallar        | 24.349                  | 10.401                 | 13.495                                          |                       |             |                          | 225.720.448                        | 24.923                                            | 10.918                                     | 98.882.703                       | 324.603.151                            | 35.841                              |
| A    | ET-1 San Felipe |                         |                        |                                                 |                       | 277.128.567 | 2.294                    |                                    |                                                   |                                            |                                  |                                        |                                     |
| 2020 | Año 2020        | 16.839                  | 9.808                  | 6.828                                           |                       | 277.128.567 |                          | 16.994.202.233                     | 18.312                                            |                                            | 5.601.142.486                    | 22.595.344.719                         | 24.348                              |



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Evaluación Económica de las Alternativas de Transporte de la Alternativa 2a

TABLA N°6: ALTERNATIVA 2a: 2 Rellenos Sanitarios nuevos: RS SUR y CENTRO, ET en San Felipe a Loma los Colorados y ET's Norte a RS Centro

| N°  | Comuna           | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|-----|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|     |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3   | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6   | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15  | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16  | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19  | Panguelhue       | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23  | Putendo          | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27  | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29  | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30  | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31  | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
|     | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2   | Cabildo          | 21.804    | 6.295        | 26                            | 0                        | 3.147       | 15.736    | 1.532      | 45.968                          | 442             | 17        | 2                            | 92%         | 0           |
| 13  | La Ligua         | 41.747    | 22.646       | 0                             | 0                        | 11.323      | 56.615    | 0          | 0                               | 1.586           | 61        | 5                            | 93%         | 0           |
| 20  | Papudo           | 6.174     | 5.307        | 16                            | 0                        | 2.653       | 13.267    | 832        | 24.960                          | 390             | 15        | 2                            | 70%         | 0           |
| 21  | Petorca          | 9.680     | 6.190        | 45                            | 0                        | 3.095       | 15.475    | 2.652      | 79.560                          | 442             | 17        | 3                            | 74%         | 0           |
| 36  | Zapallar         | 8.455     | 9.057        | 41                            | 0                        | 4.528       | 22.642    | 3.553      | 106.600                         | 650             | 25        | 4                            | 79%         | 0           |
|     | ET - Petorca     | 87.860    | 49.494       | 128                           | 0                        | 24.747      | 123.736   | 8.570      | 257.088                         | 3.510           | 135       | 16                           | 82%         | 0           |
| 7   | Con Con          | 93.336    | 45.653       | 21                            | 0                        | 22.827      | 114.133   | 8.882      | 266.448                         | 3.172           | 14        | 14                           | 90%         | 0           |
| 22  | Pichuncavi       | 18.741    | 25.534       | 25                            | 0                        | 12.767      | 63.834    | 5.980      | 179.400                         | 1.794           | 69        | 8                            | 92%         | 0           |
| 26  | Quintero         | 29.063    | 30.534       | 0                             | 0                        | 15.287      | 76.335    | 0          | 0                               | 2.132           | 82        | 7                            | 90%         | 0           |
|     | ET - El Quintero | 141.140   | 101.721      | 46                            | 0                        | 50.860      | 254.302   | 14.862     | 445.848                         | 7.098           | 273       | 29                           | 91%         | 0           |
| 14  | Limache          | 48.868    | 20.523       | 13                            | 0                        | 10.262      | 51.308    | 2.479      | 74.360                          | 1.430           | 55        | 6                            | 85%         | 0           |
| 18  | Olmue            | 17.216    | 7.138        | 0                             | 0                        | 3.569       | 17.845    | 0          | 0                               | 520             | 20        | 2                            | 74%         | 0           |
| 25  | Quilpué          | 185.176   | 62.505       | 24                            | 1                        | 31.253      | 158.263   | 13.894     | 416.832                         | 4.342           | 167       | 20                           | 89%         | 17.368.000  |
| 34  | Villa Alemana    | 163.329   | 55.697       | 23                            | 0                        | 27.849      | 139.243   | 11.880     | 356.408                         | 3.874           | 149       | 17                           | 92%         | 0           |
|     | ET - Marga       | 414.589   | 145.864      | 60                            | 1                        | 72.932      | 364.660   | 28.253     | 847.600                         | 10.166          | 391       | 45                           | 85%         | 17.368.000  |
| 1   | Algarrobo        | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.765                          | 520             | 20        | 2                            | 87%         | 0           |
| 4   | Cartagena        | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5   | Casablanca       | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8   | El Quisco        | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9   | El Tabo          | 16.217    | 32.787       | 0                             | 0                        | 16.393      | 81.966    | 0          | 0                               | 2.288           | 88        | 8                            | 84%         | 0           |
| 10  | Hijuelas         | 20.641    | 10.177       | 77                            | 4                        | 5.089       | 25.443    | 7.484      | 224.515                         | 728             | 28        | 6                            | 80%         | 23.296.000  |
| 11  | La Calera        | 56.954    | 24.227       | 60                            | 4                        | 12.114      | 60.568    | 13.520     | 405.600                         | 1.690           | 65        | 11                           | 89%         | 54.080.000  |
| 12  | La Cruz          | 18.230    | 7.491        | 60                            | 4                        | 3.746       | 18.729    | 4.332      | 129.948                         | 546             | 21        | 4                            | 78%         | 17.472.000  |
| 17  | Nogales          | 28.752    | 17.040       | 70                            | 4                        | 8.520       | 42.601    | 11.226     | 336.794                         | 1.196           | 46        | 9                            | 84%         | 38.272.000  |
| 24  | Quillota         | 94.718    | 57.603       | 50                            | 3                        | 28.802      | 144.008   | 26.747     | 802.402                         | 4.004           | 154       | 24                           | 89%         | 80.080.000  |
| 28  | San Antonio      | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32  | Santo Domingo    | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33  | Valparaíso       | 253.877   | 110.200      | 14                            | 0                        | 55.100      | 275.501   | 13.908     | 417.248                         | 7.670           | 295       | 30                           | 92%         | 0           |
| 35  | Viña del Mar     | 280.140   | 136.570      | 0                             | 1                        | 68.285      | 341.425   | 0          | 0                               | 9.490           | 365       | 31                           | 90%         | 75.920.000  |
| A   | ET-2 San Felipe  | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
| B   | ET - 2 Petorca   | 87.860    | 49.494       | 100                           | 2                        |             |           | 8.160      | 530.400                         | 2.652           | 51        |                              | 78%         | 15.912.000  |
| C   | ET- 3 Quintero   | 141.140   | 101.721      | 30                            | 0                        |             |           | 4.992      | 324.480                         | 5.408           | 104       |                              | 75%         | 0           |
| D   | ET- 3 Marga Mar  | 414.589   | 145.864      | 26                            | 0                        |             |           | 6.198      | 402.896                         | 7.748           | 149       |                              | 80%         | 0           |
| ### | Año 2020         | 1.927.522 | 928.015      | 1.113                         | 28                       | 464.008     | 2.320.039 | 203.836    | 7.226.294                       | 87.300          | 2.923     | 288                          | 84%         | 435.344.000 |



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### Continuación TABLA N°6: ALTERNATIVA 2a

| N°  | Comuna            | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl. Peaje | Costo Fijo Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|-----|-------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|----------------------------------------|---------------------|-------------------------------------------------------|------------------------------|
|     |                   | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                             | [Ch\$/año]          | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3   | Calle Larga       | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                             | 10.446.999          | 131.917.846                                           | 24.137                       |
| 6   | Catemu            | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                             | 12.823.023          | 140.420.073                                           | 20.932                       |
| 15  | Lluy Lluy         | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                             | 18.951.413          | 279.973.559                                           | 28.239                       |
| 16  | Los Andes         | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                            | 63.847.730          | 713.656.650                                           | 21.365                       |
| 19  | Panquehue         | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                             | 5.521.609           | 66.981.495                                            | 23.188                       |
| 23  | Putendo           | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                             | 17.721.595          | 207.420.677                                           | 22.373                       |
| 27  | Rinconada         | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                             | 6.336.745           | 69.930.077                                            | 21.094                       |
| 29  | San Esteban       | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                             | 15.249.328          | 193.403.521                                           | 24.243                       |
| 30  | San Felipe        | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                            | 67.908.554          | 583.141.666                                           | 16.414                       |
| 31  | Santa María       | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                             | 12.117.345          | 139.515.816                                           | 22.008                       |
|     | ET - San Felipe   | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                            | 230.924.340         | 2.526.361.381                                         | 20.912                       |
| 2   | Cabido            | 27.372.817                          | 82.215.458                      | 9.752.456                | 50.522.952              | 17.620.362                      | 31.692.506                      |                          | 30.838.044                             | 19.579.062          | 160.005.381                                           | 25.419                       |
| 13  | La Ligua          | 35.086.248                          | 205.538.645                     | 35.086.248               | 180.286.132             | 0                               | 25.252.513                      |                          | 110.945.519                            | 70.439.265          | 422.009.676                                           | 18.635                       |
| 20  | Papudo            | 17.789.834                          | 82.215.458                      | 8.222.216                | 56.291.507              | 9.567.617                       | 25.923.951                      |                          | 25.999.305                             | 16.506.948          | 142.511.545                                           | 26.854                       |
| 21  | Petorca           | 40.087.238                          | 123.323.187                     | 9.590.458                | 61.671.746              | 30.496.780                      | 61.651.441                      |                          | 30.325.794                             | 19.253.835          | 212.990.054                                           | 34.409                       |
| 36  | Zapallar          | 54.893.580                          | 164.430.916                     | 14.031.881               | 85.275.727              | 40.861.699                      | 79.155.189                      |                          | 44.369.930                             | 28.170.451          | 291.864.877                                           | 32.226                       |
|     | ET - Petorca      | 175.229.717                         | 657.723.664                     | 76.683.259               | 434.048.064             | 98.546.458                      | 223.675.600                     | 4                        | 242.478.592                            | 153.949.560         | 1.229.381.533                                         | 24.839                       |
| 7   | Con Con           | 172.866.492                         | 575.508.206                     | 70.732.177               | 376.628.953             | 102.134.314                     | 198.879.253                     |                          | 62.207.274                             | 69.093.840          | 879.675.812                                           | 19.269                       |
| 22  | Puchuncaví        | 108.327.370                         | 328.861.832                     | 39.560.121               | 204.398.636             | 68.767.249                      | 124.463.196                     |                          | 34.792.189                             | 38.643.808          | 510.625.198                                           | 19.998                       |
| 26  | Quintero          | 47.307.678                          | 287.754.103                     | 47.307.678               | 252.494.065             | 0                               | 35.260.037                      |                          | 41.605.982                             | 46.211.912          | 422.879.675                                           | 13.849                       |
|     | ET - El Quintero  | 328.501.540                         | 1.192.124.140                   | 157.599.976              | 833.521.654             | 170.901.564                     | 358.602.486                     | 4                        | 138.605.445                            | 153.949.560         | 1.813.180.685                                         | 17.825                       |
| 14  | Limache           | 60.301.096                          | 246.646.374                     | 31.797.569               | 178.612.796             | 28.503.526                      | 68.033.578                      |                          | 24.215.045                             | 27.076.245          | 358.238.760                                           | 17.455                       |
| 18  | Olmue             | 11.059.133                          | 82.215.458                      | 11.059.133               | 71.760.049              | 0                               | 10.455.409                      |                          | 19.989.448                             | 9.417.065           | 122.681.104                                           | 17.187                       |
| 25  | Quilpué           | 256.620.985                         | 822.154.580                     | 96.841.776               | 519.195.791             | 159.779.209                     | 302.958.788                     |                          | 175.042.083                            | 82.462.645          | 1.353.648.292                                         | 21.657                       |
| 34  | Villa Alemana     | 222.911.585                         | 698.831.393                     | 86.293.983               | 446.335.196             | 136.617.602                     | 252.496.197                     |                          | 155.976.884                            | 73.480.995          | 1.151.200.857                                         | 20.669                       |
|     | ET - Marga        | 550.892.798                         | 1.849.847.804                   | 225.992.461              | 1.215.903.833           | 324.900.337                     | 633.943.972                     | 5                        | 375.223.461                            | 192.436.950         | 2.985.769.013                                         | 20.470                       |
| 1   | Algarrobo         | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                        |                     | 102.028.456                                           | 14.253                       |
| 4   | Cartagena         | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                        |                     | 329.724.619                                           | 24.349                       |
| 5   | Casablanca        | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                        |                     | 338.782.553                                           | 22.503                       |
| 8   | El Quisco         | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                        |                     | 150.314.960                                           | 17.149                       |
| 9   | El Tabo           | 50.797.388                          | 328.861.832                     | 50.797.388               | 288.584.258             | 0                               | 40.277.574                      |                          |                                        |                     | 379.659.220                                           | 11.580                       |
| 10  | Hijuelas          | 101.828.414                         | 246.646.374                     | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                     |                          |                                        |                     | 371.770.788                                           | 36.530                       |
| 11  | La Calera         | 193.009.703                         | 452.185.019                     | 37.535.922               | 200.470.407             | 155.473.781                     | 251.714.612                     |                          |                                        |                     | 699.274.722                                           | 28.863                       |
| 12  | La Cruz           | 61.418.261                          | 164.430.916                     | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                      |                          |                                        |                     | 243.321.177                                           | 32.480                       |
| 17  | Nogales           | 155.500.448                         | 369.969.561                     | 26.401.398               | 150.516.718             | 129.099.049                     | 219.452.843                     |                          |                                        |                     | 563.742.008                                           | 33.083                       |
| 24  | Quillota          | 396.821.769                         | 986.585.496                     | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                     |                          |                                        |                     | 1.463.487.264                                         | 25.406                       |
| 28  | San Antonio       | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                        |                     | 1.078.224.996                                         | 16.508                       |
| 32  | Santo Domingo     | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                        |                     | 106.225.409                                           | 25.315                       |
| 33  | Valparaíso        | 330.676.003                         | 1.233.231.869                   | 170.737.334              | 886.184.798             | 159.938.669                     | 347.047.071                     |                          |                                        |                     | 1.563.907.873                                         | 14.192                       |
| 35  | Viña del Mar      | 211.593.331                         | 1.274.339.598                   | 211.593.331              | 1.118.846.608           | 0                               | 155.492.990                     |                          |                                        |                     | 1.561.852.929                                         | 11.436                       |
| A   | ET-2 San Felipe   |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                            | 230.924.340         |                                                       |                              |
| B   | ET - 2 Petorca    |                                     |                                 |                          |                         |                                 |                                 | 4                        | 242.478.592                            | 153.949.560         |                                                       |                              |
| C   | ET- 3 Quintero    |                                     |                                 |                          |                         |                                 |                                 | 4                        | 138.605.445                            | 153.949.560         |                                                       |                              |
| D   | ET- 3 Marga Marga |                                     |                                 |                          |                         |                                 |                                 | 5                        | 172.101.760                            | 192.436.950         |                                                       |                              |
| ### | Año 2020          | 3.416.735.284                       | 11.839.025.947                  | 1.437.809.191            | 7.810.071.068           | 1.978.926.093                   | 4.028.954.879                   | 19                       | 999.769.743                            | 731.260.411         | 17.507.009.085                                        | 18.865                       |



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### Continuación TABLA N°6: ALTERNATIVA 2a

| N°  | Comuna            | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET      | Costo ET<br>por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|-----|-------------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|---------------|-----------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|     |                   | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]    | [Ch\$/t]                    | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3   | Calle Larga       | 18.529                  | 11.717                 | 6.812                                           | 5.608                 | 12.537.275    | 2.294                       | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6   | Catemu            | 15.324                  | 10.280                 | 5.044                                           | 5.608                 | 15.388.703    | 2.294                       | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15  | Llay Llay         | 22.064                  | 10.636                 | 11.428                                          | 5.608                 | 22.743.285    | 2.294                       | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16  | Los Andes         | 15.757                  | 9.917                  | 5.840                                           | 5.608                 | 76.622.628    | 2.294                       | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19  | Panquehue         | 17.580                  | 11.316                 | 6.263                                           | 5.608                 | 6.626.394     | 2.294                       | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23  | Putendo           | 16.765                  | 10.580                 | 6.185                                           | 5.608                 | 21.267.399    | 2.294                       | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27  | Rinconada         | 15.486                  | 10.353                 | 5.133                                           | 5.608                 | 7.604.625     | 2.294                       | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29  | San Esteban       | 18.635                  | 12.387                 | 6.248                                           | 5.608                 | 18.300.472    | 2.294                       | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30  | San Felipe        | 10.806                  | 9.676                  | 1.130                                           | 5.608                 | 81.495.958    | 2.294                       | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31  | Santa María       | 16.400                  | 10.392                 | 6.008                                           | 5.608                 | 14.541.829    | 2.294                       | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                    | 192.093.325                        | 30.302                              |
|     | ET - San Felipe   | 15.257                  | 10.291                 | 4.966                                           | 5.608                 | 277.128.567   | 2.294                       | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2   | Cabildo           | 17.410                  | 9.576                  | 7.834                                           | 8.010                 | 23.842.405    | 3.788                       | 183.847.786                     | 29.207                                         | 4.136                                       | 26.032.424                    | 209.880.210                        | 33.343                              |
| 13  | La Ligua          | 10.626                  | 9.510                  | 1.115                                           | 8.010                 | 85.777.424    | 3.788                       | 507.787.100                     | 22.423                                         | 4.136                                       | 93.656.419                    | 601.443.519                        | 26.559                              |
| 20  | Papudo            | 18.844                  | 12.157                 | 6.688                                           | 8.010                 | 20.101.339    | 3.788                       | 162.612.884                     | 30.642                                         | 4.136                                       | 21.947.726                    | 184.560.610                        | 34.777                              |
| 21  | Petorca           | 26.399                  | 11.512                 | 14.887                                          | 8.010                 | 23.446.360    | 3.788                       | 236.436.414                     | 38.196                                         | 4.136                                       | 25.600.000                    | 262.036.414                        | 42.332                              |
| 36  | Zapallar          | 24.217                  | 10.965                 | 13.252                                          | 8.010                 | 34.304.570    | 3.788                       | 326.169.446                     | 36.014                                         | 4.136                                       | 37.455.580                    | 363.625.026                        | 40.150                              |
|     | ET - Petorca      | 16.829                  | 10.319                 | 6.510                                           | 8.010                 | 187.472.097   | 3.788                       | 1.416.853.630                   | 28.627                                         | 4.136                                       | 204.692.149                   | 1.621.545.779                      | 32.762                              |
| 7   | Con Con           | 16.393                  | 9.799                  | 6.593                                           | 2.876                 | 141.787.971   | 3.106                       | 1.021.463.783                   | 22.374                                         | 4.136                                       | 188.806.808                   | 1.210.270.590                      | 26.510                              |
| 22  | Puchuncavi        | 17.122                  | 9.554                  | 7.568                                           | 2.876                 | 79.301.238    | 3.106                       | 589.926.436                     | 23.104                                         | 4.136                                       | 105.598.617                   | 695.525.053                        | 27.240                              |
| 26  | Quintero          | 10.973                  | 9.819                  | 1.155                                           | 2.876                 | 94.831.800    | 3.106                       | 517.711.475                     | 16.955                                         | 4.136                                       | 126.279.326                   | 643.990.801                        | 21.091                              |
|     | ET - El Quintero  | 14.949                  | 9.744                  | 5.205                                           | 2.876                 | 315.921.008   | 3.106                       | 2.129.101.694                   | 20.931                                         | 4.136                                       | 420.684.751                   | 2.549.786.445                      | 25.066                              |
| 14  | Limache           | 14.956                  | 10.252                 | 4.704                                           | 2.499                 | 40.591.156    | 1.978                       | 398.829.916                     | 19.433                                         | 4.136                                       | 84.877.884                    | 483.707.800                        | 23.569                              |
| 18  | Olmue             | 13.067                  | 11.603                 | 1.465                                           | 4.120                 | 14.117.525    | 1.978                       | 136.798.630                     | 19.165                                         | 4.136                                       | 29.520.363                    | 166.318.993                        | 23.301                              |
| 25  | Quilpué           | 17.259                  | 9.856                  | 7.403                                           | 4.120                 | 123.623.276   | 1.978                       | 1.477.271.568                   | 23.634                                         | 4.136                                       | 258.501.679                   | 1.735.773.247                      | 27.770                              |
| 34  | Villa Alemana     | 16.549                  | 9.563                  | 6.986                                           | 4.120                 | 110.158.501   | 1.978                       | 1.261.359.358                   | 22.647                                         | 4.136                                       | 230.346.245                   | 1.491.705.603                      | 26.782                              |
|     | ET - Marga        | 16.459                  | 9.885                  | 6.574                                           | 3.892                 | 288.490.459   | 1.978                       | 3.274.259.472                   | 22.447                                         | 4.136                                       | 603.246.171                   | 3.877.505.643                      | 26.583                              |
| 1   | Algarrobo         | 14.253                  | 10.012                 | 4.241                                           |                       |               |                             | 102.028.456                     | 14.253                                         | 9.396                                       | 67.256.957                    | 169.285.413                        | 23.649                              |
| 4   | Cartagena         | 24.349                  | 10.940                 | 13.409                                          |                       |               |                             | 329.724.619                     | 24.349                                         | 9.396                                       | 127.232.928                   | 456.957.546                        | 33.745                              |
| 5   | Casablanca        | 22.503                  | 10.009                 | 12.494                                          |                       |               |                             | 338.782.553                     | 22.503                                         | 9.396                                       | 141.451.779                   | 480.234.332                        | 31.899                              |
| 8   | El Quisco         | 16.580                  | 12.294                 | 4.285                                           |                       |               |                             | 150.314.960                     | 17.149                                         | 9.396                                       | 82.355.708                    | 232.670.668                        | 26.545                              |
| 9   | El Tabo           | 11.580                  | 10.351                 | 1.228                                           |                       |               |                             | 379.659.220                     | 11.580                                         | 9.396                                       | 308.053.878                   | 687.713.097                        | 20.975                              |
| 10  | Hijuelas          | 34.241                  | 10.822                 | 23.420                                          |                       |               |                             | 371.770.788                     | 36.530                                         | 4.136                                       | 42.089.026                    | 413.859.815                        | 40.666                              |
| 11  | La Calera         | 26.631                  | 9.824                  | 16.807                                          |                       |               |                             | 699.274.722                     | 28.863                                         | 4.136                                       | 100.195.383                   | 799.470.104                        | 32.999                              |
| 12  | La Cruz           | 30.147                  | 11.083                 | 19.064                                          |                       |               |                             | 243.321.177                     | 32.480                                         | 4.136                                       | 30.982.405                    | 274.303.582                        | 36.615                              |
| 17  | Nogales           | 30.837                  | 10.382                 | 20.454                                          |                       |               |                             | 563.742.008                     | 33.083                                         | 4.136                                       | 70.473.778                    | 634.215.786                        | 37.218                              |
| 24  | Quillota          | 24.016                  | 9.833                  | 14.183                                          |                       |               |                             | 1.463.487.264                   | 25.406                                         | 4.136                                       | 238.228.238                   | 1.701.715.502                      | 29.542                              |
| 28  | San Antonio       | 16.508                  | 9.661                  | 6.847                                           |                       |               |                             | 1.078.224.496                   | 16.508                                         | 9.396                                       | 613.677.982                   | 1.691.902.477                      | 25.904                              |
| 32  | Santo Domingo     | 25.315                  | 12.002                 | 13.313                                          |                       |               |                             | 106.225.409                     | 25.315                                         | 9.396                                       | 39.425.713                    | 145.651.122                        | 34.711                              |
| 33  | Valparaíso        | 14.192                  | 9.591                  | 4.601                                           |                       |               |                             | 1.563.907.873                   | 14.192                                         | 4.136                                       | 455.752.562                   | 2.019.660.434                      | 18.327                              |
| 35  | Viña del Mar      | 10.880                  | 9.742                  | 1.139                                           |                       |               |                             | 1.561.852.929                   | 11.436                                         | 4.136                                       | 564.810.287                   | 2.126.663.216                      | 15.572                              |
| A   | ET-2 San Felipe   |                         |                        |                                                 |                       | 277.128.567   | 2.294                       |                                 |                                                |                                             |                               |                                    |                                     |
| B   | ET - 2 Petorca    |                         |                        |                                                 |                       | 187.472.097   | 3.788                       |                                 |                                                |                                             |                               |                                    |                                     |
| C   | ET- 3 Quintero    |                         |                        |                                                 |                       | 315.921.008   | 3.106                       |                                 |                                                |                                             |                               |                                    |                                     |
| D   | ET- 3 Marga Marga |                         |                        |                                                 |                       | 288.490.459   | 1.978                       |                                 |                                                |                                             |                               |                                    |                                     |
| ### | Año 2020          | 36.439                  | 9.965                  | 6.474                                           |                       | 1.069.012.131 |                             | 18.576.021.216                  | 20.017                                         | 4.136                                       | 4.835.468.542                 | 23.411.489.758                     | 25.227                              |



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**TABLA N°7: ALTERNATIVA 2a: 2 Rellenos Sanitarios nuevos: RS SUR y RS CENTRO, ET en San Felipe a Loma Los Colorados y resto transporte directo**

| N°  | Comuna                  | Población        | Cantidad RSU   | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección    |                  | Transporte     | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas      | Numero de Recolectores 19 m³ | Ocupaciones | Peaje              |
|-----|-------------------------|------------------|----------------|-------------------------------|--------------------------|----------------|------------------|----------------|---------------------------------|-----------------|--------------|------------------------------|-------------|--------------------|
|     |                         | [hab.]           | [ton/año]      | [km]                          | Unidades                 | [hrs./año]     | [km/año]         | [h/año]        | [km/año]                        | [hrs./año]      | semanales    | Unidades                     | %           | [Ch\$/año]         |
| 3   | Calle Larga             | 11.086           | 5.465          | 18                            | 0                        | 2.733          | 13.664           | 920            | 27.612                          | 390             | 15           | 2                            | 73%         | 0                  |
| 6   | Catemu                  | 13.606           | 6.708          | 14                            | 0                        | 3.354          | 16.771           | 886            | 26.582                          | 468             | 18           | 2                            | 85%         | 0                  |
| 15  | Llay Llay               | 24.125           | 9.915          | 36                            | 1                        | 4.957          | 24.786           | 3.388          | 101.650                         | 702             | 27           | 4                            | 81%         | 5.616.000          |
| 16  | Los Andes               | 85.279           | 33.402         | 18                            | 0                        | 16.701         | 83.506           | 5.522          | 165.672                         | 2.340           | 90           | 10                           | 88%         | 0                  |
| 19  | Panquehue               | 8.010            | 2.889          | 16                            | 0                        | 1.444          | 7.222            | 452            | 13.562                          | 208             | 8            | 1                            | 76%         | 0                  |
| 23  | Putendo                 | 18.803           | 9.271          | 18                            | 0                        | 4.636          | 23.178           | 1.543          | 46.280                          | 650             | 25           | 3                            | 82%         | 0                  |
| 27  | Rinconada               | 8.775            | 3.315          | 14                            | 0                        | 1.658          | 8.288            | 443            | 13.291                          | 234             | 9            | 1                            | 84%         | 0                  |
| 29  | San Esteban             | 19.414           | 7.978          | 15                            | 0                        | 3.989          | 19.945           | 1.129          | 33.862                          | 572             | 22           | 3                            | 68%         | 0                  |
| 30  | San Felipe              | 86.449           | 35.527         | 0                             | 0                        | 17.763         | 88.817           | 0              | 0                               | 2.470           | 95           | 8                            | 91%         | 0                  |
| 31  | Santa María             | 15.428           | 6.339          | 18                            | 0                        | 3.170          | 15.848           | 1.037          | 31.117                          | 442             | 17           | 2                            | 84%         | 0                  |
|     | <b>ET - San Felipe</b>  | <b>290.975</b>   | <b>120.810</b> | <b>167</b>                    | <b>1</b>                 | <b>60.405</b>  | <b>302.025</b>   | <b>15.321</b>  | <b>459.628</b>                  | <b>8.476</b>    | <b>326</b>   | <b>36</b>                    | <b>82%</b>  | <b>5.616.000</b>   |
| 2   | Cabildo                 | 21.804           | 6.295          | 126                           | 1                        | 3.147          | 15.736           | 7.426          | 222.768                         | 442             | 17           | 5                            | 79%         | 3.536.000          |
| 13  | La Ligua                | 41.747           | 22.646         | 96                            | 1                        | 11.323         | 56.615           | 20.301         | 609.024                         | 1.586           | 61           | 13                           | 92%         | 12.688.000         |
| 20  | Papudo                  | 6.174            | 5.307          | 90                            | 0                        | 2.653          | 13.267           | 4.675          | 140.244                         | 390             | 15           | 3                            | 93%         | 0                  |
| 21  | Petorca                 | 9.680            | 6.190          | 145                           | 1                        | 3.095          | 15.475           | 8.545          | 256.360                         | 442             | 17           | 5                            | 87%         | 3.536.000          |
| 36  | Zapallar                | 8.455            | 9.057          | 67                            | 0                        | 4.528          | 22.642           | 5.789          | 173.680                         | 650             | 25           | 5                            | 79%         | 0                  |
|     | <b>ET - Petorca</b>     | <b>87.860</b>    | <b>49.494</b>  | <b>128</b>                    | <b>3</b>                 | <b>24.747</b>  | <b>123.736</b>   | <b>46.736</b>  | <b>1.402.076</b>                | <b>3.510</b>    | <b>135</b>   | <b>31</b>                    | <b>86%</b>  | <b>19.760.000</b>  |
| 7   | Con Con                 | 93.336           | 45.653         | 18                            | 0                        | 22.827         | 114.133          | 7.655          | 229.653                         | 3.172           | 122          | 14                           | 87%         | 0                  |
| 22  | Puchuncaví              | 18.741           | 25.534         | 54                            | 0                        | 12.767         | 63.834           | 12.869         | 386.069                         | 1.794           | 69           | 11                           | 90%         | 0                  |
| 26  | Quintero                | 29.063           | 30.534         | 30                            | 0                        | 15.267         | 76.335           | 8.585          | 257.546                         | 2.132           | 82           | 11                           | 85%         | 0                  |
|     | <b>ET - El Quintero</b> | <b>141.140</b>   | <b>101.721</b> | <b>46</b>                     | <b>0</b>                 | <b>50.860</b>  | <b>254.302</b>   | <b>29.109</b>  | <b>873.267</b>                  | <b>7.098</b>    | <b>273</b>   | <b>36</b>                    | <b>87%</b>  | <b>0</b>           |
| 14  | Limache                 | 48.868           | 20.523         | 37                            | 2                        | 10.262         | 51.308           | 6.978          | 209.352                         | 1.430           | 55           | 8                            | 84%         | 22.880.000         |
| 18  | Olnué                   | 17.216           | 7.138          | 44                            | 2                        | 3.569          | 17.845           | 3.044          | 91.312                          | 520             | 20           | 3                            | 86%         | 6.240.000          |
| 25  | Quilpué                 | 185.176          | 62.505         | 16                            | 1                        | 31.253         | 156.263          | 9.136          | 274.067                         | 4.342           | 167          | 18                           | 89%         | 17.368.000         |
| 34  | Villa Alemana           | 163.329          | 55.697         | 26                            | 2                        | 27.849         | 139.243          | 13.327         | 399.797                         | 3.874           | 149          | 18                           | 90%         | 46.488.000         |
|     | <b>ET - Marga</b>       | <b>414.589</b>   | <b>145.864</b> | <b>60</b>                     | <b>6</b>                 | <b>72.932</b>  | <b>364.660</b>   | <b>32.484</b>  | <b>974.528</b>                  | <b>10.166</b>   | <b>391</b>   | <b>47</b>                    | <b>87%</b>  | <b>92.976.000</b>  |
| 1   | Algarrobo               | 17.420           | 7.158          | 11                            | 0                        | 3.579          | 17.896           | 759            | 22.755                          | 520             | 20           | 2                            | 87%         | 0                  |
| 4   | Cartagena               | 32.953           | 13.542         | 42                            | 0                        | 6.771          | 33.854           | 5.400          | 162.001                         | 962             | 37           | 6                            | 79%         | 0                  |
| 5   | Casablanca              | 36.634           | 15.055         | 42                            | 0                        | 7.527          | 37.637           | 5.984          | 179.514                         | 1.066           | 41           | 6                            | 87%         | 0                  |
| 8   | El Quisco               | 21.332           | 8.765          | 9                             | 1                        | 4.383          | 21.913           | 732            | 21.965                          | 624             | 24           | 3                            | 69%         | 4.992.000          |
| 9   | El Tabo                 | 16.217           | 32.787         | 0                             | 0                        | 16.393         | 81.966           | 0              | 0                               | 2.288           | 88           | 8                            | 84%         | 0                  |
| 10  | Hijuelas                | 20.641           | 10.177         | 77                            | 4                        | 5.089          | 25.443           | 7.484          | 224.515                         | 728             | 28           | 6                            | 80%         | 23.296.000         |
| 11  | La Calera               | 56.954           | 24.227         | 63                            | 4                        | 12.114         | 60.568           | 14.241         | 427.232                         | 1.690           | 65           | 11                           | 92%         | 54.080.000         |
| 12  | La Cruz                 | 18.230           | 7.491          | 60                            | 4                        | 3.746          | 18.729           | 4.332          | 129.948                         | 546             | 21           | 4                            | 78%         | 17.472.000         |
| 17  | Nogales                 | 28.752           | 17.040         | 70                            | 4                        | 8.520          | 42.601           | 11.226         | 336.794                         | 1.196           | 46           | 9                            | 84%         | 38.272.000         |
| 24  | Quillota                | 94.718           | 57.603         | 50                            | 3                        | 28.802         | 144.008          | 26.747         | 802.402                         | 4.004           | 154          | 24                           | 89%         | 80.080.000         |
| 28  | San Antonio             | 104.877          | 65.314         | 22                            | 0                        | 32.657         | 163.286          | 13.468         | 404.040                         | 4.550           | 175          | 20                           | 91%         | 0                  |
| 32  | Santo Domingo           | 10.213           | 4.196          | 37                            | 0                        | 2.098          | 10.490           | 1.523          | 45.677                          | 312             | 12           | 2                            | 71%         | 0                  |
| 33  | Valparaíso              | 253.877          | 110.200        | 14                            | 0                        | 55.100         | 275.501          | 13.908         | 417.248                         | 7.670           | 295          | 30                           | 92%         | 0                  |
| 35  | Viña del Mar            | 280.140          | 136.570        | 0                             | 1                        | 68.285         | 341.425          | 0              | 0                               | 9.490           | 365          | 31                           | 90%         | 75.920.000         |
| A   | <b>ET-2 San Felipe</b>  | <b>290.975</b>   | <b>120.810</b> | <b>63</b>                     | <b>4</b>                 |                |                  | <b>12.398</b>  | <b>805.896</b>                  | <b>6.396</b>    | <b>123</b>   |                              | <b>90%</b>  | <b>102.336.000</b> |
| ### | <b>Año 2020</b>         | <b>1.927.522</b> | <b>928.015</b> | <b>1.113</b>                  | <b>28</b>                | <b>464.008</b> | <b>2.320.039</b> | <b>241.851</b> | <b>7.689.485</b>                | <b>71.292</b>   | <b>2.639</b> | <b>312</b>                   | <b>84%</b>  | <b>514.800.000</b> |



UNIVERSIDAD TECNICA  
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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°7: ALTERNATIVA 2ª

| N°  | Comuna           | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m² | Costo Variable<br>Amplirol incl. Peaje | Costo Fijo Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|-----|------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|----------------------------------------|---------------------|-------------------------------------------------------|------------------------------|
|     |                  | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                             | [Ch\$/año]          | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3   | Calle Larga      | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                             | 10.446.999          | 131.917.846                                           | 24.137                       |
| 6   | Catemu           | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                             | 12.823.023          | 140.420.073                                           | 20.932                       |
| 15  | Llay Llay        | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                             | 18.951.413          | 279.973.559                                           | 28.239                       |
| 16  | Los Andes        | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                            | 63.847.730          | 713.656.650                                           | 21.365                       |
| 19  | Panquehue        | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                             | 5.521.609           | 66.981.495                                            | 23.188                       |
| 23  | Putendo          | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                             | 17.721.595          | 207.420.677                                           | 22.373                       |
| 27  | Rinconada        | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                             | 6.336.745           | 69.930.077                                            | 21.094                       |
| 29  | San Esteban      | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                             | 15.249.328          | 193.403.521                                           | 24.243                       |
| 30  | San Felipe       | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                            | 67.908.554          | 583.141.666                                           | 16.414                       |
| 31  | Santa María      | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                             | 12.117.345          | 139.515.816                                           | 22.008                       |
|     | ET - San Felipe  | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                            | 230.924.340         | 2.526.361.381                                         | 20.912                       |
| 2   | Cabildo          | 95.143.440                          | 205.538.645                     | 9.752.456                | 58.728.775              | 85.390.984                      | 146.809.870                     |                          |                                        |                     | 304.218.085                                           | 48.330                       |
| 13  | La Ligua         | 268.536.109                         | 534.400.477                     | 35.086.248               | 182.205.584             | 233.449.862                     | 352.194.893                     |                          |                                        |                     | 815.624.586                                           | 36.016                       |
| 20  | Papudo           | 61.980.266                          | 123.323.187                     | 8.222.216                | 42.397.290              | 53.758.050                      | 80.925.897                      |                          |                                        |                     | 185.303.453                                           | 34.917                       |
| 21  | Petorca          | 107.857.860                         | 205.538.645                     | 9.590.458                | 52.650.841              | 98.267.402                      | 152.887.804                     |                          |                                        |                     | 316.932.505                                           | 51.200                       |
| 36  | Zapallar         | 80.606.552                          | 205.538.645                     | 14.031.881               | 84.863.025              | 66.574.670                      | 120.675.620                     |                          |                                        |                     | 286.145.197                                           | 31.595                       |
|     | ET - Petorca     | 614.124.228                         | 1.274.339.598                   | 76.683.259               | 420.845.515             | 537.440.968                     | 853.494.084                     |                          |                                        |                     | 1.908.223.826                                         | 38.554                       |
| 7   | Con Con          | 158.762.229                         | 575.508.206                     | 70.732.177               | 390.355.176             | 88.030.052                      | 185.153.030                     |                          |                                        |                     | 734.270.435                                           | 16.084                       |
| 22  | Ruchuncavi       | 187.547.241                         | 452.185.019                     | 39.560.121               | 210.463.100             | 147.987.120                     | 241.721.919                     |                          |                                        |                     | 639.732.260                                           | 25.055                       |
| 26  | Quintero         | 146.029.542                         | 452.185.019                     | 47.307.678               | 265.685.041             | 98.721.864                      | 186.499.978                     |                          |                                        |                     | 598.214.561                                           | 19.592                       |
|     | ET - El Quintero | 492.339.013                         | 1.479.878.243                   | 157.599.976              | 866.503.317             | 334.739.037                     | 613.374.927                     |                          |                                        |                     | 1.972.217.256                                         | 19.389                       |
| 14  | Limache          | 112.045.959                         | 328.861.832                     | 31.797.569               | 180.752.995             | 80.248.390                      | 148.108.837                     |                          |                                        |                     | 463.787.791                                           | 22.598                       |
| 18  | Olmué            | 46.060.666                          | 123.323.187                     | 11.059.133               | 61.707.017              | 35.001.533                      | 61.616.170                      |                          |                                        |                     | 175.623.853                                           | 24.604                       |
| 25  | Quilpué          | 201.896.606                         | 739.939.122                     | 96.841.776               | 516.989.573             | 105.054.830                     | 222.949.549                     |                          |                                        |                     | 959.203.727                                           | 15.346                       |
| 34  | Villa Alemana    | 239.543.293                         | 739.939.122                     | 86.293.983               | 457.417.828             | 153.249.310                     | 282.521.294                     |                          |                                        |                     | 1.025.970.414                                         | 18.420                       |
|     | ET - Marga       | 599.546.524                         | 1.932.063.262                   | 225.992.461              | 1.216.867.412           | 373.554.063                     | 715.195.850                     |                          |                                        |                     | 2.624.585.786                                         | 17.993                       |
| 1   | Algarrobo        | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                        |                     | 102.028.456                                           | 14.253                       |
| 4   | Cartagena        | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                        |                     | 329.724.619                                           | 24.349                       |
| 5   | Casablanca       | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                        |                     | 338.782.553                                           | 22.503                       |
| 8   | El Quisco        | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                        |                     | 150.314.960                                           | 17.149                       |
| 9   | El Tabo          | 50.797.388                          | 328.861.832                     | 50.797.388               | 288.584.258             | 0                               | 40.277.574                      |                          |                                        |                     | 379.659.220                                           | 11.580                       |
| 10  | Hijuelas         | 101.828.414                         | 246.646.374                     | 15.767.697               | 94.363.336              | 86.060.717                      | 152.283.038                     |                          |                                        |                     | 371.770.788                                           | 36.530                       |
| 11  | La Calera        | 201.301.638                         | 452.185.019                     | 37.535.922               | 195.316.028             | 163.765.716                     | 256.868.991                     |                          |                                        |                     | 707.566.656                                           | 29.206                       |
| 12  | La Cruz          | 61.418.261                          | 164.430.916                     | 11.606.854               | 71.424.313              | 49.811.407                      | 93.006.603                      |                          |                                        |                     | 243.321.177                                           | 32.480                       |
| 17  | Nogales          | 155.500.448                         | 369.969.561                     | 26.401.398               | 150.516.718             | 129.099.049                     | 219.452.843                     |                          |                                        |                     | 563.742.008                                           | 33.083                       |
| 24  | Quillota         | 396.821.769                         | 986.585.496                     | 89.246.792               | 477.147.488             | 307.574.977                     | 509.438.007                     |                          |                                        |                     | 1.463.487.264                                         | 25.406                       |
| 28  | San Antonio      | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                        |                     | 1.078.224.496                                         | 16.508                       |
| 32  | Santo Domingo    | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                        |                     | 106.225.409                                           | 25.315                       |
| 33  | Valparaíso       | 330.676.003                         | 1.233.231.869                   | 170.737.334              | 886.184.798             | 159.938.669                     | 347.047.071                     |                          |                                        |                     | 1.563.907.873                                         | 14.192                       |
| 35  | Viña del Mar     | 211.593.331                         | 1.274.339.598                   | 211.593.331              | 1.118.846.608           | 0                               | 155.492.990                     |                          |                                        |                     | 1.561.852.929                                         | 11.436                       |
| A   | ET-2 San Felipe  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                            | 230.924.340         |                                                       |                              |
| ### | Año 2020         | 4.076.412.928                       | 12.825.611.442                  | 1.437.809.191            | 7.825.659.382           | 2.638.603.737                   | 4.999.952.060                   | 6                        | 446.583.946                            | 230.924.340         | 17.991.996.657                                        | 19.388                       |



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Continuación TABLA N°7: ALTERNATIVA 2ª

| N°  | Comuna           | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET<br>por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición<br>Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|-----|------------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|-------------|-----------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|----------------------------------|------------------------------------|-------------------------------------|
|     |                  | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                    | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                       | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3   | Calle Larga      | 18.529                  | 11.717                 | 6.812                                           | 5.608                 | 12.537.275  | 2.294                       | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                       | 177.247.677                        | 32.431                              |
| 6   | Catemu           | 15.324                  | 10.280                 | 5.044                                           | 5.608                 | 15.388.703  | 2.294                       | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                       | 196.059.543                        | 29.226                              |
| 15  | Llay Llay        | 22.064                  | 10.636                 | 11.428                                          | 5.608                 | 22.743.285  | 2.294                       | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                       | 362.204.292                        | 36.533                              |
| 16  | Los Andes        | 15.757                  | 9.917                  | 5.840                                           | 5.608                 | 76.622.628  | 2.294                       | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                      | 990.693.802                        | 29.659                              |
| 19  | Panguehue        | 17.580                  | 11.316                 | 6.263                                           | 5.608                 | 6.626.394   | 2.294                       | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                       | 90.939.917                         | 31.482                              |
| 23  | Putendo          | 16.765                  | 10.580                 | 6.185                                           | 5.608                 | 21.267.399  | 2.294                       | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                       | 284.315.190                        | 30.667                              |
| 27  | Rinconada        | 15.486                  | 10.353                 | 5.133                                           | 5.608                 | 7.604.625   | 2.294                       | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                       | 97.425.398                         | 29.388                              |
| 29  | San Esteban      | 18.635                  | 12.387                 | 6.248                                           | 5.608                 | 18.300.472  | 2.294                       | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                       | 259.570.796                        | 32.537                              |
| 30  | San Felipe       | 10.806                  | 9.676                  | 1.130                                           | 5.608                 | 81.495.958  | 2.294                       | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                      | 877.798.854                        | 24.708                              |
| 31  | Santa María      | 16.400                  | 10.392                 | 6.008                                           | 5.608                 | 14.541.829  | 2.294                       | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                       | 192.093.325                        | 30.302                              |
|     | ET - San Felipe  | 15.257                  | 10.291                 | 4.966                                           |                       |             |                             | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                      | 3.528.348.795                      | 29.206                              |
| 2   | Cabildo          | 47.768                  | 10.879                 | 36.889                                          |                       |             |                             | 304.218.085                     | 48.330                                         | 4.136                                       | 26.032.424                       | 330.250.509                        | 52.466                              |
| 13  | La Ligua         | 35.456                  | 9.595                  | 25.861                                          |                       |             |                             | 815.624.586                     | 36.016                                         | 4.136                                       | 93.656.419                       | 909.281.005                        | 40.152                              |
| 20  | Papudo           | 34.917                  | 9.538                  | 25.379                                          |                       |             |                             | 185.303.453                     | 34.917                                         | 4.136                                       | 21.947.726                       | 207.251.179                        | 39.053                              |
| 21  | Petorca          | 50.629                  | 10.055                 | 40.574                                          |                       |             |                             | 316.932.505                     | 51.200                                         | 4.136                                       | 25.600.000                       | 342.532.506                        | 55.336                              |
| 36  | Zapallar         | 31.595                  | 10.920                 | 20.675                                          |                       |             |                             | 286.145.197                     | 31.595                                         | 4.136                                       | 37.455.580                       | 323.600.777                        | 35.731                              |
|     | ET - Petorca     | 38.155                  | 10.052                 | 28.103                                          |                       |             |                             | 1.908.223.826                   | 38.554                                         | 4.136                                       | 204.692.149                      | 2.112.915.975                      | 42.690                              |
| 7   | Con Con          | 16.084                  | 10.100                 | 5.984                                           |                       |             |                             | 734.270.435                     | 16.084                                         | 4.136                                       | 188.806.808                      | 923.077.243                        | 20.219                              |
| 22  | Puchuncaví       | 25.055                  | 9.792                  | 15.263                                          |                       |             |                             | 639.732.260                     | 25.055                                         | 4.136                                       | 105.598.617                      | 745.330.877                        | 29.190                              |
| 26  | Quintero         | 19.592                  | 10.251                 | 9.341                                           |                       |             |                             | 598.214.561                     | 19.592                                         | 4.136                                       | 126.279.326                      | 724.493.887                        | 23.727                              |
|     | ET - El Quintero | 19.389                  | 10.068                 | 9.321                                           |                       |             |                             | 1.972.217.256                   | 19.389                                         | 4.136                                       | 420.684.751                      | 2.392.902.007                      | 23.524                              |
| 14  | Limache          | 21.483                  | 10.357                 | 11.127                                          |                       |             |                             | 463.787.791                     | 22.598                                         | 4.136                                       | 84.877.884                       | 548.665.675                        | 26.734                              |
| 18  | Olmué            | 23.730                  | 10.194                 | 13.536                                          |                       |             |                             | 175.623.853                     | 24.604                                         | 4.136                                       | 29.520.363                       | 205.144.216                        | 28.740                              |
| 25  | Quilpué          | 15.068                  | 9.820                  | 5.248                                           |                       |             |                             | 959.203.727                     | 15.346                                         | 4.136                                       | 258.501.679                      | 1.217.705.406                      | 19.482                              |
| 34  | Villa Alemana    | 17.586                  | 9.762                  | 7.824                                           |                       |             |                             | 1.025.970.414                   | 18.420                                         | 4.136                                       | 230.346.245                      | 1.256.316.660                      | 22.556                              |
|     | ET - Marga       | 17.356                  | 9.892                  | 7.464                                           |                       |             |                             | 2.624.585.786                   | 17.993                                         | 4.136                                       | 603.246.171                      | 3.227.831.957                      | 22.129                              |
| 1   | Algarrobo        | 14.253                  | 10.012                 | 4.241                                           |                       |             |                             | 102.028.456                     | 14.253                                         | 9.396                                       | 67.256.957                       | 169.285.413                        | 23.649                              |
| 4   | Cartagena        | 24.349                  | 10.940                 | 13.409                                          |                       |             |                             | 329.724.619                     | 24.349                                         | 9.396                                       | 127.232.928                      | 456.957.546                        | 33.745                              |
| 5   | Casablanca       | 22.503                  | 10.009                 | 12.494                                          |                       |             |                             | 338.782.553                     | 22.503                                         | 9.396                                       | 141.451.779                      | 480.234.332                        | 31.899                              |
| 8   | El Quisco        | 16.580                  | 12.294                 | 4.285                                           |                       |             |                             | 150.314.960                     | 17.149                                         | 9.396                                       | 82.355.708                       | 232.670.668                        | 26.545                              |
| 9   | El Tabo          | 11.580                  | 10.351                 | 1.228                                           |                       |             |                             | 379.659.220                     | 11.580                                         | 9.396                                       | 308.053.878                      | 687.713.097                        | 20.975                              |
| 10  | Hijuelas         | 34.241                  | 10.822                 | 23.420                                          |                       |             |                             | 371.770.788                     | 36.530                                         | 4.136                                       | 42.089.026                       | 413.859.815                        | 40.666                              |
| 11  | La Calera        | 26.973                  | 9.611                  | 17.362                                          |                       |             |                             | 707.566.656                     | 29.206                                         | 4.136                                       | 100.195.383                      | 807.762.039                        | 33.341                              |
| 12  | La Cruz          | 30.147                  | 11.083                 | 19.064                                          |                       |             |                             | 243.321.177                     | 32.480                                         | 4.136                                       | 30.982.405                       | 274.303.582                        | 36.615                              |
| 17  | Nogales          | 30.837                  | 10.382                 | 20.454                                          |                       |             |                             | 563.742.008                     | 33.083                                         | 4.136                                       | 70.473.778                       | 634.215.786                        | 37.218                              |
| 24  | Quillota         | 24.016                  | 9.833                  | 14.183                                          |                       |             |                             | 1.463.487.264                   | 25.406                                         | 4.136                                       | 238.228.238                      | 1.701.715.502                      | 29.542                              |
| 28  | San Antonio      | 16.508                  | 9.661                  | 6.847                                           |                       |             |                             | 1.078.224.496                   | 16.508                                         | 9.396                                       | 613.677.982                      | 1.691.902.477                      | 25.904                              |
| 32  | Santo Domingo    | 25.315                  | 12.002                 | 13.313                                          |                       |             |                             | 106.225.409                     | 25.315                                         | 9.396                                       | 39.425.713                       | 145.651.122                        | 34.711                              |
| 33  | Valparaíso       | 14.192                  | 9.591                  | 4.601                                           |                       |             |                             | 1.563.907.873                   | 14.192                                         | 4.136                                       | 455.752.562                      | 2.019.660.434                      | 18.327                              |
| 35  | Viña del Mar     | 10.880                  | 9.742                  | 1.139                                           |                       |             |                             | 1.561.852.929                   | 11.436                                         | 4.136                                       | 564.810.287                      | 2.126.663.216                      | 15.572                              |
| A   | ET-2 San Felipe  |                         |                        |                                                 |                       | 277.128.567 | 2.294                       |                                 |                                                |                                             |                                  |                                    |                                     |
| ### | Año 2020         | 18.213                  | 9.982                  | 8.231                                           |                       | 277.128.567 |                             | 18.269.125.223                  | 19.686                                         | 4.136                                       | 4.835.468.542                    | 23.104.593.765                     | 24.897                              |



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Evaluación Económica de las Alternativas de Transporte de la Alternativa 2a

**TABLA N°8: ALTERNATIVA 2a\*: 2 Rellenos Sanitarios: SUR y El Molle, ET en San Felipe a Loma Los Colorados, ET en La Ligua, ET en Puchuncaví, ET en La Cruz y ET en Villa Alemana a El Molle**

| N°   | Comuna           | Población | Cantidad RSU | Kilómetros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas     | Número de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-------------|------------------------------|-------------|-------------|
|      |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales   | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15          | 2                            | 73%         | 0           |
| 6    | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18          | 2                            | 85%         | 0           |
| 15   | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27          | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90          | 10                           | 88%         | 0           |
| 19   | Panguehue        | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8           | 1                            | 76%         | 0           |
| 23   | Putendo          | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25          | 3                            | 82%         | 0           |
| 27   | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9           | 1                            | 84%         | 0           |
| 29   | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22          | 3                            | 68%         | 0           |
| 30   | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95          | 8                            | 91%         | 0           |
| 31   | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17          | 2                            | 84%         | 0           |
| A    | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326         | 36                           | 82%         | 5.616.000   |
| 2    | Cabildo          | 21.804    | 6.295        | 26                            | 0                        | 3.147       | 15.736    | 1.532      | 45.968                          | 442             | 17          | 2                            | 92%         | 0           |
| 13   | La Ligua         | 41.747    | 22.646       | 0                             | 0                        | 11.323      | 56.615    | 0          | 0                               | 1.586           | 61          | 5                            | 93%         | 0           |
| 20   | Rapido           | 6.174     | 5.307        | 16                            | 0                        | 2.653       | 13.267    | 832        | 24.960                          | 390             | 15          | 2                            | 70%         | 0           |
| 21   | Petorca          | 9.690     | 6.190        | 45                            | 0                        | 3.095       | 15.475    | 2.652      | 79.560                          | 442             | 17          | 3                            | 74%         | 0           |
| 36   | Zapallar         | 8.455     | 9.057        | 41                            | 0                        | 4.528       | 22.642    | 3.553      | 106.600                         | 650             | 25          | 4                            | 79%         | 0           |
| B    | ET - Petorca     | 87.860    | 49.494       | 128                           | 0                        | 24.747      | 123.736   | 8.570      | 257.088                         | 3.510           | 135         | 16                           | 82%         | 0           |
| 7    | Con Con          | 93.336    | 45.653       | 21                            | 0                        | 22.827      | 114.133   | 8.882      | 266.448                         | 3.172           | 122         | 14                           | 90%         | 0           |
| 22   | Puchuncaví       | 18.741    | 25.534       | 25                            | 0                        | 12.767      | 63.834    | 5.980      | 179.400                         | 1.794           | 69          | 8                            | 92%         | 0           |
| 26   | Quintero         | 29.063    | 30.534       | 0                             | 0                        | 15.267      | 76.335    | 0          | 0                               | 2.132           | 82          | 7                            | 90%         | 0           |
| C    | ET - El Quintero | 141.140   | 101.721      | 46                            | 0                        | 50.860      | 254.302   | 14.862     | 445.848                         | 7.098           | 273         | 29                           | 91%         | 0           |
| 14   | Limache          | 48.868    | 20.523       | 13                            | 0                        | 10.262      | 51.308    | 2.479      | 74.360                          | 1.430           | 55          | 6                            | 85%         | 0           |
| 18   | Olmué            | 17.216    | 7.138        | 0                             | 0                        | 3.569       | 17.845    | 0          | 0                               | 520             | 20          | 2                            | 74%         | 0           |
| 25   | Quilpué          | 185.176   | 62.505       | 24                            | 1                        | 31.253      | 156.263   | 13.894     | 416.832                         | 4.342           | 167         | 20                           | 89%         | 17.368.000  |
| 34   | Villa Alemana    | 163.329   | 55.697       | 23                            | 0                        | 27.849      | 139.243   | 11.880     | 356.408                         | 3.874           | 149         | 17                           | 92%         | 0           |
| D    | ET - Marga       | 414.589   | 145.864      | 60                            | 1                        | 72.932      | 364.660   | 28.253     | 847.600                         | 10.166          | 391         | 45                           | 85%         | 17.368.000  |
| 24   | Quilota          | 94.718    | 7.158        | 8                             | 3                        | 3.579       | 17.896    | 562        | 16.848                          | 520             | 20          | 2                            | 84%         | 10.400.000  |
| 11   | La Calera        | 56.954    | 13.542       | 8                             | 4                        | 6.771       | 33.854    | 975        | 29.245                          | 962             | 37          | 4                            | 78%         | 30.784.000  |
| 12   | La Cruz          | 18.230    | 15.055       | 0                             | 4                        | 7.527       | 37.637    | 0          | 0                               | 1.066           | 41          | 4                            | 77%         | 34.112.000  |
| 10   | Hijuelas         | 20.641    | 8.765        | 21                            | 4                        | 4.383       | 21.913    | 1.756      | 52.666                          | 624             | 24          | 3                            | 81%         | 19.968.000  |
| E    | ET - 5 Quilota   | 190.543   | 32.787       | 37                            | 15                       | 22.260      | 111.300   | 3.292      | 98.758                          | 3.172           | 122         | 13                           | 80%         | 95.264.000  |
| 1    | Algarrobo        | 17.420    | 10.177       | 11                            | 0                        | 5.089       | 25.443    | 1.062      | 31.857                          | 728             | 28          | 3                            | 83%         | 0           |
| 4    | Cartagena        | 32.953    | 24.227       | 42                            | 0                        | 12.114      | 60.568    | 9.487      | 284.596                         | 1.690           | 65          | 10                           | 84%         | 0           |
| 5    | Casablanca       | 36.634    | 7.491        | 42                            | 0                        | 3.746       | 18.729    | 3.065      | 91.946                          | 546             | 21          | 3                            | 88%         | 0           |
| 8    | El Quisco        | 21.332    | 17.040       | 9                             | 1                        | 8.520       | 42.601    | 1.403      | 42.099                          | 1.196           | 46          | 5                            | 80%         | 9.568.000   |
| 9    | El Tabo          | 16.217    | 57.603       | 0                             | 0                        | 28.802      | 144.008   | 0          | 0                               | 4.004           | 154         | 13                           | 91%         | 0           |
| 17   | Nogales          | 28.752    | 65.314       | 78                            | 0                        | 32.657      | 163.286   | 47.077     | 1.412.320                       | 4.550           | 175         | 33                           | 92%         | 0           |
| 28   | San Antonio      | 104.877   | 4.196        | 22                            | 0                        | 2.098       | 10.490    | 924        | 27.706                          | 312             | 12          | 2                            | 60%         | 0           |
| 32   | Santo Domingo    | 10.213    | 110.200      | 37                            | 0                        | 55.100      | 275.501   | 37.430     | 1.122.888                       | 7.670           | 295         | 39                           | 93%         | 0           |
| 33   | Valparaíso       | 253.877   | 136.570      | 8                             | 0                        | 68.285      | 341.425   | 10.376     | 311.272                         | 9.490           | 365         | 35                           | 91%         | 0           |
| 35   | Viña del Mar     | 280.140   | 120.810      | 17                            | 0                        | 60.405      | 302.025   | 19.147     | 574.423                         | 8.398           | 323         | 35                           | 90%         | 0           |
| A    | ET-1 San Felipe  | 290.975   | 120.810      | 63                            | 4                        | 12.398      | 805.896   | 6.396      | 123                             | 90%             | 102.336.000 |                              |             |             |
| B    | ET - 2 Petorca   | 87.860    | 49.494       | 150                           | 0                        | 12.240      | 795.600   | 2.652      | 51                              | 86%             | 0           |                              |             |             |
| C    | ET - 3 Quintero  | 141.140   | 101.721      | 49                            | 0                        | 8.087       | 525.658   | 5.408      | 104                             | 78%             | 0           |                              |             |             |
| D    | ET - 4 Marga Mar | 414.589   | 145.864      | 41                            | 2                        | 9.679       | 629.138   | 7.748      | 149                             | 84%             | 46.488.000  |                              |             |             |
| E    | ET - 5 Quilota   | 190.543   | 32.787       | 58                            | 4                        | 3.128       | 203.320   | 1.768      | 34                              | 71%             | 24.752.000  |                              |             |             |
| 2020 | Año 2020         | 1.927.522 | 1.004.305    | 1.063                         | 26                       | 508.019     | 2.540.097 | 245.800    | 8.967.641                       | 94.978          | 3.192       | 317                          | 84%         | 301.392.000 |



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## Continuación TABLA N°8: ALTERNATIVA 2a\*

| N°   | Comuna             | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T<br>Rec. y<br>Transporte |
|------|--------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|---------------------------------|
|      |                    | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                      |
| 3    | Calle Larga        | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                          |
| 6    | Catemu             | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                          |
| 15   | Llay Llay          | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                          |
| 16   | Los Andes          | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                          |
| 19   | Panquehue          | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                          |
| 23   | Putendo            | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                          |
| 27   | Rinconada          | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                          |
| 29   | San Esteban        | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.990.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                          |
| 30   | San Felipe         | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                          |
| 31   | Santa María        | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                          |
| A    | ET - San Felipe    | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                          |
| 2    | Cabildo            | 27.372.817                          | 82.215.458                      | 9.752.456                | 50.522.952              | 17.620.362                      | 31.692.506                      |                          | 43.221.571                                | 24.473.827             | 177.283.674                                           | 28.164                          |
| 13   | La Ligua           | 35.086.248                          | 205.538.645                     | 35.086.248               | 180.286.132             | 0                               | 25.252.513                      |                          | 155.497.530                               | 88.049.081             | 484.171.504                                           | 21.380                          |
| 20   | Papudo             | 17.789.834                          | 82.215.458                      | 8.222.216                | 56.291.507              | 9.567.617                       | 20.633.686                      |                          | 36.439.757                                | 20.633.686             | 157.078.734                                           | 29.599                          |
| 21   | Petorca            | 40.087.238                          | 123.323.187                     | 9.590.458                | 61.671.746              | 30.496.780                      | 61.651.441                      |                          | 42.503.620                                | 24.067.293             | 229.981.338                                           | 37.153                          |
| 36   | Zapallar           | 54.893.580                          | 164.430.916                     | 14.031.881               | 85.275.727              | 40.861.699                      | 79.155.189                      |                          | 62.187.410                                | 35.213.063             | 316.724.970                                           | 34.971                          |
| B    | ET - Petorca       | 175.229.717                         | 657.723.664                     | 76.683.259               | 434.048.064             | 98.546.458                      | 223.675.600                     | 5                        | 339.849.888                               | 192.436.950            | 1.365.240.220                                         | 27.584                          |
| 7    | Con Con            | 172.866.492                         | 575.508.206                     | 70.732.177               | 376.628.953             | 102.134.314                     | 198.879.253                     |                          | 100.775.784                               | 86.367.300             | 935.517.782                                           | 20.492                          |
| 22   | Puchuncaví         | 108.327.370                         | 328.861.832                     | 39.560.121               | 204.398.636             | 68.767.249                      | 124.463.196                     |                          | 56.363.346                                | 48.304.760             | 541.857.307                                           | 21.221                          |
| 26   | Quintero           | 47.307.678                          | 287.754.103                     | 47.307.678               | 252.494.065             | 0                               | 35.260.037                      |                          | 67.401.691                                | 57.764.890             | 460.228.362                                           | 15.073                          |
| C    | ET - El Quintero   | 328.501.540                         | 1.192.124.140                   | 157.599.976              | 833.521.654             | 170.901.564                     | 358.602.486                     | 5                        | 224.540.820                               | 192.436.950            | 1.937.603.451                                         | 19.048                          |
| 14   | Limache            | 60.301.096                          | 246.646.374                     | 31.797.569               | 178.612.796             | 28.503.526                      | 68.033.578                      |                          | 44.353.674                                | 32.491.494             | 383.792.638                                           | 18.700                          |
| 18   | Olmúe              | 11.059.133                          | 82.215.458                      | 11.059.133               | 71.760.049              | 0                               | 10.455.409                      |                          | 32.382.906                                | 11.300.479             | 136.957.975                                           | 19.187                          |
| 25   | Quilpué            | 256.620.985                         | 822.154.580                     | 96.841.776               | 519.195.791             | 159.779.209                     | 302.958.788                     |                          | 283.568.174                               | 98.955.174             | 1.478.666.912                                         | 23.657                          |
| 34   | Villa Alemana      | 222.911.585                         | 698.831.393                     | 86.293.983               | 446.335.196             | 136.617.602                     | 252.496.197                     |                          | 252.682.553                               | 88.177.194             | 1.262.602.724                                         | 22.669                          |
| D    | ET - Marga         | 550.892.798                         | 1.849.847.804                   | 225.992.461              | 1.215.903.833           | 324.900.337                     | 633.943.972                     | 6                        | 612.987.307                               | 230.924.340            | 3.262.020.250                                         | 22.363                          |
| 24   | Quillota           | 17.548.662                          | 82.215.458                      | 11.090.520               | 63.135.938              | 6.458.142                       | 19.079.519                      |                          | 24366018.19                               | 16.805.792             | 151.335.930                                           | 21.142                          |
| 11   | La Calera          | 32.190.480                          | 164.430.916                     | 20.980.422               | 127.856.633             | 11.210.058                      | 36.574.283                      |                          | 46094262.37                               | 31.792.252             | 305.291.911                                           | 22.545                          |
| 12   | La Cruz            | 23.325.078                          | 164.430.916                     | 23.325.078               | 144.033.562             | 0                               | 20.397.354                      |                          | 51245503.22                               | 35.345.179             | 308.458.677                                           | 20.489                          |
| 10   | Hijuelas           | 33.767.942                          | 123.323.187                     | 13.580.270               | 79.927.070              | 20.187.672                      | 43.396.117                      |                          | 29836031.13                               | 20.578.584             | 227.473.744                                           | 25.952                          |
| E    | ET - 5 Quillota    | 106.832.163                         | 534.400.477                     | 68.976.291               | 414.953.203             | 37.855.872                      | 119.447.274                     | 2                        | 151.541.815                               | 104.521.808            | 992.560.262                                           | 30.273                          |
| 1    | Algarrobo          | 27.979.166                          | 123.323.187                     | 15.767.697               | 91.231.988              | 12.211.469                      | 32.091.199                      |                          |                                           |                        | 151.302.353                                           | 14.867                          |
| 4    | Cartagena          | 146.626.691                         | 411.077.290                     | 37.535.922               | 213.807.875             | 109.090.770                     | 197.269.415                     |                          |                                           |                        | 557.703.981                                           | 23.020                          |
| 5    | Casablanca         | 46.851.564                          | 123.323.187                     | 11.606.854               | 62.792.021              | 35.244.710                      | 60.531.166                      |                          |                                           |                        | 170.174.751                                           | 22.716                          |
| 8    | El Quisco          | 42.538.780                          | 205.538.645                     | 26.401.398               | 157.491.826             | 16.137.381                      | 48.046.819                      |                          |                                           |                        | 257.645.424                                           | 15.120                          |
| 9    | El Tabo            | 89.246.792                          | 534.400.477                     | 89.246.792               | 469.175.649             | 0                               | 65.224.828                      |                          |                                           |                        | 623.647.269                                           | 10.827                          |
| 17   | Nogales            | 642.561.789                         | 1.356.555.056                   | 101.194.111              | 525.616.085             | 541.367.678                     | 830.938.972                     |                          |                                           |                        | 1.999.116.845                                         | 30.608                          |
| 28   | San Antonio        | 17.121.266                          | 82.215.458                      | 6.501.211                | 51.744.074              | 10.620.055                      | 30.471.384                      |                          |                                           |                        | 99.336.724                                            | 23.673                          |
| 32   | Santo Domingo      | 601.160.517                         | 1.603.201.430                   | 170.737.334              | 881.605.100             | 430.423.182                     | 721.596.330                     |                          |                                           |                        | 2.204.361.947                                         | 20.003                          |
| 33   | Valparaíso         | 330.909.492                         | 1.438.770.514                   | 211.593.331              | 1.114.528.185           | 119.316.160                     | 324.242.329                     |                          |                                           |                        | 1.769.680.006                                         | 12.958                          |
| 35   | Viña del Mar       | 407.361.918                         | 1.438.770.514                   | 187.175.166              | 988.157.531             | 220.186.752                     | 450.612.983                     |                          |                                           |                        | 1.846.132.432                                         | 15.281                          |
| A    | ET-1 San Felipe    |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                                 |
| B    | ET - 2 Petorca     |                                     |                                 |                          |                         |                                 |                                 | 5                        | 339.849.888                               | 192.436.950            |                                                       |                                 |
| C    | ET - 3 Quintero    |                                     |                                 |                          |                         |                                 |                                 | 5                        | 224.540.820                               | 192.436.950            |                                                       |                                 |
| D    | ET - 4 Marga Marga |                                     |                                 |                          |                         |                                 |                                 | 6                        | 315.231.518                               | 230.924.340            |                                                       |                                 |
| E    | ET - 5 Quillota    |                                     |                                 |                          |                         |                                 |                                 | 2                        | 111.602.527                               | 76.974.780             |                                                       |                                 |
| 2020 | Año 2020           | 3.877.173.044                       | 13.031.350.087                  | 1.574.386.969            | 8.510.661.911           | 2.302.986.074                   | 4.520.488.176                   | 24                       | 1.437.808.700                             | 923.697.361            | 19.762.887.296                                        | 19.678                          |



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### Continuación TABLA N°8: ALTERNATIVA 2a\*

| N°   | Comuna            | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET      | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|-------------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|---------------|--------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                   | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]    | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga       | 18.529                  | 11.717                 | 6.812                                           | 5.608                 | 12.537.275    | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catemu            | 15.324                  | 10.280                 | 5.044                                           | 5.608                 | 15.388.703    | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay         | 22.064                  | 10.636                 | 11.428                                          | 5.608                 | 22.743.285    | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes         | 15.757                  | 9.917                  | 5.840                                           | 5.608                 | 76.622.628    | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panquehue         | 17.580                  | 11.316                 | 6.263                                           | 5.608                 | 6.626.394     | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putendo           | 16.765                  | 10.580                 | 6.185                                           | 5.608                 | 21.267.399    | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada         | 15.486                  | 10.353                 | 5.133                                           | 5.608                 | 7.604.625     | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban       | 18.635                  | 12.387                 | 6.248                                           | 5.608                 | 18.300.472    | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe        | 10.806                  | 9.676                  | 1.130                                           | 5.608                 | 81.495.958    | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María       | 16.400                  | 10.392                 | 6.008                                           | 5.608                 | 14.541.829    | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe   | 15.257                  | 10.291                 | 4.966                                           | 5.608                 | 277.128.567   | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo           | 17.410                  | 9.576                  | 7.834                                           | 10.755                | 23.842.405    | 3.788                    | 201.126.079                     | 31.952                                         | 4.136                                       | 26.032.424                    | 227.158.503                        | 36.088                              |
| 13   | La Ligua          | 10.626                  | 9.510                  | 1.115                                           | 10.755                | 85.777.424    | 3.788                    | 569.948.928                     | 25.168                                         | 4.136                                       | 93.656.419                    | 663.605.347                        | 29.303                              |
| 20   | Papudo            | 18.844                  | 12.157                 | 6.688                                           | 10.755                | 20.101.339    | 3.788                    | 177.180.073                     | 33.387                                         | 4.136                                       | 21.947.726                    | 199.127.799                        | 37.522                              |
| 21   | Petorca           | 26.399                  | 11.512                 | 14.887                                          | 10.755                | 23.446.360    | 3.788                    | 253.427.697                     | 40.941                                         | 4.136                                       | 25.600.000                    | 279.027.698                        | 45.077                              |
| 36   | Zapallar          | 24.217                  | 10.965                 | 13.252                                          | 10.755                | 34.304.570    | 3.788                    | 351.029.539                     | 38.759                                         | 4.136                                       | 37.455.580                    | 388.485.119                        | 42.895                              |
| B    | ET - Petorca      | 16.829                  | 10.319                 | 6.510                                           | 10.755                | 187.472.097   | 3.788                    | 1.552.712.316                   | 31.372                                         | 4.136                                       | 204.692.149                   | 1.757.404.465                      | 35.507                              |
| 7    | Con Con           | 16.393                  | 9.799                  | 6.593                                           | 4.099                 | 141.787.971   | 3.106                    | 1.077.305.752                   | 23.598                                         | 4.136                                       | 188.806.808                   | 1.266.112.560                      | 27.733                              |
| 22   | Ruchuncavi        | 17.122                  | 9.554                  | 7.568                                           | 4.099                 | 79.301.238    | 3.106                    | 621.158.545                     | 24.327                                         | 4.136                                       | 105.598.617                   | 726.757.162                        | 28.463                              |
| 26   | Quintero          | 10.973                  | 9.819                  | 1.155                                           | 4.099                 | 94.831.800    | 3.106                    | 555.060.162                     | 18.178                                         | 4.136                                       | 126.279.326                   | 681.339.488                        | 22.314                              |
| C    | ET - B Quintero   | 14.949                  | 9.744                  | 5.205                                           | 4.099                 | 315.921.008   | 3.106                    | 2.253.524.459                   | 22.154                                         | 4.136                                       | 420.684.751                   | 2.674.209.210                      | 26.290                              |
| 14   | Lirache           | 14.956                  | 10.252                 | 4.704                                           | 3.744                 | 40.591.156    | 1.978                    | 424.383.794                     | 20.678                                         | 4.136                                       | 84.877.884                    | 509.261.678                        | 24.814                              |
| 18   | Olmue             | 13.067                  | 11.603                 | 1.465                                           | 6.120                 | 14.117.525    | 1.978                    | 151.075.501                     | 21.165                                         | 4.136                                       | 29.520.363                    | 180.595.864                        | 25.301                              |
| 25   | Quilpué           | 17.259                  | 9.856                  | 7.403                                           | 6.120                 | 123.623.276   | 1.978                    | 1.602.290.188                   | 25.634                                         | 4.136                                       | 258.501.679                   | 1.860.791.867                      | 29.770                              |
| 34   | Villa Alemana     | 16.549                  | 9.563                  | 6.986                                           | 6.120                 | 110.158.501   | 1.978                    | 1.372.761.225                   | 24.647                                         | 4.136                                       | 230.346.245                   | 1.603.107.470                      | 28.782                              |
| D    | ET - Marga        | 16.459                  | 9.885                  | 6.574                                           | 5.786                 | 288.490.459   | 1.978                    | 3.550.510.709                   | 24.341                                         | 4.136                                       | 603.246.171                   | 4.153.756.880                      | 28.477                              |
| 24   | Quillota          | 13.937                  | 10.369                 | 3.568                                           | 5.752                 | 19.605.895    | 2.739                    | 170.941.825                     | 23.880                                         | 4.136                                       | 29.604.146                    | 200.545.971                        | 28.016                              |
| 11   | La Calera         | 14.520                  | 10.991                 | 3.529                                           | 5.752                 | 37.089.329    | 2.739                    | 342.381.240                     | 25.284                                         | 4.136                                       | 56.003.458                    | 398.384.698                        | 29.419                              |
| 12   | La Cruz           | 12.471                  | 11.117                 | 1.355                                           | 5.752                 | 41.234.228    | 2.739                    | 349.692.905                     | 23.228                                         | 4.136                                       | 62.262.096                    | 411.955.001                        | 27.364                              |
| 10   | Hijuelas          | 17.922                  | 10.668                 | 7.254                                           | 5.752                 | 24.007.291    | 2.739                    | 251.481.035                     | 28.691                                         | 4.136                                       | 36.250.085                    | 287.731.120                        | 32.826                              |
| E    | ET - 5 Quillota   | 19.558                  | 14.760                 | 4.798                                           | 7.810                 | 121.936.744   | 3.719                    | 1.114.497.006                   | 33.993                                         | 4.136                                       | 184.119.784                   | 1.298.616.790                      | 39.608                              |
| 1    | Algarrobo         | 14.867                  | 10.514                 | 4.353                                           |                       |               |                          | 151.302.353                     | 14.867                                         | 9.396                                       | 95.621.061                    | 246.923.414                        | 24.263                              |
| 4    | Cartagena         | 23.020                  | 10.374                 | 12.645                                          |                       |               |                          | 557.703.981                     | 23.020                                         | 9.396                                       | 227.631.515                   | 785.335.496                        | 32.416                              |
| 5    | Casablanca        | 22.716                  | 9.931                  | 12.785                                          |                       |               |                          | 170.174.751                     | 22.716                                         | 9.396                                       | 70.388.191                    | 240.562.942                        | 32.111                              |
| 8    | B Quisco          | 14.558                  | 10.792                 | 3.767                                           |                       |               |                          | 257.645.424                     | 15.120                                         | 9.396                                       | 160.107.705                   | 417.753.129                        | 24.515                              |
| 9    | B Tabo            | 10.827                  | 9.694                  | 1.132                                           |                       |               |                          | 623.647.269                     | 10.827                                         | 9.396                                       | 541.225.085                   | 1.164.872.354                      | 20.222                              |
| 17   | Nogales           | 30.608                  | 9.597                  | 21.011                                          |                       |               |                          | 1.999.116.845                   | 30.608                                         | 4.136                                       | 270.119.453                   | 2.269.236.299                      | 34.743                              |
| 28   | San Antonio       | 23.673                  | 13.881                 | 9.793                                           |                       |               |                          | 99.336.724                      | 23.673                                         | 9.396                                       | 39.425.713                    | 138.762.437                        | 33.069                              |
| 32   | Santo Domingo     | 20.003                  | 9.549                  | 10.454                                          |                       |               |                          | 2.204.361.947                   | 20.003                                         | 9.396                                       | 1.035.413.439                 | 3.239.775.386                      | 29.399                              |
| 33   | Valparaíso        | 12.958                  | 9.710                  | 3.248                                           |                       |               |                          | 1.769.680.006                   | 12.958                                         | 4.136                                       | 564.810.287                   | 2.334.490.292                      | 17.094                              |
| 35   | Viña del Mar      | 15.281                  | 9.729                  | 5.553                                           |                       |               |                          | 1.846.132.432                   | 15.281                                         | 4.136                                       | 499.630.392                   | 2.345.762.825                      | 19.417                              |
| A    | ET-1 San Felipe   |                         |                        |                                                 |                       | 277.128.567   | 2.294                    |                                 |                                                |                                             |                               |                                    |                                     |
| B    | ET - 2 Petorca    |                         |                        |                                                 |                       | 187.472.097   | 3.788                    |                                 |                                                |                                             |                               |                                    |                                     |
| C    | ET- 3 Quintero    |                         |                        |                                                 |                       | 315.921.008   | 3.106                    |                                 |                                                |                                             |                               |                                    |                                     |
| D    | ET- 4 Marga Marga |                         |                        |                                                 |                       | 288.490.459   | 1.978                    |                                 |                                                |                                             |                               |                                    |                                     |
| E    | ET - 5 Quillota   |                         |                        |                                                 |                       | 89.799.959    | 2.739                    |                                 |                                                |                                             |                               |                                    |                                     |
| 2020 | Año 2020          | 16.836                  | 10.042                 | 6.794                                           |                       | 1.158.812.090 |                          | 20.953.836.171                  | 20.864                                         |                                             | 5.641.974.545                 | 26.595.810.716                     | 26.482                              |

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**TABLA N°9: ALTERNATIVA 2a\*: 2 Rellenos Sanitarios: SUR y El Molle, ET en San Felipe a Loma Los Colorados y el resto transporte directo**

| N°   | Comuna           | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|      |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6    | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15   | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19   | Panquehue        | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23   | Putendo          | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27   | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29   | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30   | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31   | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A    | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2    | Cabildo          | 21.804    | 6.295        | 128                           | 0                        | 3.147       | 15.736    | 7.543      | 226.304                         | 442             | 17        | 5                            | 80%         | 0           |
| 13   | La Ligua         | 41.747    | 22.646       | 122                           | 0                        | 11.323      | 56.615    | 25.799     | 773.968                         | 1.586           | 61        | 15                           | 93%         | 0           |
| 20   | Papudo           | 6.174     | 5.307        | 100                           | 0                        | 2.653       | 13.267    | 5.200      | 156.000                         | 390             | 15        | 4                            | 74%         | 0           |
| 21   | Petorca          | 9.680     | 6.190        | 150                           | 0                        | 3.095       | 15.475    | 8.840      | 265.200                         | 442             | 17        | 5                            | 89%         | 0           |
| 36   | Zapallar         | 8.455     | 9.057        | 80                            | 0                        | 4.528       | 22.642    | 6.942      | 208.260                         | 650             | 25        | 5                            | 87%         | 0           |
| B    | ET - Petorca     | 87.860    | 49.494       | 580                           | 0                        | 24.747      | 123.736   | 54.324     | 1.629.732                       | 3.510           | 135       | 34                           | 85%         | 0           |
| 7    | Con Con          | 93.336    | 38.356       | 29                            | 0                        | 19.178      | 95.890    | 10.248     | 307.434                         | 2.678           | 103       | 13                           | 89%         | 0           |
| 22   | Puchuncaví       | 18.741    | 9.240        | 67                            | 0                        | 4.620       | 23.099    | 5.824      | 174.720                         | 650             | 25        | 5                            | 80%         | 0           |
| 26   | Quintero         | 29.063    | 30.534       | 49                            | 0                        | 15.267      | 76.335    | 13.815     | 414.461                         | 2.132           | 82        | 13                           | 86%         | 0           |
| C    | ET - El Quintero | 141.140   | 78.130       | 145                           | 0                        | 39.065      | 195.324   | 29.887     | 896.615                         | 5.460           | 210       | 31                           | 85%         | 0           |
| 14   | Limache          | 48.868    | 20.523       | 51                            | 2                        | 10.262      | 51.308    | 9.743      | 292.292                         | 1.430           | 55        | 9                            | 86%         | 17.160.000  |
| 18   | Olmué            | 17.216    | 7.138        | 59                            | 2                        | 3.569       | 17.845    | 4.111      | 123.344                         | 520             | 20        | 4                            | 74%         | 6.240.000   |
| 25   | Quilpué          | 185.176   | 62.505       | 27                            | 2                        | 31.253      | 156.263   | 15.359     | 460.773                         | 4.342           | 167       | 20                           | 92%         | 52.104.000  |
| 34   | Villa Alemana    | 163.329   | 55.697       | 41                            | 2                        | 27.849      | 139.243   | 20.971     | 629.138                         | 3.874           | 149       | 21                           | 90%         | 46.488.000  |
| D    | ET - Marga       | 414.589   | 145.864      | 178                           | 6                        | 72.932      | 364.660   | 50.185     | 1.505.547                       | 10.166          | 391       | 54                           | 85%         | 121.992.000 |
| 24   | Quillota         | 94.718    | 57.603       | 58                            | 4                        | 28.802      | 144.008   | 30.697     | 920.920                         | 4.004           | 154       | 25                           | 91%         | 112.112.000 |
| 11   | La Calera        | 56.954    | 24.227       | 79                            | 4                        | 12.114      | 60.568    | 17.869     | 536.068                         | 1.690           | 65        | 13                           | 88%         | 47.320.000  |
| 12   | La Cruz          | 18.230    | 7.491        | 64                            | 4                        | 3.746       | 18.729    | 4.681      | 140.431                         | 546             | 21        | 4                            | 81%         | 15.288.000  |
| 10   | Hijuelas         | 20.641    | 10.177       | 21                            | 4                        | 5.089       | 25.443    | 2.048      | 61.443                          | 728             | 28        | 4                            | 71%         | 23.296.000  |
| E    | ET - Quillota    | 190.543   | 99.499       | 222                           | 15                       | 49.749      | 248.747   | 55.295     | 1.658.862                       | 6.968           | 268       | 46                           | 83%         | 198.016.000 |
| 1    | Algarrobo        | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                            | 87%         | 0           |
| 4    | Cartagena        | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5    | Casablanca       | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8    | El Quisco        | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9    | El Tabo          | 16.217    | 7.995        | 0                             | 0                        | 3.998       | 19.988    | 0          | 0                               | 572             | 22        | 2                            | 82%         | 0           |
| 17   | Nogales          | 28.752    | 17.040       | 78                            | 0                        | 8.520       | 42.601    | 12.375     | 371.238                         | 1.196           | 46        | 9                            | 88%         | 0           |
| 28   | San Antonio      | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32   | Santo Domingo    | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33   | Valparaíso       | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35   | Viña del Mar     | 280.140   | 136.570      | 17                            | 0                        | 68.285      | 341.425   | 21.637     | 649.116                         | 9.490           | 365       | 39                           | 92%         | 0           |
| A    | ET-1 San Felipe  | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
| 2020 | Año 2020         | 1.927.522 | 879.633      | 1.556                         | 23                       | 439.817     | 2.199.083 | 287.674    | 9.064.163                       | 67.938          | 2.490     | 318                          | 84%         | 432.952.000 |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°9: ALTERNATIVA 2a\*

| N°   | Comuna           | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolectión<br>por km | CF Recolectión por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T<br>Rec. y<br>Transporte |
|------|------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|---------------------------------|
|      |                  | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                      |
| 3    | Calle Larga      | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                          |
| 6    | Catemu           | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                          |
| 15   | Llay Llay        | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                          |
| 16   | Los Andes        | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                          |
| 19   | Panquehue        | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                          |
| 23   | Putendo          | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                          |
| 27   | Rinconada        | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                          |
| 29   | San Esteban      | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                          |
| 30   | San Felipe       | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                          |
| 31   | Santa María      | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                          |
| A    | ET - San Felipe  | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                          |
| 2    | Cabildo          | 96.498.852                          | 205.538.645                     | 9.752.456                | 58.106.992              | 86.746.397                      | 147.431.653                     |                          |                                           |                        | 302.037.497                                           | 47.984                          |
| 13   | La Ligua         | 331.762.114                         | 616.615.935                     | 35.086.248               | 180.374.789             | 296.675.866                     | 436.241.146                     |                          |                                           |                        | 948.378.048                                           | 41.878                          |
| 20   | Papudo           | 68.019.824                          | 164.430.916                     | 8.222.216                | 52.928.150              | 59.797.608                      | 111.502.766                     |                          |                                           |                        | 232.450.740                                           | 43.801                          |
| 21   | Petorca          | 111.246.392                         | 205.538.645                     | 9.590.458                | 51.397.353              | 101.655.934                     | 154.141.292                     |                          |                                           |                        | 316.785.037                                           | 51.177                          |
| 36   | Zapallar         | 93.861.688                          | 205.538.645                     | 14.031.881               | 76.792.401              | 79.829.807                      | 128.746.244                     |                          |                                           |                        | 299.400.333                                           | 33.058                          |
| B    | ET - Petorca     | 701.388.870                         | 1.397.662.785                   | 76.683.259               | 419.599.684             | 624.705.611                     | 978.063.102                     | #REF!                    | 0                                         | 0                      | 2.099.051.656                                         | 42.410                          |
| 7    | Con Con          | 177.271.389                         | 534.400.477                     | 59.426.250               | 319.236.926             | 117.845.139                     | 215.163.551                     |                          |                                           |                        | 711.671.866                                           | 18.554                          |
| 22   | Puchuncaví       | 81.288.549                          | 205.538.645                     | 14.315.228               | 85.592.514              | 66.973.321                      | 119.946.131                     |                          |                                           |                        | 286.827.194                                           | 31.043                          |
| 26   | Quintero         | 206.177.963                         | 534.400.477                     | 47.307.678               | 261.376.825             | 158.870.285                     | 273.023.652                     |                          |                                           |                        | 740.578.440                                           | 24.254                          |
| C    | ET - El Quintero | 464.737.901                         | 1.274.339.598                   | 121.049.156              | 666.206.265             | 343.688.745                     | 608.133.333                     | #REF!                    | 0                                         | 0                      | 1.739.077.500                                         | 22.259                          |
| 14   | Limache          | 143.838.354                         | 369.969.561                     | 31.797.569               | 177.119.267             | 112.040.785                     | 192.850.293                     |                          |                                           |                        | 530.967.915                                           | 25.871                          |
| 18   | Olmue            | 58.339.108                          | 164.430.916                     | 11.059.133               | 71.563.341              | 47.279.975                      | 92.867.575                      |                          |                                           |                        | 229.010.024                                           | 32.083                          |
| 25   | Quilpué          | 273.464.376                         | 822.154.580                     | 96.841.776               | 504.271.141             | 176.622.600                     | 317.883.438                     |                          |                                           |                        | 1.147.722.956                                         | 18.362                          |
| 34   | Villa Alemana    | 327.453.750                         | 863.262.309                     | 86.293.983               | 456.233.022             | 241.159.767                     | 407.029.287                     |                          |                                           |                        | 1.237.204.058                                         | 22.213                          |
| D    | ET - Marga       | 803.095.588                         | 2.219.817.365                   | 225.992.461              | 1.209.186.772           | 577.103.127                     | 1.010.630.593                   | #REF!                    | 0                                         | 0                      | 3.144.904.953                                         | 21.561                          |
| 24   | Quillota         | 442.252.005                         | 1.027.693.225                   | 89.246.792               | 466.107.731             | 353.005.213                     | 561.585.493                     |                          |                                           |                        | 1.582.057.230                                         | 27.465                          |
| 11   | La Calera        | 243.020.436                         | 534.400.477                     | 37.535.922               | 204.388.249             | 205.484.514                     | 330.012.227                     |                          |                                           |                        | 824.740.912                                           | 34.042                          |
| 12   | La Cruz          | 65.436.660                          | 164.430.916                     | 11.606.854               | 68.642.735              | 53.829.807                      | 95.788.181                      |                          |                                           |                        | 245.155.576                                           | 32.725                          |
| 10   | Hijuelas         | 39.319.981                          | 164.430.916                     | 15.767.697               | 106.389.095             | 23.552.285                      | 58.041.821                      |                          |                                           |                        | 227.046.897                                           | 22.310                          |
| E    | ET- Quillota     | 790.029.082                         | 1.890.955.533                   | 154.157.265              | 845.527.810             | 635.871.817                     | 1.045.427.723                   | 0                        | 0                                         | 0                      | 2.879.000.615                                         | 28.935                          |
| 1    | Algarrobo        | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                           |                        | 102.028.456                                           | 14.253                          |
| 4    | Cartagena        | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                           |                        | 329.724.619                                           | 24.349                          |
| 5    | Casablanca       | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                           |                        | 338.782.553                                           | 22.503                          |
| 8    | El Quisco        | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                           |                        | 150.314.960                                           | 17.149                          |
| 9    | El Tabo          | 12.387.569                          | 82.215.458                      | 12.387.569               | 71.924.355              | 0                               | 10.291.103                      |                          |                                           |                        | 94.603.027                                            | 11.832                          |
| 17   | Nogales          | 168.703.759                         | 369.969.561                     | 26.401.398               | 142.693.688             | 142.302.361                     | 227.275.873                     |                          |                                           |                        | 538.673.320                                           | 31.611                          |
| 28   | San Antonio      | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                         | 16.508                          |
| 32   | Santo Domingo    | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                           |                        | 106.225.409                                           | 25.315                          |
| 33   | Valparaíso       | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          |                                           |                        | 1.418.187.355                                         | 12.869                          |
| 35   | Viña del Mar     | 460.411.178                         | 1.603.201.430                   | 211.593.331              | 1.101.219.565           | 248.817.847                     | 501.981.865                     |                          |                                           |                        | 2.063.612.608                                         | 15.110                          |
| A    | ET-1 San Felipe  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                                 |
| 2020 | Año 2020         | 4.528.390.805                       | 13.072.257.836                  | 1.362.848.553            | 7.386.715.045           | 3.165.542.252                   | 5.685.542.772                   | 6                        | 446.583.946                               | 230.924.340            | 38.608.772.907                                        | 21.155                          |



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### Continuación TABLA N°9: ALTERNATIVA 2a\*

| N°   | Comuna           | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o<br>RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|------------------|-------------------------|------------------------|-------------------------------------------------|-----------------------|-------------|--------------------------|---------------------------------|------------------------------------------------|------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                  | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                      | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                 | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga      | 18.529                  | 11.717                 | 6.812                                           | 5.608                 | 12.537.275  | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                    | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catenu           | 15.324                  | 10.280                 | 5.044                                           | 5.608                 | 15.388.703  | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                    | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay        | 22.064                  | 10.636                 | 11.428                                          | 5.608                 | 22.743.285  | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                    | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes        | 15.757                  | 9.917                  | 5.840                                           | 5.608                 | 76.622.628  | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                    | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panquehue        | 17.580                  | 11.316                 | 6.263                                           | 5.608                 | 6.626.394   | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                    | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putendo          | 16.765                  | 10.580                 | 6.185                                           | 5.608                 | 21.267.399  | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                    | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada        | 15.486                  | 10.353                 | 5.133                                           | 5.608                 | 7.604.625   | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                    | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban      | 18.635                  | 12.387                 | 6.248                                           | 5.608                 | 18.300.472  | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                    | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe       | 10.806                  | 9.676                  | 1.130                                           | 5.608                 | 81.495.958  | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                    | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María      | 16.400                  | 10.392                 | 6.008                                           | 5.608                 | 14.541.829  | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                    | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe  | 15.257                  | 10.291                 | 4.966                                           | 5.608                 | 277.128.567 | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                    | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo          | 47.984                  | 10.781                 | 37.203                                          | 0                     | 0           | 0                        | 302.037.497                     | 47.984                                         | 4.136                                    | 26.032.424                    | 328.069.921                        | 52.119                              |
| 13   | La Ligua         | 41.878                  | 9.514                  | 32.364                                          | 0                     | 0           | 0                        | 948.378.048                     | 41.878                                         | 4.136                                    | 93.656.419                    | 1.042.034.467                      | 46.014                              |
| 20   | Papudo           | 43.801                  | 11.523                 | 32.279                                          | 0                     | 0           | 0                        | 232.450.740                     | 43.801                                         | 4.136                                    | 21.947.726                    | 254.398.466                        | 47.937                              |
| 21   | Petorca          | 51.177                  | 9.853                  | 41.324                                          | 0                     | 0           | 0                        | 316.785.037                     | 51.177                                         | 4.136                                    | 25.600.000                    | 342.385.037                        | 55.312                              |
| 36   | Zapallar         | 33.058                  | 10.028                 | 23.030                                          | 0                     | 0           | 0                        | 299.400.333                     | 33.058                                         | 4.136                                    | 37.455.580                    | 336.855.913                        | 37.194                              |
| B    | ET - Petorca     | 42.410                  | 10.027                 | 32.383                                          | 0                     | 0           | 0                        | 2.099.051.656                   | 42.410                                         | 4.136                                    | 204.692.149                   | 2.303.743.805                      | 46.546                              |
| 7    | Con Con          | 18.554                  | 9.872                  | 8.682                                           | 0                     | 0           | 0                        | 711.671.866                     | 18.554                                         | 4.136                                    | 158.627.671                   | 870.299.538                        | 22.690                              |
| 22   | Ruchuncaví       | 31.043                  | 10.813                 | 20.230                                          | 0                     | 0           | 0                        | 286.827.194                     | 31.043                                         | 4.136                                    | 38.211.922                    | 325.039.116                        | 35.179                              |
| 26   | Quintero         | 24.254                  | 10.109                 | 14.145                                          | 0                     | 0           | 0                        | 740.578.440                     | 24.254                                         | 4.136                                    | 126.279.326                   | 866.857.766                        | 28.390                              |
| C    | ET - El Quintero | 22.259                  | 10.076                 | 12.183                                          | 0                     | 0           | 0                        | 1.739.077.500                   | 22.259                                         | 4.136                                    | 323.118.920                   | 2.062.196.419                      | 26.395                              |
| 14   | Limache          | 25.035                  | 10.179                 | 14.856                                          | 0                     | 0           | 0                        | 530.967.915                     | 25.871                                         | 4.136                                    | 84.877.884                    | 615.845.799                        | 30.007                              |
| 18   | Olmue            | 31.209                  | 11.575                 | 19.634                                          | 0                     | 0           | 0                        | 229.010.024                     | 32.083                                         | 4.136                                    | 29.520.363                    | 258.530.388                        | 36.219                              |
| 25   | Quilpué          | 17.528                  | 9.617                  | 7.911                                           | 0                     | 0           | 0                        | 1.147.722.956                   | 18.362                                         | 4.136                                    | 258.501.679                   | 1.406.224.635                      | 22.498                              |
| 34   | Villa Alemana    | 21.378                  | 9.741                  | 11.638                                          | 0                     | 0           | 0                        | 1.237.204.058                   | 22.213                                         | 4.136                                    | 230.346.245                   | 1.467.550.303                      | 26.349                              |
| D    | ET - Marga       | 20.724                  | 9.839                  | 10.885                                          | 0                     | 0           | 0                        | 3.144.904.953                   | 21.561                                         | 4.136                                    | 603.246.171                   | 3.748.151.125                      | 25.696                              |
| 24   | Quillota         | 25.518                  | 9.641                  | 15.877                                          | 0                     | 0           | 0                        | 1.582.057.230                   | 27.465                                         | 4.136                                    | 238.228.238                   | 1.820.285.467                      | 31.600                              |
| 11   | La Calera        | 32.089                  | 9.986                  | 22.103                                          | 0                     | 0           | 0                        | 824.740.912                     | 34.042                                         | 4.136                                    | 100.195.383                   | 924.936.295                        | 38.178                              |
| 12   | La Cruz          | 30.684                  | 10.712                 | 19.972                                          | 0                     | 0           | 0                        | 245.155.576                     | 32.725                                         | 4.136                                    | 30.982.405                    | 276.137.981                        | 36.860                              |
| 10   | Hijuelas         | 20.021                  | 12.003                 | 8.017                                           | 0                     | 0           | 0                        | 227.046.897                     | 22.310                                         | 4.136                                    | 42.089.026                    | 269.135.924                        | 26.445                              |
| E    | ET - Quillota    | 26.945                  | 10.047                 | 16.898                                          | 0                     | 0           | 0                        | 2.879.000.615                   | 28.935                                         | 4.136                                    | 411.495.052                   | 3.290.495.667                      | 33.071                              |
| 1    | Algarrobo        | 14.253                  | 10.012                 | 4.241                                           | 0                     | 0           | 0                        | 102.028.456                     | 14.253                                         | 9.396                                    | 67.256.957                    | 169.285.413                        | 23.649                              |
| 4    | Cartagena        | 24.349                  | 10.940                 | 13.409                                          | 0                     | 0           | 0                        | 329.724.619                     | 24.349                                         | 9.396                                    | 127.232.928                   | 456.957.546                        | 33.745                              |
| 5    | Casablanca       | 22.503                  | 10.009                 | 12.494                                          | 0                     | 0           | 0                        | 338.782.553                     | 22.503                                         | 9.396                                    | 141.451.779                   | 480.234.332                        | 31.899                              |
| 8    | El Quisco        | 16.580                  | 12.294                 | 4.285                                           | 0                     | 0           | 0                        | 150.314.960                     | 17.149                                         | 9.396                                    | 82.355.708                    | 232.670.668                        | 26.545                              |
| 9    | El Tabo          | 11.832                  | 10.545                 | 1.287                                           | 0                     | 0           | 0                        | 94.603.027                      | 11.832                                         | 9.396                                    | 75.122.737                    | 169.725.764                        | 21.228                              |
| 17   | Nogales          | 31.611                  | 9.923                  | 21.688                                          | 0                     | 0           | 0                        | 538.673.320                     | 31.611                                         | 4.136                                    | 70.473.778                    | 609.147.098                        | 35.747                              |
| 28   | San Antonio      | 16.508                  | 9.661                  | 6.847                                           | 0                     | 0           | 0                        | 1.078.224.496                   | 16.508                                         | 9.396                                    | 613.677.982                   | 1.691.902.477                      | 25.904                              |
| 32   | Santo Domingo    | 25.315                  | 12.002                 | 13.313                                          | 0                     | 0           | 0                        | 106.225.409                     | 25.315                                         | 9.396                                    | 139.425.713                   | 145.651.122                        | 34.711                              |
| 33   | Valparaíso       | 12.869                  | 9.637                  | 3.232                                           | 0                     | 0           | 0                        | 1.418.187.355                   | 12.869                                         | 4.136                                    | 455.752.562                   | 1.873.939.917                      | 17.005                              |
| 35   | Viña del Mar     | 15.110                  | 9.613                  | 5.498                                           | 0                     | 0           | 0                        | 2.063.612.608                   | 15.110                                         | 4.136                                    | 564.810.287                   | 2.628.422.895                      | 19.246                              |
| A    | ET-1 San Felipe  |                         |                        |                                                 |                       | 277.128.567 | 2.294                    |                                 |                                                |                                          |                               |                                    |                                     |
| 2020 | Año 2020         | 20.009                  | 9.947                  | 10.062                                          |                       | 277.128.567 | 2.294                    | 18.885.901.474                  | 21.470                                         |                                          | 4.504.971.570                 | 23.390.873.043                     | 26.592                              |



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Evaluación Económica de las Alternativas de Transporte de la Alternativa 2a

**TABLA N°10 ALTERNATIVA 2a\*\*: 2 Rellenos Sanitarios: RS SUR y El Molle, ET en San Felipe a Loma Los Colorados, ET en La Ligua, ET en Puchuncaví, ET en La Cruz y ET en Villa Alemana a RS Sur**

| N°   | Comuna           | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|      |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6    | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15   | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19   | Panquehue        | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23   | Putendo          | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27   | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29   | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30   | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31   | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A    | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2    | Cabido           | 21.804    | 6.295        | 26                            | 0                        | 3.147       | 15.736    | 1.532      | 45.968                          | 442             | 17        | 2                            | 92%         | 0           |
| 13   | La Ligua         | 41.747    | 22.646       | 0                             | 0                        | 11.323      | 56.615    | 0          | 0                               | 1.586           | 61        | 5                            | 93%         | 0           |
| 20   | Papudo           | 6.174     | 5.307        | 16                            | 0                        | 2.653       | 13.267    | 832        | 24.960                          | 390             | 15        | 2                            | 70%         | 0           |
| 21   | Petorca          | 9.680     | 6.190        | 45                            | 0                        | 3.095       | 15.475    | 2.652      | 79.560                          | 442             | 17        | 3                            | 74%         | 0           |
| 36   | Zapallar         | 8.455     | 9.057        | 41                            | 0                        | 4.528       | 22.642    | 3.553      | 106.600                         | 650             | 25        | 4                            | 79%         | 0           |
| B    | ET - Petorca     | 87.860    | 49.494       | 128                           | 0                        | 24.747      | 123.736   | 8.570      | 257.088                         | 3.510           | 135       | 16                           | 82%         | 0           |
| 7    | Con Con          | 93.336    | 38.356       | 21                            | 0                        | 19.178      | 95.890    | 7.498      | 224.952                         | 2.678           | 103       | 12                           | 88%         | 0           |
| 22   | Puchuncaví       | 18.741    | 9.240        | 25                            | 0                        | 4.620       | 23.099    | 2.167      | 65.000                          | 650             | 25        | 3                            | 89%         | 0           |
| 26   | Quintero         | 29.063    | 30.534       | 0                             | 0                        | 15.267      | 76.335    | 0          | 0                               | 2.132           | 82        | 7                            | 90%         | 0           |
| C    | ET - El Quintero | 141.140   | 78.130       | 46                            | 0                        | 39.065      | 195.324   | 9.665      | 289.952                         | 5.460           | 210       | 22                           | 89%         | 0           |
| 14   | Limache          | 48.868    | 20.523       | 13                            | 0                        | 10.262      | 51.308    | 2.479      | 74.360                          | 1.430           | 55        | 6                            | 85%         | 0           |
| 18   | Olmue            | 17.216    | 7.138        | 0                             | 0                        | 3.569       | 17.845    | 0          | 0                               | 520             | 20        | 2                            | 74%         | 0           |
| 25   | Quilpué          | 185.176   | 62.505       | 24                            | 1                        | 31.253      | 156.263   | 13.894     | 416.832                         | 4.342           | 167       | 20                           | 89%         | 17.368.000  |
| 34   | Villa Alemana    | 163.329   | 55.697       | 23                            | 0                        | 27.849      | 139.243   | 11.880     | 356.408                         | 3.874           | 149       | 17                           | 92%         | 0           |
| D    | ET - Marga       | 414.589   | 145.864      | 60                            | 1                        | 72.932      | 364.660   | 28.253     | 847.600                         | 10.166          | 391       | 45                           | 85%         | 17.368.000  |
| 24   | Quillota         | 94.718    | 57.603       | 8                             | 3                        | 28.802      | 144.008   | 4.324      | 129.730                         | 4.004           | 154       | 15                           | 89%         | 80.080.000  |
| 11   | La Calera        | 56.954    | 24.227       | 8                             | 4                        | 12.114      | 60.568    | 1.713      | 51.376                          | 1.690           | 65        | 7                            | 80%         | 54.080.000  |
| 12   | La Cruz          | 18.230    | 7.491        | 0                             | 4                        | 3.746       | 18.729    | 0          | 0                               | 546             | 21        | 2                            | 77%         | 17.472.000  |
| 10   | Hijuelas         | 20.641    | 10.177       | 21                            | 4                        | 5.089       | 25.443    | 2.048      | 61.443                          | 728             | 28        | 4                            | 71%         | 23.296.000  |
| E    | ET - 5 Quillota  | 190.543   | 99.499       | 37                            | 15                       | 49.749      | 248.747   | 8.085      | 242.549                         | 6.968           | 268       | 28                           | 79%         | 174.928.000 |
| 1    | Algarrobo        | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                            | 87%         | 0           |
| 4    | Cartagena        | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5    | Casablanca       | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8    | El Quisco        | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9    | El Tabo          | 16.217    | 7.995        | 0                             | 0                        | 3.998       | 19.988    | 0          | 0                               | 572             | 22        | 2                            | 82%         | 0           |
| 17   | Nogales          | 28.752    | 17.040       | 72                            | 0                        | 8.520       | 42.601    | 11.482     | 344.448                         | 1.196           | 46        | 9                            | 85%         | 0           |
| 28   | San Antonio      | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32   | Santo Domingo    | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33   | Valparaíso       | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35   | Viña del Mar     | 280.140   | 136.570      | 17                            | 0                        | 68.285      | 341.425   | 21.637     | 649.116                         | 9.490           | 365       | 39                           | 92%         | 0           |
| A    | ET-1 San Felipe  | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
| B    | ET-2 Petorca     | 87.860    | 49.494       | 209                           | 0                        |             |           | 17.054     | 1.108.536                       | 2.652           | 51        |                              | 81%         | 0           |
| C    | ET-3 Quintero    | 141.140   | 78.130       | 118                           | 2                        |             |           | 15.104     | 981.760                         | 4.160           | 80        |                              | 92%         | 24.960.000  |
| D    | ET-4 Marga Mar   | 414.589   | 145.864      | 84                            | 0                        |             |           | 20.121     | 1.307.862                       | 7.748           | 149       |                              | 89%         | 0           |
| E    | ET-5 Quillota    | 190.543   | 99.499       | 129                           | 0                        |             |           | 21.069     | 1.369.493                       | 5.304           | 102       |                              | 84%         | 0           |
| 2020 | Año 2020         | 1.927.522 | 879.633      | 1.301                         | 23                       | 439.817     | 2.199.083 | 225.011    | 9.751.456                       | 87.802          | 2.872     | 264                          | 84%         | 330.200.000 |



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### Continuación TABLA N°10 ALTERNATIVA 2a\*\*:

| N°   | Comuna            | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolectión<br>por km | CF Recolectión por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|------|-------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|------------------------------|
|      |                   | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3    | Calle Larga       | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                       |
| 6    | Catemu            | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                       |
| 15   | Llay Llay         | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                       |
| 16   | Los Andes         | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                       |
| 19   | Panquehue         | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                       |
| 23   | Putendo           | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                       |
| 27   | Rinconada         | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                       |
| 29   | San Esteban       | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                       |
| 30   | San Felipe        | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                       |
| 31   | Santa María       | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                       |
| A    | ET - San Felipe   | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                       |
| 2    | Cabildo           | 27.372.817                          | 82.215.458                      | 9.752.456                | 50.522.952              | 17.620.362                      | 31.692.506                      |                          | 60.222.056                                | 34.263.358             | 204.073.690                                           | 32.420                       |
| 13   | La Ligua          | 35.086.248                          | 205.538.645                     | 35.086.248               | 180.286.132             | 0                               | 25.252.513                      |                          | 216.659.892                               | 123.268.714            | 580.553.498                                           | 25.636                       |
| 20   | Rapido            | 17.789.834                          | 82.215.458                      | 8.222.216                | 56.291.507              | 9.567.617                       | 25.923.951                      |                          | 50.772.728                                | 28.887.160             | 179.665.180                                           | 33.855                       |
| 21   | Petorca           | 40.087.238                          | 123.323.187                     | 9.590.458                | 61.671.746              | 30.496.780                      | 61.651.441                      |                          | 59.221.710                                | 33.694.211             | 256.326.346                                           | 41.409                       |
| 36   | Zapallar          | 54.893.580                          | 164.430.916                     | 14.031.881               | 85.275.727              | 40.861.699                      | 79.155.189                      |                          | 86.647.792                                | 49.298.288             | 355.270.576                                           | 39.227                       |
| B    | ET - Petorca      | 175.229.717                         | 657.723.664                     | 76.683.259               | 434.048.064             | 98.546.458                      | 223.675.600                     | 7                        | 473.524.178                               | 269.411.730            | 1.575.889.289                                         | 31.840                       |
| 7    | Con Con           | 145.654.401                         | 493.292.748                     | 59.426.250               | 322.280.838             | 86.228.151                      | 171.011.909                     |                          | 218.133.571                               | 113.366.900            | 970.447.620                                           | 25.301                       |
| 22   | Ruchuncaví        | 39.230.898                          | 123.323.187                     | 14.315.228               | 76.612.727              | 24.915.670                      | 46.710.460                      |                          | 52.546.337                                | 27.309.026             | 242.409.447                                           | 26.236                       |
| 26   | Quintero          | 47.307.678                          | 287.754.103                     | 47.307.678               | 252.494.065             | 0                               | 35.260.037                      |                          | 173.650.412                               | 90.248.414             | 598.960.607                                           | 19.616                       |
| C    | ET - B Quintero   | 232.192.977                         | 904.370.038                     | 121.049.156              | 651.387.631             | 111.143.821                     | 252.982.407                     | 6                        | 444.330.320                               | 230.924.340            | 1.811.817.674                                         | 23.190                       |
| 14   | Lirache           | 60.301.096                          | 246.646.374                     | 31.797.569               | 178.612.796             | 28.503.526                      | 68.033.578                      |                          | 78.605.762                                | 48.737.241             | 434.290.472                                           | 21.161                       |
| 18   | Olmue             | 11.059.133                          | 82.215.458                      | 11.059.133               | 71.760.049              | 0                               | 10.455.409                      |                          | 64.080.584                                | 16.950.718             | 174.305.893                                           | 24.420                       |
| 25   | Quilpe            | 256.620.985                         | 822.154.580                     | 96.841.776               | 519.195.791             | 159.779.209                     | 302.958.788                     |                          | 561.135.999                               | 148.432.761            | 1.805.712.324                                         | 28.889                       |
| 34   | Villa Alemana     | 222.911.585                         | 698.831.393                     | 86.293.983               | 446.335.196             | 136.617.602                     | 252.496.197                     |                          | 500.018.301                               | 132.265.791            | 1.554.027.070                                         | 27.901                       |
| D    | ET - Marga        | 550.892.798                         | 1.849.847.804                   | 225.992.461              | 1.215.903.833           | 324.900.337                     | 633.943.972                     | 9                        | 1.203.840.646                             | 346.386.510            | 3.968.335.759                                         | 27.206                       |
| 24   | Quillota          | 138.974.483                         | 616.615.935                     | 89.246.792               | 478.307.663             | 49.727.691                      | 138.308.272                     |                          | 338673121.9                               | 200.534.727            | 1.374.878.267                                         | 23.868                       |
| 11   | La Calera         | 57.229.267                          | 287.754.103                     | 37.535.922               | 224.652.251             | 19.693.346                      | 63.101.852                      |                          | 142441061.7                               | 84.342.032             | 625.846.465                                           | 25.833                       |
| 12   | La Cruz           | 11.606.854                          | 82.215.458                      | 11.606.854               | 71.755.933              | 0                               | 10.459.525                      |                          | 44045608.89                               | 26.080.234             | 181.420.154                                           | 24.217                       |
| 10   | Huelvas           | 39.319.981                          | 164.430.916                     | 15.767.697               | 106.389.095             | 23.552.285                      | 58.041.821                      |                          | 59835148.53                               | 35.429.517             | 322.311.563                                           | 31.670                       |
| E    | ET - 5 Quillota   | 247.130.585                         | 1.151.016.411                   | 154.157.265              | 881.104.941             | 92.973.321                      | 269.911.470                     | 9                        | 584.994.941                               | 346.386.510            | 2.504.456.449                                         | 25.171                       |
| 1    | Algarrobo         | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                           |                        | 102.028.456                                           | 14.253                       |
| 4    | Cartagena         | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                           |                        | 329.724.619                                           | 24.349                       |
| 5    | Casablanca        | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                           |                        | 338.782.553                                           | 22.503                       |
| 8    | B Quisco          | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                           |                        | 150.314.960                                           | 17.149                       |
| 9    | B Tabo            | 12.387.569                          | 82.215.458                      | 12.387.569               | 71.924.355              | 0                               | 10.291.103                      |                          |                                           |                        | 94.603.027                                            | 11.832                       |
| 17   | Nogales           | 158.434.517                         | 369.969.561                     | 26.401.398               | 148.705.030             | 132.033.118                     | 221.264.531                     |                          |                                           |                        | 528.404.078                                           | 31.009                       |
| 28   | San Antonio       | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                         | 16.508                       |
| 32   | Santo Domingo     | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                           |                        | 106.225.409                                           | 25.315                       |
| 33   | Valparaíso        | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          |                                           |                        | 1.418.187.355                                         | 12.869                       |
| 35   | Viña del Mar      | 460.411.178                         | 1.603.201.430                   | 211.593.331              | 1.101.219.565           | 248.817.847                     | 501.981.865                     |                          |                                           |                        | 2.063.612.608                                         | 15.110                       |
| A    | ET-1 San Felipe   |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                              |
| B    | ET - 2 Petorca    |                                     |                                 |                          |                         |                                 |                                 | 7                        | 473.524.178                               | 269.411.730            |                                                       |                              |
| C    | ET- 3 Quintero    |                                     |                                 |                          |                         |                                 |                                 | 6                        | 444.330.320                               | 230.924.340            |                                                       |                              |
| D    | ET- 4 Marga Marga |                                     |                                 |                          |                         |                                 |                                 | 9                        | 588.668.792                               | 346.386.510            |                                                       |                              |
| E    | ET - 5 Quillota   |                                     |                                 |                          |                         |                                 |                                 | 9                        | 584.994.941                               | 346.386.510            |                                                       |                              |
| 2020 | Año 2020          | 2.964.316.198                       | 10.852.440.451                  | 1.362.848.553            | 7.434.650.325           | 1.601.467.645                   | 3.417.790.126                   | 37                       | 2.508.102.176                             | 1.424.033.432          | 18.596.968.111                                        | 21.142                       |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°10 ALTERNATIVA 2a\*\*:

| N°   | Comuna            | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET      | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|-------------------|-------------------------|------------------------|----------------------------------------------|-----------------------|---------------|--------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                   | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]    | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga       | 18.529                  | 11.717                 | 6.812                                        | 5.608                 | 12.537.275    | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catemu            | 15.324                  | 10.280                 | 5.044                                        | 5.608                 | 15.388.703    | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay         | 22.064                  | 10.636                 | 11.428                                       | 5.608                 | 22.743.285    | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes         | 15.757                  | 9.917                  | 5.840                                        | 5.608                 | 76.622.628    | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panquehue         | 17.580                  | 11.316                 | 6.263                                        | 5.608                 | 6.626.394     | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putendo           | 16.765                  | 10.580                 | 6.185                                        | 5.608                 | 21.267.399    | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada         | 15.486                  | 10.353                 | 5.133                                        | 5.608                 | 7.604.625     | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban       | 18.635                  | 12.387                 | 6.248                                        | 5.608                 | 18.300.472    | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe        | 10.806                  | 9.676                  | 1.130                                        | 5.608                 | 81.495.958    | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María       | 16.400                  | 10.392                 | 6.008                                        | 5.608                 | 14.541.829    | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe   | 15.257                  | 10.291                 | 4.966                                        | 5.608                 | 277.128.567   | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo           | 17.410                  | 9.576                  | 7.834                                        | 15.011                | 23.842.405    | 3.788                    | 227.916.094                     | 36.208                                         | 4.674                                       | 29.423.783                    | 257.339.877                        | 40.883                              |
| 13   | La Ligua          | 10.626                  | 9.510                  | 1.115                                        | 15.011                | 85.777.424    | 3.788                    | 666.330.922                     | 29.424                                         | 4.674                                       | 105.857.455                   | 772.188.377                        | 34.098                              |
| 20   | Papudo            | 18.844                  | 12.157                 | 6.688                                        | 15.011                | 20.101.339    | 3.788                    | 199.766.518                     | 37.643                                         | 4.674                                       | 24.806.953                    | 224.573.472                        | 42.317                              |
| 21   | Petorca           | 26.399                  | 11.512                 | 14.887                                       | 15.011                | 23.446.360    | 3.788                    | 279.772.705                     | 45.197                                         | 4.674                                       | 28.935.026                    | 308.707.731                        | 49.872                              |
| 36   | Zapallar          | 24.217                  | 10.965                 | 13.252                                       | 15.011                | 34.304.570    | 3.788                    | 389.575.146                     | 43.015                                         | 4.674                                       | 42.335.084                    | 431.910.230                        | 47.690                              |
| B    | ET - Petorca      | 16.829                  | 10.319                 | 6.510                                        | 15.011                | 187.472.097   | 3.788                    | 1.763.361.396                   | 35.628                                         | 4.674                                       | 231.358.301                   | 1.994.719.686                      | 40.302                              |
| 7    | Con Con           | 16.658                  | 9.952                  | 6.707                                        | 8.643                 | 119.124.389   | 3.106                    | 1.089.572.009                   | 28.407                                         | 4.674                                       | 179.292.799                   | 1.268.864.809                      | 33.081                              |
| 22   | Puchuncavi        | 17.593                  | 9.841                  | 7.752                                        | 8.643                 | 28.695.951    | 3.106                    | 271.105.398                     | 29.342                                         | 4.674                                       | 43.189.958                    | 314.295.356                        | 34.016                              |
| 26   | Quintero          | 10.973                  | 9.819                  | 1.155                                        | 8.643                 | 94.831.800    | 3.106                    | 693.792.407                     | 22.722                                         | 4.674                                       | 142.730.292                   | 836.522.699                        | 27.396                              |
| C    | ET - El Quintero  | 14.547                  | 9.887                  | 4.661                                        | 8.643                 | 242.652.140   | 3.106                    | 2.054.469.814                   | 26.296                                         | 4.674                                       | 365.213.050                   | 2.419.682.864                      | 30.970                              |
| 14   | Limache           | 14.956                  | 10.252                 | 4.704                                        | 6.205                 | 40.591.156    | 1.978                    | 474.881.629                     | 23.139                                         | 4.674                                       | 95.935.301                    | 570.816.930                        | 27.813                              |
| 18   | Olmue             | 13.067                  | 11.603                 | 1.465                                        | 11.352                | 14.117.525    | 1.978                    | 188.423.418                     | 26.397                                         | 4.674                                       | 33.366.112                    | 221.789.530                        | 31.072                              |
| 25   | Quilpué           | 17.259                  | 9.856                  | 7.403                                        | 11.352                | 123.623.276   | 1.978                    | 1.929.335.600                   | 30.867                                         | 4.674                                       | 292.177.836                   | 2.221.513.436                      | 35.541                              |
| 34   | Villa Alemana     | 16.549                  | 9.563                  | 6.986                                        | 11.352                | 110.158.501   | 1.978                    | 1.664.185.571                   | 29.879                                         | 4.674                                       | 260.354.469                   | 1.924.540.039                      | 34.554                              |
| D    | ET - Marga        | 16.459                  | 9.885                  | 6.574                                        | 10.628                | 288.490.459   | 1.978                    | 4.258.826.218                   | 29.184                                         | 4.674                                       | 681.833.717                   | 4.938.659.935                      | 33.855                              |
| 24   | Quilota           | 13.117                  | 9.853                  | 3.264                                        | 9.361                 | 157.771.071   | 2.739                    | 1.532.649.339                   | 26.607                                         | 4.674                                       | 269.263.284                   | 1.801.912.622                      | 31.281                              |
| 11   | La Calera         | 14.240                  | 10.822                 | 3.417                                        | 9.361                 | 66.356.252    | 2.739                    | 692.202.716                     | 28.571                                         | 4.674                                       | 113.248.278                   | 805.450.995                        | 33.246                              |
| 12   | La Cruz           | 12.524                  | 11.128                 | 1.396                                        | 9.361                 | 20.518.673    | 2.739                    | 201.938.827                     | 26.956                                         | 4.674                                       | 35.018.620                    | 236.957.446                        | 31.630                              |
| 10   | Hijuelas          | 20.021                  | 12.003                 | 8.017                                        | 9.361                 | 27.874.239    | 2.739                    | 350.185.802                     | 34.409                                         | 4.674                                       | 47.572.150                    | 397.757.952                        | 39.084                              |
| E    | ET - 5 Quilota    | 14.052                  | 10.405                 | 3.647                                        | 9.361                 | 272.520.235   | 2.739                    | 2.776.976.683                   | 27.910                                         | 4.674                                       | 465.102.332                   | 3.242.079.015                      | 32.584                              |
| 1    | Algarrobo         | 14.253                  | 10.012                 | 4.241                                        |                       |               |                          | 102.028.456                     | 14.253                                         | 4.674                                       | 33.460.809                    | 135.489.265                        | 18.928                              |
| 4    | Cartagena         | 24.349                  | 10.940                 | 13.409                                       |                       |               |                          | 329.724.619                     | 24.349                                         | 4.674                                       | 63.299.276                    | 393.023.894                        | 29.024                              |
| 5    | Casablanca        | 22.503                  | 10.009                 | 12.494                                       |                       |               |                          | 338.782.553                     | 22.503                                         | 4.674                                       | 70.373.254                    | 409.155.807                        | 27.178                              |
| 8    | El Quisco         | 16.580                  | 12.294                 | 4.285                                        |                       |               |                          | 150.314.960                     | 17.149                                         | 4.674                                       | 40.972.543                    | 191.287.503                        | 21.823                              |
| 9    | El Tabo           | 11.832                  | 10.545                 | 1.287                                        |                       |               |                          | 94.603.027                      | 11.832                                         | 4.674                                       | 37.374.090                    | 131.977.117                        | 16.507                              |
| 17   | Nogales           | 31.009                  | 10.276                 | 20.733                                       |                       |               |                          | 528.404.078                     | 31.009                                         | 6.315                                       | 107.602.772                   | 636.006.850                        | 37.323                              |
| 28   | San Antonio       | 16.508                  | 9.661                  | 6.847                                        |                       |               |                          | 1.078.224.496                   | 16.508                                         | 4.674                                       | 305.309.109                   | 1.383.533.605                      | 21.183                              |
| 32   | Santo Domingo     | 25.315                  | 12.002                 | 13.313                                       |                       |               |                          | 106.225.409                     | 25.315                                         | 4.674                                       | 19.614.569                    | 125.839.978                        | 29.990                              |
| 33   | Valparaíso        | 12.869                  | 9.637                  | 3.232                                        |                       |               |                          | 1.418.187.355                   | 12.869                                         | 6.315                                       | 695.865.053                   | 2.114.052.407                      | 19.184                              |
| 35   | Viña del Mar      | 15.110                  | 9.613                  | 5.498                                        |                       |               |                          | 2.063.612.608                   | 15.110                                         | 6.315                                       | 862.379.661                   | 2.925.992.269                      | 21.425                              |
| A    | ET-1 San Felipe   |                         |                        |                                              |                       | 277.128.567   | 2.294                    |                                 |                                                |                                             |                               |                                    |                                     |
| B    | ET - 2 Petorca    |                         |                        |                                              |                       | 187.472.097   | 3.788                    |                                 |                                                |                                             |                               |                                    |                                     |
| C    | ET- 3 Quintero    |                         |                        |                                              |                       | 242.652.140   | 3.106                    |                                 |                                                |                                             |                               |                                    |                                     |
| D    | ET- 4 Marga Marga |                         |                        |                                              |                       | 288.490.459   | 1.978                    |                                 |                                                |                                             |                               |                                    |                                     |
| E    | ET- 5 Quilota     |                         |                        |                                              |                       | 272.520.235   | 2.739                    |                                 |                                                |                                             |                               |                                    |                                     |
| 2020 | Año 2020          | 15.707                  | 10.001                 | 5.706                                        |                       | 1.268.263.496 |                          | 19.865.231.608                  | 22.584                                         |                                             | 4.704.617.383                 | 24.569.848.991                     | 27.932                              |

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**TABLA N°11: ALTERNATIVA 2a\*\*: 2 Rellenos Sanitarios: RS SUR y El Molle, ET en San Felipe a Loma Los Colorados, Otras Comunas con Transporte Directo a RS SUR**

| N°   | Comuna           | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|      |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6    | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15   | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19   | Panquehue        | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23   | Putendo          | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27   | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29   | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30   | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31   | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A    | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2    | Cabildo          | 21.804    | 6.295        | 190                           | 0                        | 3.147       | 15.736    | 11.197     | 335.920                         | 442             | 17        | 6                            | 89%         | 0           |
| 13   | La Ligua         | 41.747    | 22.646       | 162                           | 0                        | 11.323      | 56.615    | 34.258     | 1.027.728                       | 1.586           | 61        | 19                           | 89%         | 0           |
| 20   | Papudo           | 6.174     | 5.307        | 170                           | 0                        | 2.653       | 13.267    | 8.840      | 265.200                         | 390             | 15        | 5                            | 86%         | 0           |
| 21   | Petorca          | 9.680     | 6.190        | 209                           | 0                        | 3.095       | 15.475    | 12.317     | 369.512                         | 442             | 17        | 7                            | 82%         | 0           |
| 36   | Zapallar         | 8.455     | 9.057        | 147                           | 0                        | 4.528       | 22.642    | 12.740     | 382.200                         | 650             | 25        | 7                            | 92%         | 0           |
| B    | ET - Petorca     | 87.860    | 49.494       | 878                           | 0                        | 24.747      | 123.736   | 79.352     | 2.380.560                       | 3.510           | 135       | 44                           | 87%         | 0           |
| 7    | Con Con          | 93.336    | 38.356       | 100                           | 0                        | 19.178      | 95.890    | 35.707     | 1.071.200                       | 2.678           | 103       | 23                           | 90%         | 0           |
| 22   | Puchuncaví       | 18.741    | 9.240        | 129                           | 0                        | 4.620       | 23.099    | 11.189     | 335.660                         | 650             | 25        | 7                            | 85%         | 0           |
| 26   | Quintero         | 29.063    | 30.534       | 110                           | 0                        | 15.267      | 76.335    | 31.269     | 938.080                         | 2.132           | 82        | 19                           | 92%         | 0           |
| C    | ET - El Quintero | 141.140   | 78.130       | 339                           | 0                        | 39.065      | 195.324   | 78.165     | 2.344.940                       | 5.460           | 210       | 49                           | 89%         | 0           |
| 14   | Limache          | 48.868    | 20.523       | 92                            | 0                        | 10.262      | 51.308    | 17.579     | 527.384                         | 1.430           | 55        | 12                           | 88%         | 0           |
| 18   | Olmue            | 17.216    | 7.138        | 103                           | 0                        | 3.569       | 17.845    | 7.141      | 214.240                         | 520             | 20        | 5                            | 81%         | 0           |
| 25   | Quilpué          | 185.176   | 62.505       | 80                            | 0                        | 31.253      | 156.263   | 46.083     | 1.382.493                       | 4.342           | 167       | 32                           | 92%         | 0           |
| 34   | Villa Alemana    | 163.329   | 55.697       | 84                            | 0                        | 27.849      | 139.243   | 43.595     | 1.307.862                       | 3.874           | 149       | 30                           | 90%         | 0           |
| D    | ET - Marga       | 414.589   | 145.864      | 359                           | 0                        | 72.932      | 364.660   | 114.399    | 3.431.979                       | 10.166          | 391       | 79                           | 88%         | -           |
| 24   | Quillota         | 94.718    | 57.603       | 109                           | 3                        | 28.802      | 144.008   | 58.191     | 1.745.744                       | 4.004           | 154       | 36                           | 91%         | 96.096.000  |
| 11   | La Calera        | 56.954    | 24.227       | 122                           | 3                        | 12.114      | 60.568    | 27.491     | 824.720                         | 1.690           | 65        | 16                           | 93%         | 40.560.000  |
| 12   | La Cruz          | 18.230    | 7.491        | 118                           | 3                        | 3.746       | 18.729    | 8.590      | 257.712                         | 546             | 21        | 5                            | 93%         | 13.104.000  |
| 10   | Hijuelas         | 20.641    | 10.177       | 136                           | 3                        | 5.089       | 25.443    | 13.201     | 396.032                         | 728             | 28        | 8                            | 86%         | 17.472.000  |
| E    | ET- Quillota     | 190.543   | 99.499       | 485                           | 12                       | 49.749      | 248.747   | 107.474    | 3.224.208                       | 6.968           | 268       | 65                           | 91%         | 167.232.000 |
| 1    | Algarrobo        | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                            | 87%         | 0           |
| 4    | Cartagena        | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5    | Casablanca       | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8    | El Quisco        | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9    | El Tabo          | 16.217    | 7.995        | 0                             | 0                        | 3.998       | 19.988    | 0          | 0                               | 572             | 22        | 2                            | 82%         | 0           |
| 17   | Nogales          | 28.752    | 17.040       | 72                            | 0                        | 8.520       | 42.601    | 11.482     | 344.448                         | 1.196           | 46        | 9                            | 85%         | 0           |
| 28   | San Antonio      | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32   | Santo Domingo    | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33   | Valparaíso       | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35   | Viña del Mar     | 280.140   | 136.570      | 17                            | 0                        | 68.285      | 341.425   | 21.637     | 649.116                         | 9.490           | 365       | 39                           | 92%         | 0           |
| A    | ET-1 San Felipe  | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
| 2020 | Año 2020         | 1.927.522 | 879.633      | 2.488                         | 14                       | 439.817     | 2.199.083 | 476.479    | 14.728.303                      | 67.938          | 2.490     | 390                          | 85%         | 280.176.000 |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°11: ALTERNATIVA 2a\*\*

| N°   | Comuna          | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|------|-----------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|------------------------------|
|      |                 | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3    | Calle Larga     | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                       |
| 6    | Catemu          | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                       |
| 15   | Llay Llay       | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                       |
| 16   | Los Andes       | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                       |
| 19   | Panquehue       | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                       |
| 23   | Putendo         | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                       |
| 27   | Rinconada       | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                       |
| 29   | San Esteban     | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                       |
| 30   | San Felipe      | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                       |
| 31   | Santa María     | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                       |
| A    | ET - San Felipe | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                       |
| 2    | Cabildo         | 138.516.638                         | 246.646.374                     | 9.752.456                | 52.498.081              | 128.764.183                     | 194.148.293                     |                          |                                           |                        | 385.163.012                                           | 61.189                       |
| 13   | La Ligua        | 429.032.889                         | 781.046.851                     | 35.086.248               | 187.500.987             | 393.946.642                     | 593.545.863                     |                          |                                           |                        | 1.210.079.740                                         | 53.435                       |
| 20   | Rapido          | 109.878.150                         | 205.538.645                     | 8.222.216                | 45.894.790              | 101.655.934                     | 159.643.855                     |                          |                                           |                        | 315.416.795                                           | 59.435                       |
| 21   | Petorca         | 151.231.059                         | 287.754.103                     | 9.590.458                | 56.175.073              | 141.640.601                     | 231.579.030                     |                          |                                           |                        | 438.985.162                                           | 70.918                       |
| 36   | Zapallar        | 160.536.021                         | 287.754.103                     | 14.031.881               | 72.721.598              | 146.504.140                     | 215.032.505                     |                          |                                           |                        | 448.290.124                                           | 49.498                       |
| B    | ET - Petorca    | 989.194.757                         | 1.808.740.075                   | 76.683.259               | 414.790.529             | 912.511.498                     | 1.393.949.547                   |                          | 0                                         | 0                      | 2.797.934.833                                         | 56.531                       |
| 7    | Con Con         | 470.036.492                         | 945.477.767                     | 59.426.250               | 315.001.812             | 410.610.242                     | 630.475.954                     |                          |                                           |                        | 1.415.514.258                                         | 36.905                       |
| 22   | Puchuncaví      | 142.979.748                         | 287.754.103                     | 14.315.228               | 80.770.849              | 128.664.520                     | 206.983.254                     |                          |                                           |                        | 430.733.850                                           | 46.618                       |
| 26   | Quintero        | 406.890.628                         | 781.046.851                     | 47.307.678               | 245.011.022             | 359.582.949                     | 536.035.829                     |                          |                                           |                        | 1.187.937.478                                         | 38.905                       |
| C    | ET - B Quintero | 1.019.906.867                       | 2.014.278.720                   | 121.049.156              | 640.783.683             | 898.857.711                     | 1.373.495.037                   |                          | 0                                         | 0                      | 3.034.185.587                                         | 38.835                       |
| 14   | Limache         | 233.953.349                         | 493.292.748                     | 31.797.569               | 172.935.076             | 202.155.780                     | 320.357.672                     |                          |                                           |                        | 727.246.097                                           | 35.435                       |
| 18   | Olmúe           | 93.181.181                          | 205.538.645                     | 11.059.133               | 65.320.029              | 82.122.048                      | 140.218.616                     |                          |                                           |                        | 298.719.826                                           | 41.849                       |
| 25   | Quilpué         | 626.776.151                         | 1.315.447.327                   | 96.841.776               | 503.334.270             | 529.934.375                     | 812.113.058                     |                          |                                           |                        | 1.942.223.479                                         | 31.073                       |
| 34   | Villa Alemana   | 587.621.182                         | 1.233.231.869                   | 86.293.983               | 455.984.370             | 501.327.199                     | 777.247.500                     |                          |                                           |                        | 1.820.853.052                                         | 32.692                       |
| D    | ET - Marga      | 1.541.531.864                       | 3.247.510.590                   | 225.992.461              | 1.197.573.744           | 1.315.539.403                   | 2.049.936.845                   |                          | 0                                         | 0                      | 4.789.042.454                                         | 32.832                       |
| 24   | Quilota         | 758.421.891                         | 1.479.878.243                   | 89.246.792               | 468.398.169             | 669.175.099                     | 1.011.480.074                   |                          |                                           |                        | 2.334.396.134                                         | 40.525                       |
| 11   | La Calera       | 353.665.943                         | 657.723.664                     | 37.535.922               | 192.941.391             | 316.130.021                     | 464.782.273                     |                          |                                           |                        | 1.051.949.607                                         | 43.420                       |
| 12   | La Cruz         | 110.392.502                         | 205.538.645                     | 11.606.854               | 59.764.557              | 98.785.648                      | 145.774.088                     |                          |                                           |                        | 329.035.147                                           | 43.921                       |
| 10   | Huelvas         | 167.573.891                         | 328.861.832                     | 15.767.697               | 87.993.400              | 151.806.194                     | 240.868.432                     |                          |                                           |                        | 513.907.723                                           | 50.497                       |
| E    | ET - Quilota    | 1.390.054.227                       | 2.672.002.384                   | 154.157.265              | 809.097.517             | 1.235.896.962                   | 1.862.904.867                   |                          | 0                                         | 0                      | 4.229.288.611                                         | 42.506                       |
| 1    | Algarrobo       | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                           |                        | 102.028.456                                           | 14.253                       |
| 4    | Cartagena       | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                           |                        | 329.724.619                                           | 24.349                       |
| 5    | Casablanca      | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                           |                        | 338.782.553                                           | 22.503                       |
| 8    | El Quisco       | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                           |                        | 150.314.960                                           | 17.149                       |
| 9    | El Tabo         | 12.387.569                          | 82.215.458                      | 12.387.569               | 71.924.355              | 0                               | 10.291.103                      |                          |                                           |                        | 94.603.027                                            | 11.832                       |
| 17   | Nogales         | 158.434.517                         | 369.969.561                     | 26.401.398               | 148.705.030             | 132.033.118                     | 221.264.531                     |                          |                                           |                        | 528.404.078                                           | 31.009                       |
| 28   | San Antonio     | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                         | 16.508                       |
| 32   | Santo Domingo   | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                           |                        | 106.225.409                                           | 25.315                       |
| 33   | Valparaíso      | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          |                                           |                        | 1.418.187.355                                         | 12.869                       |
| 35   | Vina del Mar    | 460.411.178                         | 1.603.201.430                   | 211.593.331              | 1.101.219.565           | 248.817.847                     | 501.981.865                     |                          |                                           |                        | 2.063.612.608                                         | 15.110                       |
| A    | ET-1 San Felipe |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                              |
| 2020 | Año 2020        | 6.699.557.836                       | 16.032.014.303                  | 1.362.848.553            | 7.314.451.329           | 5.336.709.283                   | 8.717.562.974                   | 6                        | 446.583.946                               | 230.924.340            | 23.586.920.425                                        | 26.814                       |



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### Continuación TABLA N°11: ALTERNATIVA 2a\*\*

| N°   | Comuna           | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|------------------|-------------------------|------------------------|----------------------------------------------|-----------------------|-------------|--------------------------|---------------------------------|------------------------------------------------|------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                  | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                 | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga      | 18.529                  | 11.717                 | 6.812                                        | 5.608                 | 12.537.275  | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                    | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catemu           | 15.324                  | 10.280                 | 5.044                                        | 5.608                 | 15.388.703  | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                    | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay        | 22.064                  | 10.636                 | 11.428                                       | 5.608                 | 22.743.285  | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                    | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes        | 15.757                  | 9.917                  | 5.840                                        | 5.608                 | 76.622.628  | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                    | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panquehue        | 17.580                  | 11.316                 | 6.263                                        | 5.608                 | 6.626.394   | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                    | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putendo          | 16.765                  | 10.580                 | 6.185                                        | 5.608                 | 21.267.399  | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                    | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada        | 15.486                  | 10.353                 | 5.133                                        | 5.608                 | 7.604.625   | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                    | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban      | 18.635                  | 12.387                 | 6.248                                        | 5.608                 | 18.300.472  | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                    | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe       | 10.806                  | 9.676                  | 1.130                                        | 5.608                 | 81.495.958  | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                    | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María      | 16.400                  | 10.392                 | 6.008                                        | 5.608                 | 14.541.829  | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                    | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe  | 15.257                  | 10.291                 | 4.966                                        | 5.608                 | 277.128.567 | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                    | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo          | 61.189                  | 9.890                  | 51.300                                       | 0                     | 0           | 0                        | 385.163.012                     | 61.189                                         | 4.674                                    | 29.423.783                    | 414.586.795                        | 65.864                              |
| 13   | La Ligua         | 53.435                  | 9.829                  | 43.606                                       | 0                     | 0           | 0                        | 1.210.079.740                   | 53.435                                         | 4.674                                    | 105.857.455                   | 1.315.937.195                      | 58.109                              |
| 20   | Rapado           | 59.435                  | 10.197                 | 49.238                                       | 0                     | 0           | 0                        | 315.416.795                     | 59.435                                         | 4.674                                    | 24.806.953                    | 340.223.748                        | 64.109                              |
| 21   | Petorca          | 70.918                  | 10.624                 | 60.294                                       | 0                     | 0           | 0                        | 438.985.162                     | 70.918                                         | 4.674                                    | 28.935.026                    | 467.920.187                        | 75.592                              |
| 36   | Zapallar         | 49.498                  | 9.579                  | 39.919                                       | 0                     | 0           | 0                        | 448.290.124                     | 49.498                                         | 4.674                                    | 42.335.084                    | 490.625.208                        | 54.173                              |
| B    | ET - Petorca     | 56.531                  | 9.930                  | 46.601                                       | 0                     | 0           | 0                        | 2.797.934.833                   | 56.531                                         | 4.674                                    | 231.358.301                   | 3.029.293.133                      | 61.205                              |
| 7    | Con Con          | 36.905                  | 9.762                  | 27.143                                       | 0                     | 0           | 0                        | 1.415.514.258                   | 36.905                                         | 4.674                                    | 179.292.799                   | 1.594.807.058                      | 41.579                              |
| 22   | Puchuncaví       | 46.618                  | 10.291                 | 36.327                                       | 0                     | 0           | 0                        | 430.733.850                     | 46.618                                         | 4.674                                    | 43.189.958                    | 473.923.809                        | 51.293                              |
| 26   | Quintero         | 38.905                  | 9.574                  | 29.332                                       | 0                     | 0           | 0                        | 1.187.937.478                   | 38.905                                         | 4.674                                    | 142.730.292                   | 1.330.667.771                      | 43.580                              |
| C    | ET - El Quintero | 38.835                  | 9.751                  | 29.084                                       | 0                     | 0           | 0                        | 3.034.185.587                   | 38.835                                         | 4.674                                    | 365.213.050                   | 3.399.398.637                      | 43.510                              |
| 14   | Limache          | 35.435                  | 9.976                  | 25.459                                       | 0                     | 0           | 0                        | 727.246.097                     | 35.435                                         | 4.674                                    | 95.935.301                    | 823.181.398                        | 40.110                              |
| 18   | Olmúe            | 41.849                  | 10.700                 | 31.149                                       | 0                     | 0           | 0                        | 298.719.826                     | 41.849                                         | 4.674                                    | 33.366.112                    | 332.085.938                        | 46.524                              |
| 25   | Quilpué          | 31.073                  | 9.602                  | 21.471                                       | 0                     | 0           | 0                        | 1.942.223.479                   | 31.073                                         | 4.674                                    | 292.177.836                   | 2.234.401.314                      | 35.747                              |
| 34   | Villa Alemana    | 32.692                  | 9.736                  | 22.956                                       | 0                     | 0           | 0                        | 1.820.853.052                   | 32.692                                         | 4.674                                    | 260.354.469                   | 2.081.207.521                      | 37.366                              |
| D    | ET - Marga       | 32.832                  | 9.760                  | 23.073                                       | 0                     | 0           | 0                        | 4.789.042.454                   | 32.832                                         | 4.674                                    | 681.833.717                   | 5.470.876.171                      | 37.507                              |
| 24   | Quilota          | 38.857                  | 9.681                  | 29.176                                       | 0                     | 0           | 0                        | 2.334.396.134                   | 40.525                                         | 4.674                                    | 269.263.284                   | 2.603.659.418                      | 45.200                              |
| 11   | La Calera        | 41.746                  | 9.513                  | 32.233                                       | 0                     | 0           | 0                        | 1.051.949.607                   | 43.420                                         | 4.674                                    | 113.248.278                   | 1.165.197.885                      | 48.095                              |
| 12   | La Cruz          | 42.172                  | 9.527                  | 32.645                                       | 0                     | 0           | 0                        | 329.035.147                     | 43.921                                         | 4.674                                    | 35.018.620                    | 364.053.767                        | 48.596                              |
| 10   | Hijuelas         | 48.780                  | 10.196                 | 38.584                                       | 0                     | 0           | 0                        | 513.907.723                     | 50.497                                         | 4.674                                    | 47.572.150                    | 561.479.873                        | 55.171                              |
| E    | ET - Quilota     | 40.825                  | 9.681                  | 31.144                                       | 0                     | 0           | 0                        | 4.229.288.611                   | 42.506                                         | 4.674                                    | 465.102.332                   | 4.694.390.942                      | 47.180                              |
| 1    | Algarrobo        | 14.253                  | 10.012                 | 4.241                                        | 0                     | 0           | 0                        | 102.028.456                     | 14.253                                         | 4.674                                    | 33.460.809                    | 135.489.265                        | 18.928                              |
| 4    | Cartagena        | 24.349                  | 10.940                 | 13.409                                       | 0                     | 0           | 0                        | 329.724.619                     | 24.349                                         | 4.674                                    | 63.299.276                    | 393.023.894                        | 29.024                              |
| 5    | Casablanca       | 22.503                  | 10.009                 | 12.494                                       | 0                     | 0           | 0                        | 338.782.553                     | 22.503                                         | 4.674                                    | 70.373.254                    | 409.155.807                        | 27.178                              |
| 8    | El Quisco        | 16.580                  | 12.294                 | 4.285                                        | 0                     | 0           | 0                        | 150.314.960                     | 17.149                                         | 4.674                                    | 40.972.543                    | 191.287.503                        | 21.823                              |
| 9    | El Tabo          | 11.832                  | 10.545                 | 1.287                                        | 0                     | 0           | 0                        | 94.603.027                      | 11.832                                         | 4.674                                    | 37.374.090                    | 131.977.117                        | 16.507                              |
| 17   | Nogales          | 31.009                  | 10.276                 | 20.733                                       | 0                     | 0           | 0                        | 528.404.078                     | 31.009                                         | 6.315                                    | 107.602.772                   | 636.006.850                        | 37.323                              |
| 28   | San Antonio      | 16.508                  | 9.661                  | 6.847                                        | 0                     | 0           | 0                        | 1.078.224.496                   | 16.508                                         | 4.674                                    | 305.309.109                   | 1.383.533.605                      | 21.183                              |
| 32   | Santo Domingo    | 25.315                  | 12.002                 | 13.313                                       | 0                     | 0           | 0                        | 106.225.409                     | 25.315                                         | 4.674                                    | 19.614.569                    | 125.839.978                        | 29.990                              |
| 33   | Valparaíso       | 12.869                  | 9.637                  | 3.232                                        | 0                     | 0           | 0                        | 1.418.187.355                   | 12.869                                         | 6.315                                    | 695.865.053                   | 2.114.052.407                      | 19.184                              |
| 35   | Viña del Mar     | 15.110                  | 9.613                  | 5.498                                        | 0                     | 0           | 0                        | 2.063.612.608                   | 15.110                                         | 6.315                                    | 862.379.661                   | 2.925.992.269                      | 21.425                              |
| A    | ET-1 San Felipe  |                         |                        |                                              |                       | 277.128.567 | 2.294                    |                                 |                                                |                                          |                               |                                    |                                     |
| 2020 | Año 2020         | 25.842                  | 9.865                  | 15.977                                       |                       | 277.128.567 |                          | 23.864.048.991                  | 27.130                                         |                                          | 4.704.617.383                 | 28.568.666.374                     | 32.478                              |



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### Evaluación Económica de las Alternativas de Transporte de la Alternativa 2a

**TABLA N°12: ALTERNATIVA 2a\*\*\*: 3 Rellenos Sanitarios: RS SUR, CENTRO y El Molle, ET en San Felipe a Loma Los Colorados, ET en Viña, ET en La Ligua, ET en Puchuncaví, ET en La Cruz y ET en Villa Alemana a RS Centro, Valparaíso a RS El Molle**

| N°   | Comuna            | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|-------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|      |                   | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga       | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6    | Catemu            | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15   | Llaj Llaj         | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes         | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19   | Panquehue         | 19.010    | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23   | Putendo           | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27   | Rinconada         | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29   | San Esteban       | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30   | San Felipe        | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31   | Santa María       | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A    | ET - San Felipe   | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2    | Cabildo           | 21.804    | 6.295        | 26                            | 0                        | 3.147       | 15.736    | 1.532      | 45.968                          | 442             | 17        | 2                            | 92%         | 0           |
| 13   | La Ligua          | 41.747    | 22.646       | 0                             | 0                        | 11.323      | 56.615    | 0          | 0                               | 1.586           | 61        | 5                            | 93%         | 0           |
| 20   | Papudo            | 6.174     | 5.307        | 16                            | 0                        | 2.653       | 13.267    | 832        | 24.960                          | 390             | 15        | 2                            | 70%         | 0           |
| 21   | Petorca           | 9.680     | 6.190        | 45                            | 0                        | 3.095       | 15.475    | 2.652      | 79.560                          | 442             | 17        | 3                            | 74%         | 0           |
| 36   | Zapallar          | 8.455     | 9.057        | 41                            | 0                        | 4.528       | 22.642    | 3.553      | 106.600                         | 650             | 25        | 4                            | 79%         | 0           |
| B    | ET - Petorca      | 87.860    | 49.494       | 128                           | 0                        | 24.747      | 123.736   | 8.570      | 257.088                         | 3.510           | 135       | 16                           | 82%         | 0           |
| 7    | Con Con           | 93.336    | 38.356       | 21                            | 0                        | 19.178      | 95.890    | 7.498      | 224.952                         | 2.678           | 103       | 12                           | 88%         | 0           |
| 22   | Puchuncaví        | 18.741    | 9.240        | 25                            | 0                        | 4.620       | 23.099    | 2.167      | 65.000                          | 650             | 25        | 3                            | 89%         | 0           |
| 26   | Quintero          | 29.063    | 30.534       | 0                             | 0                        | 15.267      | 76.335    | 0          | 0                               | 2.132           | 82        | 7                            | 90%         | 0           |
| C    | ET - El Quintero  | 141.140   | 78.130       | 46                            | 0                        | 39.065      | 195.324   | 9.665      | 289.952                         | 5.460           | 210       | 22                           | 89%         | 0           |
| 14   | Limache           | 48.868    | 20.523       | 13                            | 0                        | 10.262      | 51.308    | 2.479      | 74.360                          | 1.430           | 55        | 6                            | 85%         | 0           |
| 18   | Olmué             | 17.216    | 7.138        | 0                             | 0                        | 3.569       | 17.845    | 0          | 0                               | 520             | 20        | 2                            | 74%         | 0           |
| 25   | Quilpué           | 185.176   | 62.505       | 24                            | 1                        | 31.253      | 156.263   | 13.894     | 416.832                         | 4.342           | 167       | 20                           | 89%         | 17.368.000  |
| 34   | Villa Alemana     | 163.329   | 55.697       | 23                            | 0                        | 27.849      | 139.243   | 11.880     | 356.408                         | 3.874           | 149       | 17                           | 92%         | 0           |
| D    | ET - Marga        | 414.589   | 145.864      | 60                            | 1                        | 72.932      | 364.660   | 29.253     | 847.600                         | 10.166          | 391       | 45                           | 89%         | 17.368.000  |
| 24   | Quilota           | 94.718    | 57.603       | 8                             | 3                        | 28.802      | 144.008   | 4.324      | 129.730                         | 4.004           | 154       | 15                           | 89%         | 80.080.000  |
| 11   | La Calera         | 56.954    | 24.227       | 8                             | 4                        | 12.114      | 60.568    | 1.713      | 51.376                          | 1.690           | 65        | 7                            | 80%         | 54.080.000  |
| 12   | La Cruz           | 18.230    | 7.491        | 0                             | 4                        | 3.746       | 18.729    | 0          | 0                               | 546             | 21        | 2                            | 77%         | 17.472.000  |
| 10   | Huelvas           | 20.641    | 10.177       | 21                            | 4                        | 5.089       | 25.443    | 2.048      | 61.443                          | 728             | 28        | 4                            | 71%         | 23.296.000  |
| E    | ET - 5 Quilota    | 190.543   | 99.499       | 37                            | 15                       | 49.749      | 247.747   | 8.085      | 242.549                         | 6.368           | 268       | 28                           | 79%         | 174.928.000 |
| 1    | Algarrobo         | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                            | 87%         | 0           |
| 4    | Cartagena         | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5    | Casablanca        | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8    | El Quisco         | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9    | El Tabo           | 16.217    | 7.995        | 0                             | 0                        | 3.998       | 19.988    | 0          | 0                               | 572             | 22        | 2                            | 82%         | 0           |
| 17   | Nogales           | 28.752    | 17.040       | 15                            | 0                        | 8.520       | 42.601    | 2.392      | 71.760                          | 1.196           | 46        | 5                            | 87%         | 0           |
| 28   | San Antonio       | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32   | Santo Domingo     | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33   | Valparaíso        | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35   | Viña del Mar      | 280.140   | 136.570      | 10                            | 0                        | 68.285      | 341.425   | 12.653     | 379.600                         | 9.490           | 365       | 36                           | 90%         | 0           |
| A    | ET - 1 San Felipe | 290.975   | 120.810      | 63                            | 4                        | 29.995      | 149.975   | 12.394     | 805.896                         | 6.396           | 123       | 13                           | 90%         | 102.336.000 |
| B    | ET - 2 Petorca    | 87.860    | 49.494       | 50                            | 0                        | 24.747      | 123.736   | 4.080      | 265.200                         | 2.652           | 51        | 6                            | 85%         | 0           |
| C    | ET - 3 Quintero   | 141.140   | 78.130       | 17                            | 2                        | 39.065      | 195.324   | 2.176      | 141.440                         | 4.160           | 80        | 9                            | 91%         | 24.960.000  |
| D    | ET - 4 Marga Mar  | 414.589   | 145.864      | 57                            | 0                        | 72.932      | 364.660   | 13.589     | 883.272                         | 7.748           | 149       | 17                           | 88%         | 0           |
| E    | ET - 5 Quilota    | 190.543   | 99.499       | 38                            | 0                        | 49.749      | 247.747   | 6.202      | 403.104                         | 5.304           | 102       | 11                           | 83%         | 0           |
| F    | ET Viña del Mar   | 280.140   | 136.570      | 45                            | 0                        | 68.285      | 341.425   | 10.008     | 650.520                         | 7.228           | 139       | 14                           | 83%         | 0           |
| 2020 | Año 2020          | 1.927.522 | 879.633      | 903                           | 23                       | 439.817     | 2.199.083 | 169.643    | 6.785.137                       | 95.030          | 3.011     | 257                          | 83%         | 330.200.000 |



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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Continuación TABLA N°12: ALTERNATIVA 2a\*\*\*

| N°   | Comuna           | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores |
|------|------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|
|      |                  | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            |
| 3    | Calle Larga      | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           |
| 6    | Cateru           | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           |
| 15   | Llay Llay        | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           |
| 16   | Los Andes        | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           |
| 19   | Panquehue        | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            |
| 23   | Putendo          | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           |
| 27   | Rinconada        | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            |
| 29   | San Esteban      | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           |
| 30   | San Felipe       | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           |
| 31   | Santa María      | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           |
| A    | ET - San Felipe  | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         |
| 2    | Cabildo          | 27.372.817                          | 82.215.458                      | 9.752.456                | 50.522.952              | 17.620.362                      | 31.692.506                      |                          | 14.407.190                                | 14.684.296             | 138.679.762                                           |
| 13   | La Ligua         | 35.086.248                          | 205.538.645                     | 35.086.248               | 180.286.132             | 0                               | 25.252.513                      |                          | 51.832.510                                | 52.829.449             | 345.286.851                                           |
| 20   | Papudo           | 17.789.834                          | 82.215.458                      | 8.222.216                | 56.291.507              | 9.567.617                       | 25.923.951                      |                          | 12.146.586                                | 12.380.211             | 124.532.089                                           |
| 21   | Petorca          | 40.087.238                          | 123.323.187                     | 9.590.458                | 61.671.746              | 30.496.780                      | 61.661.441                      |                          | 14.167.873                                | 14.440.376             | 192.018.674                                           |
| 36   | Zapallar         | 54.893.580                          | 164.430.916                     | 14.031.881               | 85.275.727              | 40.861.699                      | 79.155.189                      |                          | 20.729.137                                | 21.127.838             | 261.181.471                                           |
| B    | ET - Petorca     | 175.229.717                         | 657.723.664                     | 76.683.259               | 434.048.064             | 98.546.458                      | 223.675.600                     | 3                        | 113.283.296                               | 115.462.170            | 1.061.698.847                                         |
| 7    | Con Con          | 145.654.401                         | 493.292.748                     | 59.426.250               | 322.280.838             | 86.228.151                      | 171.011.909                     |                          | 41.914.212                                | 37.788.967             | 718.650.328                                           |
| 22   | Ruchuncavi       | 39.230.898                          | 123.323.187                     | 14.315.228               | 76.612.727              | 24.915.670                      | 46.710.460                      |                          | 10.096.742                                | 9.103.009              | 181.753.835                                           |
| 26   | Quintero         | 47.307.678                          | 287.754.103                     | 47.307.678               | 252.494.065             | 0                               | 35.260.037                      |                          | 33.366.804                                | 30.082.805             | 398.511.390                                           |
| C    | ET - El Quintero | 232.192.977                         | 904.370.038                     | 121.049.156              | 651.387.631             | 111.143.821                     | 252.982.407                     | 2                        | 85.377.758                                | 76.974.780             | 1.298.915.552                                         |
| 14   | Limache          | 60.301.096                          | 246.646.374                     | 31.797.569               | 178.612.796             | 28.503.526                      | 68.033.578                      |                          | 53.086.830                                | 37.906.743             | 397.941.042                                           |
| 18   | Olmue            | 11.059.133                          | 82.215.458                      | 11.059.133               | 71.760.049              | 0                               | 10.455.409                      |                          | 12.313.039                                | 13.183.892             | 118.771.522                                           |
| 25   | Quilpué          | 256.620.985                         | 822.154.580                     | 96.841.776               | 519.195.791             | 159.779.209                     | 302.958.788                     |                          | 107.821.887                               | 115.447.703            | 1.319.413.154                                         |
| 34   | Villa Alemana    | 222.911.585                         | 698.831.393                     | 86.293.983               | 446.335.196             | 136.617.602                     | 252.496.197                     |                          | 96.078.164                                | 102.873.393            | 1.120.694.535                                         |
| D    | ET - Marga       | 550.892.798                         | 1.849.847.804                   | 225.992.461              | 1.215.903.833           | 324.900.337                     | 633.943.972                     | 7                        | 269.299.920                               | 269.411.730            | 2.956.820.253                                         |
| 24   | Quillota         | 138.974.483                         | 616.615.935                     | 89.246.792               | 478.307.663             | 49.727.691                      | 138.308.272                     |                          | 99.686.899                                | 89.126.545             | 1.024.483.862                                         |
| 11   | La Calera        | 57.229.267                          | 287.754.103                     | 37.535.922               | 224.652.251             | 19.693.346                      | 63.101.852                      |                          | 41.926.881                                | 37.485.348             | 478.475.599                                           |
| 12   | La Cruz          | 11.606.854                          | 82.215.458                      | 11.606.854               | 71.755.933              | 0                               | 10.459.525                      |                          | 12.964.625                                | 11.591.215             | 135.850.152                                           |
| 10   | Hijuelas         | 39.319.981                          | 164.430.916                     | 15.767.697               | 106.389.095             | 23.552.285                      | 58.041.821                      |                          | 17.612.205                                | 15.746.452             | 260.405.554                                           |
| E    | ET - 5 Quillota  | 247.130.585                         | 1.151.016.411                   | 154.157.265              | 881.104.941             | 92.973.321                      | 269.911.470                     | 4                        | 172.190.610                               | 153.949.560            | 1.899.215.167                                         |
| 1    | Algarrobo        | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          | 21.638.772                                | 21.638.772             | 102.028.456                                           |
| 4    | Cartagena        | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          | 119.484.875                               | 119.484.875            | 329.724.619                                           |
| 5    | Casablanca       | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          | 119.282.509                               | 119.282.509            | 338.782.553                                           |
| 8    | El Quisco        | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          | 29.143.197                                | 29.143.197             | 150.314.960                                           |
| 9    | El Tabo          | 12.387.569                          | 82.215.458                      | 12.387.569               | 71.924.355              | 0                               | 10.291.103                      |                          | 10.291.103                                | 10.291.103             | 94.603.027                                            |
| 17   | Nogales          | 53.908.298                          | 205.538.645                     | 26.401.398               | 144.631.877             | 27.506.900                      | 60.906.768                      |                          | 60.906.768                                | 60.906.768             | 259.446.943                                           |
| 28   | San Antonio      | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          | 292.323.965                               | 292.323.965            | 1.078.224.496                                         |
| 32   | Santo Domingo    | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          | 38.353.345                                | 38.353.345             | 106.225.409                                           |
| 33   | Valparaíso       | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          | 259.719.096                               | 259.719.096            | 1.418.187.355                                         |
| 35   | Viña del Mar     | 357.100.844                         | 1.479.878.243                   | 211.593.331              | 1.117.498.446           | 145.507.513                     | 362.379.798                     |                          | 277.877.262                               | 1.077.646.921          | 3.192.503.270                                         |
| A    | ET-1 San Felipe  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |
| B    | ET-2 Petorca     |                                     |                                 |                          |                         |                                 |                                 | 3                        | 113.283.296                               | 115.462.170            |                                                       |
| C    | ET-3 Quintero    |                                     |                                 |                          |                         |                                 |                                 | 2                        | 85.377.758                                | 76.974.780             |                                                       |
| D    | ET-4 Marga Marga |                                     |                                 |                          |                         |                                 |                                 | 7                        | 377.300.013                               | 269.411.730            |                                                       |
| E    | ET-5 Quillota    |                                     |                                 |                          |                         |                                 |                                 | 4                        | 172.190.610                               | 153.949.560            |                                                       |
| F    | ET Viña del Mar  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 277.877.262                               | 230.924.340            |                                                       |
| 2020 | Año 2020         | 2.756.479.645                       | 10.564.686.348                  | 1.362.848.553            | 7.446.856.052           | 1.393.631.093                   | 3.117.830.296                   | 28                       | 1.472.632.885                             | 1.077.646.921          | 16.813.052.288                                        |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°12: ALTERNATIVA 2a\*\*\*

| N°   | Comuna            | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET      | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|-------------------|-------------------------|------------------------|----------------------------------------------|-----------------------|---------------|--------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                   | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]    | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga       | 18.529                  | 11.717                 | 6.812                                        | 5.608                 | 12.537.275    | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catemu            | 15.324                  | 10.280                 | 5.044                                        | 5.608                 | 15.388.703    | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay         | 22.064                  | 10.636                 | 11.428                                       | 5.608                 | 22.743.285    | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes         | 15.757                  | 9.917                  | 5.840                                        | 5.608                 | 76.622.628    | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panguelhue        | 17.580                  | 11.316                 | 6.263                                        | 5.608                 | 6.626.394     | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putaendo          | 16.765                  | 10.580                 | 6.185                                        | 5.608                 | 21.267.399    | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada         | 15.486                  | 10.353                 | 5.133                                        | 5.608                 | 7.604.625     | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban       | 18.635                  | 12.387                 | 6.248                                        | 5.608                 | 18.300.472    | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe        | 10.806                  | 9.676                  | 1.130                                        | 5.608                 | 81.495.958    | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María       | 16.400                  | 10.392                 | 6.008                                        | 5.608                 | 14.541.829    | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe   | 15.257                  | 10.291                 | 4.966                                        | 5.608                 | 277.128.567   | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo           | 17.410                  | 9.576                  | 7.834                                        | 4.622                 | 23.842.405    | 3.788                    | 162.522.167                     | 25.819                                         | 4.540                                       | 28.580.146                    | 191.102.313                        | 30.360                              |
| 13   | La Ligua          | 10.626                  | 9.510                  | 1.115                                        | 4.622                 | 85.777.424    | 3.788                    | 431.064.275                     | 19.035                                         | 4.540                                       | 102.822.316                   | 533.886.592                        | 23.575                              |
| 20   | Papudo            | 18.844                  | 12.157                 | 6.688                                        | 4.622                 | 20.101.339    | 3.788                    | 144.633.427                     | 27.254                                         | 4.540                                       | 24.095.690                    | 168.729.117                        | 31.794                              |
| 21   | Petorca           | 26.399                  | 11.512                 | 14.887                                       | 4.622                 | 23.446.360    | 3.788                    | 215.465.034                     | 34.808                                         | 4.540                                       | 28.105.402                    | 243.570.436                        | 39.349                              |
| 36   | Zapallar          | 24.217                  | 10.965                 | 13.252                                       | 4.622                 | 34.304.570    | 3.788                    | 295.486.041                     | 32.626                                         | 4.540                                       | 41.121.255                    | 336.607.296                        | 37.167                              |
| B    | ET - Petorca      | 16.829                  | 10.319                 | 6.510                                        | 4.622                 | 187.472.097   | 3.788                    | 1.249.170.944                   | 25.239                                         | 4.540                                       | 224.724.809                   | 1.473.895.753                      | 29.779                              |
| 7    | Con Con           | 16.658                  | 9.952                  | 6.707                                        | 2.078                 | 119.124.389   | 3.106                    | 837.774.716                     | 21.842                                         | 4.540                                       | 174.152.127                   | 1.011.926.844                      | 26.383                              |
| 22   | Ruchuncavi        | 17.593                  | 9.841                  | 7.752                                        | 2.078                 | 28.695.951    | 3.106                    | 210.449.786                     | 22.777                                         | 4.540                                       | 252.401.404                   | 227.317                            | 27.317                              |
| 26   | Quintero          | 10.973                  | 9.819                  | 1.155                                        | 2.078                 | 94.831.800    | 3.106                    | 493.343.190                     | 16.157                                         | 4.540                                       | 138.637.938                   | 631.981.128                        | 20.698                              |
| C    | ET - El Quintero  | 14.547                  | 9.887                  | 4.661                                        | 2.078                 | 242.652.140   | 3.106                    | 1.541.567.692                   | 19.731                                         | 4.540                                       | 354.741.684                   | 1.896.309.376                      | 24.271                              |
| 14   | Lirache           | 14.956                  | 10.252                 | 4.704                                        | 4.434                 | 40.591.156    | 1.978                    | 438.532.199                     | 21.367                                         | 4.540                                       | 93.184.650                    | 531.716.849                        | 25.908                              |
| 18   | Olmue             | 13.067                  | 11.603                 | 1.465                                        | 3.572                 | 14.117.525    | 1.978                    | 132.889.047                     | 18.617                                         | 4.540                                       | 32.409.440                    | 165.298.487                        | 23.158                              |
| 25   | Quilpué           | 17.259                  | 9.856                  | 7.403                                        | 3.572                 | 123.623.276   | 1.978                    | 1.443.036.430                   | 23.087                                         | 4.540                                       | 283.800.531                   | 1.726.836.961                      | 27.627                              |
| 34   | Villa Alemana     | 16.549                  | 9.563                  | 6.986                                        | 3.572                 | 110.158.501   | 1.978                    | 1.230.853.036                   | 22.099                                         | 4.540                                       | 252.889.601                   | 1.483.742.637                      | 26.639                              |
| D    | ET - Marga        | 16.459                  | 9.885                  | 6.574                                        | 3.693                 | 288.490.459   | 1.978                    | 3.245.310.711                   | 22.249                                         | 4.540                                       | 662.284.222                   | 3.907.594.934                      | 28.789                              |
| 24   | Quilota           | 13.117                  | 9.853                  | 3.264                                        | 3.278                 | 157.771.071   | 2.739                    | 1.182.254.934                   | 20.524                                         | 4.540                                       | 261.542.983                   | 1.443.797.917                      | 25.065                              |
| 11   | La Calera         | 14.240                  | 10.822                 | 3.417                                        | 3.278                 | 66.356.252    | 2.739                    | 544.831.851                     | 22.489                                         | 4.540                                       | 110.001.231                   | 654.833.082                        | 27.029                              |
| 12   | La Cruz           | 12.524                  | 11.128                 | 1.396                                        | 3.278                 | 20.518.673    | 2.739                    | 156.368.824                     | 20.873                                         | 4.540                                       | 34.014.568                    | 190.383.392                        | 25.413                              |
| 10   | Mueñes            | 20.021                  | 12.003                 | 8.017                                        | 3.278                 | 27.874.239    | 2.739                    | 288.279.793                     | 28.326                                         | 4.540                                       | 46.208.164                    | 334.487.957                        | 32.867                              |
| E    | ET - 5 Quilota    | 14.052                  | 10.406                 | 3.647                                        | 3.278                 | 272.520.235   | 2.739                    | 2.171.735.402                   | 21.827                                         | 4.540                                       | 451.766.946                   | 2.623.502.348                      | 26.367                              |
| 1    | Algarrobo         | 14.253                  | 10.012                 | 4.241                                        |                       |               |                          | 102.028.456                     | 14.253                                         | 9.396                                       | 67.256.957                    | 169.285.413                        | 23.649                              |
| 4    | Cartagena         | 24.349                  | 10.940                 | 13.409                                       |                       |               |                          | 329.724.619                     | 24.349                                         | 9.396                                       | 127.232.928                   | 456.957.546                        | 33.745                              |
| 5    | Casablanca        | 22.503                  | 10.009                 | 12.494                                       |                       |               |                          | 338.782.553                     | 22.503                                         | 9.396                                       | 141.451.779                   | 480.234.332                        | 31.899                              |
| 8    | El Quisco         | 16.590                  | 12.294                 | 4.285                                        |                       |               |                          | 150.314.960                     | 17.149                                         | 9.396                                       | 82.355.708                    | 232.670.668                        | 26.545                              |
| 9    | Tabo              | 11.832                  | 10.545                 | 1.287                                        |                       |               |                          | 94.603.027                      | 11.832                                         | 9.396                                       | 75.122.737                    | 169.725.764                        | 21.228                              |
| 17   | Nogales           | 15.225                  | 10.037                 | 5.188                                        |                       |               |                          | 259.446.943                     | 15.225                                         | 4.540                                       | 77.370.854                    | 336.817.797                        | 19.766                              |
| 28   | San Antonio       | 16.508                  | 9.661                  | 6.847                                        |                       |               |                          | 1.078.224.496                   | 16.508                                         | 9.396                                       | 613.677.982                   | 1.691.902.477                      | 25.904                              |
| 32   | Santo Domingo     | 25.315                  | 12.002                 | 13.313                                       |                       |               |                          | 106.225.409                     | 25.315                                         | 9.396                                       | 39.425.713                    | 145.651.122                        | 34.711                              |
| 33   | Valparaíso        | 12.869                  | 9.637                  | 3.232                                        |                       |               |                          | 1.418.187.355                   | 12.869                                         | 9.147                                       | 1.007.979.142                 | 2.428.166.497                      | 22.016                              |
| 35   | Vina del Mar      | 13.451                  | 9.732                  | 3.719                                        | 9.925                 | 436.892.994   | 3.199                    | 3.629.396.264                   | 26.575                                         | 4.540                                       | 620.086.723                   | 4.249.482.987                      | 31.116                              |
| A    | ET-1 San Felipe   |                         |                        |                                              |                       | 277.128.567   | 2.294                    |                                 |                                                |                                             |                               |                                    |                                     |
| B    | ET - 2 Petorca    |                         |                        |                                              |                       | 187.472.097   | 3.788                    |                                 |                                                |                                             |                               |                                    |                                     |
| C    | ET- 3 Quintero    |                         |                        |                                              |                       | 242.652.140   | 3.106                    |                                 |                                                |                                             |                               |                                    |                                     |
| D    | ET- 4 Marga Marga |                         |                        |                                              |                       | 288.490.459   | 1.978                    |                                 |                                                |                                             |                               |                                    |                                     |
| E    | ET - 5 Quilota    |                         |                        |                                              |                       | 272.520.235   | 2.739                    |                                 |                                                |                                             |                               |                                    |                                     |
| F    | ET Vina del Mar   |                         |                        |                                              |                       | 318.300.338   | 2.331                    |                                 |                                                |                                             |                               |                                    |                                     |
| 2020 | Año 2020          | 35.144                  | 30.015                 | 5.129                                        |                       | 1.586.563.835 |                          | 18.518.208.778                  | 21.052                                         |                                             | 5.270.337.032                 | 23.788.545.810                     | 27.044                              |

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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



**TABLA N°13: ALTERNATIVA 2a\*\*\*: 3 Rellenos Sanitarios: RS SUR, CENTRO y El Molle, ET en San Felipe a Loma Los Colorados, Otras Comunas con Transporte Directo (Provincia Sur a RS SUR, Valparaíso a RS El Molle, Resto de Comunas a RS CENTRO)**

| N°   | Comuna           | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Numero de Recolectores 19 m³ | Ocupaciones | Peaje       |
|------|------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|      |                  | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3    | Calle Larga      | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6    | Catemu           | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15   | Llay Llay        | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16   | Los Andes        | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19   | Panquehue        | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23   | Putaendo         | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27   | Rinconada        | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29   | San Esteban      | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30   | San Felipe       | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31   | Santa María      | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A    | ET - San Felipe  | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2    | Cabildo          | 21.804    | 6.295        | 70                            | 0                        | 3.147       | 15.736    | 4.125      | 123.760                         | 442             | 17        | 3                            | 93%         | 0           |
| 13   | La Ligua         | 41.747    | 22.646       | 60                            | 0                        | 11.323      | 56.615    | 12.688     | 380.640                         | 1.586           | 61        | 10                           | 92%         | 0           |
| 20   | Papudo           | 6.174     | 5.307        | 65                            | 0                        | 2.653       | 13.267    | 3.380      | 101.400                         | 390             | 15        | 3                            | 77%         | 0           |
| 21   | Petorca          | 9.680     | 6.190        | 97                            | 0                        | 3.095       | 15.475    | 5.717      | 171.496                         | 442             | 17        | 4                            | 83%         | 0           |
| 36   | Zapallar         | 8.455     | 9.057        | 65                            | 0                        | 4.528       | 22.642    | 5.633      | 169.000                         | 650             | 25        | 5                            | 78%         | 0           |
| B    | ET - Petorca     | 87.860    | 49.494       | 357                           | 0                        | 24.747      | 123.736   | 31.543     | 946.296                         | 3.510           | 135       | 25                           | 85%         | 0           |
| 7    | Con Con          | 93.336    | 38.356       | 35                            | 0                        | 19.178      | 95.890    | 12.497     | 374.920                         | 2.678           | 103       | 14                           | 88%         | 0           |
| 22   | Puchuncavi       | 18.741    | 9.240        | 5                             | 0                        | 4.620       | 23.099    | 433        | 13.000                          | 650             | 25        | 3                            | 68%         | 0           |
| 26   | Quintero         | 29.063    | 30.534       | 15                            | 0                        | 15.267      | 76.335    | 4.264      | 127.920                         | 2.132           | 82        | 9                            | 87%         | 0           |
| C    | ET - El Quintero | 141.140   | 78.130       | 55                            | 0                        | 39.065      | 195.324   | 17.195     | 515.840                         | 5.460           | 210       | 26                           | 81%         | 0           |
| 14   | Limache          | 48.868    | 20.523       | 60                            | 0                        | 10.262      | 51.308    | 11.440     | 343.200                         | 1.430           | 55        | 9                            | 93%         | 0           |
| 18   | Olmue            | 17.216    | 7.138        | 68                            | 0                        | 3.569       | 17.845    | 4.715      | 141.440                         | 520             | 20        | 4                            | 79%         | 0           |
| 25   | Quilpué          | 185.176   | 62.505       | 48                            | 0                        | 31.253      | 156.263   | 27.789     | 833.664                         | 4.342           | 167       | 25                           | 91%         | 0           |
| 34   | Villa Alemana    | 163.329   | 55.697       | 53                            | 0                        | 27.849      | 139.243   | 27.376     | 821.288                         | 3.874           | 149       | 23                           | 93%         | 0           |
| D    | ET - Marga       | 414.589   | 145.864      | 229                           | 0                        | 72.932      | 364.660   | 71.320     | 2.139.592                       | 10.166          | 391       | 61                           | 89%         | -           |
| 24   | Quillota         | 94.718    | 57.603       | 56                            | 3                        | 28.802      | 144.008   | 29.897     | 896.896                         | 4.004           | 154       | 25                           | 90%         | 96.096.000  |
| 11   | La Calera        | 56.954    | 24.227       | 25                            | 3                        | 12.114      | 60.568    | 5.633      | 169.000                         | 1.690           | 65        | 8                            | 87%         | 40.560.000  |
| 12   | La Cruz          | 18.230    | 7.491        | 32                            | 3                        | 3.746       | 18.729    | 2.330      | 69.888                          | 546             | 21        | 3                            | 79%         | 13.104.000  |
| 10   | Hijuelas         | 20.641    | 10.177       | 33                            | 3                        | 5.089       | 25.443    | 3.203      | 96.096                          | 728             | 28        | 4                            | 81%         | 17.472.000  |
| E    | ET - Quillota    | 190.543   | 99.499       | 146                           | 12                       | 49.749      | 248.747   | 41.063     | 1.231.880                       | 6.968           | 268       | 40                           | 85%         | 167.232.000 |
| 1    | Algarrobo        | 17.420    | 7.158        | 11                            | 0                        | 3.579       | 17.896    | 759        | 22.755                          | 520             | 20        | 2                            | 87%         | 0           |
| 4    | Cartagena        | 32.953    | 13.542       | 42                            | 0                        | 6.771       | 33.854    | 5.400      | 162.001                         | 962             | 37        | 6                            | 79%         | 0           |
| 5    | Casablanca       | 36.634    | 15.055       | 42                            | 0                        | 7.527       | 37.637    | 5.984      | 179.514                         | 1.066           | 41        | 6                            | 87%         | 0           |
| 8    | El Quisco        | 21.332    | 8.765        | 9                             | 1                        | 4.383       | 21.913    | 732        | 21.965                          | 624             | 24        | 3                            | 69%         | 4.992.000   |
| 9    | El Tabo          | 16.217    | 7.995        | 0                             | 0                        | 3.998       | 19.988    | 0          | 0                               | 572             | 22        | 2                            | 82%         | 0           |
| 17   | Nogales          | 28.752    | 17.040       | 15                            | 0                        | 8.520       | 42.601    | 2.392      | 71.760                          | 1.196           | 46        | 5                            | 87%         | 0           |
| 28   | San Antonio      | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32   | Santo Domingo    | 10.213    | 4.196        | 37                            | 0                        | 2.098       | 10.490    | 1.523      | 45.677                          | 312             | 12        | 2                            | 71%         | 0           |
| 33   | Valparaíso       | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35   | Viña del Mar     | 280.140   | 136.570      | 55                            | 1                        | 68.285      | 341.425   | 69.593     | 2.087.800                       | 9.490           | 365       | 58                           | 91%         | 75.920.000  |
| A    | ET-1 San Felipe  | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
| 2020 | Año 2020         | 1.927.522 | 879.633      | 1.194                         | 15                       | 439.817     | 2.199.083 | 297.076    | 9.346.220                       | 67.938          | 2.490     | 320                          | 84%         | 356.096.000 |



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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°13: ALTERNATIVA 2a\*\*\*

| N°   | Comuna           | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|------|------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|------------------------------|
|      |                  | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3    | Calle Larga      | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                       |
| 6    | Catemu           | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                       |
| 15   | Llay Llay        | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                       |
| 16   | Los Andes        | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                       |
| 19   | Panquehue        | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                       |
| 23   | Putendo          | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                       |
| 27   | Rinconada        | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                       |
| 29   | San Esteban      | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                       |
| 30   | San Felipe       | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                       |
| 31   | Santa María      | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                       |
| A    | ET - San Felipe  | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                       |
| 2    | Cabildo          | 57.191.891                          | 123.323.187                     | 9.752.456                | 50.311.525              | 47.439.436                      | 73.011.662                      |                          |                                           |                        | 180.515.078                                           | 28.678                       |
| 13   | La Ligua         | 180.992.411                         | 411.077.290                     | 35.086.248               | 181.842.580             | 145.906.164                     | 229.234.710                     |                          |                                           |                        | 592.069.701                                           | 26.145                       |
| 20   | Papudo           | 47.090.662                          | 123.323.187                     | 8.222.216                | 50.943.462              | 38.868.445                      | 72.379.725                      |                          |                                           |                        | 170.413.849                                           | 32.112                       |
| 21   | Petorca          | 75.327.962                          | 164.430.916                     | 9.590.458                | 54.996.913              | 65.737.504                      | 109.434.003                     |                          |                                           |                        | 239.758.878                                           | 38.733                       |
| 36   | Zapallar         | 78.812.623                          | 205.538.645                     | 14.031.881               | 86.087.500              | 64.780.742                      | 119.451.145                     |                          |                                           |                        | 284.351.268                                           | 31.397                       |
| B    | ET - Petorca     | 439.415.549                         | 1.027.693.225                   | 76.683.259               | 424.181.979             | 362.732.290                     | 603.511.245                     |                          | 0                                         | 0                      | 1.467.108.774                                         | 29.642                       |
| 7    | Con Con          | 203.139.835                         | 575.508.206                     | 59.426.250               | 321.281.340             | 143.713.585                     | 254.226.866                     |                          |                                           |                        | 778.648.040                                           | 20.301                       |
| 22   | Puchuncaví       | 19.298.362                          | 123.323.187                     | 14.315.228               | 99.897.406              | 4.983.134                       | 23.425.781                      |                          |                                           |                        | 142.621.549                                           | 15.436                       |
| 26   | Quintero         | 96.341.717                          | 369.969.561                     | 47.307.678               | 260.736.398             | 49.034.039                      | 109.233.163                     |                          |                                           |                        | 466.311.278                                           | 15.272                       |
| C    | ET - El Quintero | 318.779.913                         | 1.068.800.954                   | 121.049.156              | 681.915.143             | 197.730.757                     | 386.885.810                     |                          | 0                                         | 0                      | 1.387.580.867                                         | 17.760                       |
| 14   | Limache          | 163.352.307                         | 369.969.561                     | 31.797.569               | 164.125.842             | 131.554.738                     | 205.843.719                     |                          |                                           |                        | 533.321.868                                           | 25.986                       |
| 18   | Olmue            | 65.275.631                          | 164.430.916                     | 11.059.133               | 66.660.036              | 54.216.498                      | 97.770.880                      |                          |                                           |                        | 229.706.547                                           | 32.181                       |
| 25   | Quilpué          | 416.400.193                         | 1.027.693.225                   | 96.841.776               | 506.727.415             | 319.558.417                     | 520.965.810                     |                          |                                           |                        | 1.444.093.418                                         | 23.104                       |
| 34   | Villa Alemana    | 401.108.457                         | 945.477.767                     | 86.293.983               | 445.529.153             | 314.814.474                     | 499.948.613                     |                          |                                           |                        | 1.346.586.223                                         | 24.177                       |
| D    | ET - Marga       | 1.046.136.588                       | 2.507.571.468                   | 225.992.461              | 1.183.042.445           | 820.144.126                     | 1.324.529.023                   |                          | 0                                         | 0                      | 3.553.708.055                                         | 24.363                       |
| 24   | Quillota         | 433.043.173                         | 1.027.693.225                   | 89.246.792               | 472.060.624             | 343.796.381                     | 555.632.600                     |                          |                                           |                        | 1.556.832.398                                         | 27.027                       |
| 11   | La Calera        | 102.316.664                         | 328.861.832                     | 37.535.922               | 204.954.821             | 64.780.742                      | 123.907.011                     |                          |                                           |                        | 471.738.496                                           | 19.472                       |
| 12   | La Cruz          | 38.396.182                          | 123.323.187                     | 11.606.854               | 69.764.879              | 26.789.328                      | 53.558.308                      |                          |                                           |                        | 174.823.369                                           | 23.336                       |
| 10   | Hijuelas         | 52.603.023                          | 164.430.916                     | 15.767.697               | 92.764.590              | 36.835.327                      | 71.666.326                      |                          |                                           |                        | 234.505.939                                           | 23.043                       |
| E    | ET - Quillota    | 626.359.042                         | 1.644.309.159                   | 154.157.265              | 839.544.914             | 472.201.778                     | 804.764.245                     |                          | 0                                         | 0                      | 2.437.900.202                                         | 24.502                       |
| 1    | Algarrobo        | 19.812.998                          | 82.215.458                      | 11.090.520               | 60.576.686              | 8.722.478                       | 21.638.772                      |                          |                                           |                        | 102.028.456                                           | 14.253                       |
| 4    | Cartagena        | 83.078.245                          | 246.646.374                     | 20.980.422               | 127.161.499             | 62.097.823                      | 119.484.875                     |                          |                                           |                        | 329.724.619                                           | 24.349                       |
| 5    | Casablanca       | 92.136.179                          | 246.646.374                     | 23.325.078               | 127.363.865             | 68.811.101                      | 119.282.509                     |                          |                                           |                        | 338.782.553                                           | 22.503                       |
| 8    | El Quisco        | 21.999.773                          | 123.323.187                     | 13.580.270               | 94.179.990              | 8.419.503                       | 29.143.197                      |                          |                                           |                        | 150.314.960                                           | 17.149                       |
| 9    | El Tabo          | 12.387.569                          | 82.215.458                      | 12.387.569               | 71.924.355              | 0                               | 10.291.103                      |                          |                                           |                        | 94.603.027                                            | 11.832                       |
| 17   | Nogales          | 53.908.298                          | 205.538.645                     | 26.401.398               | 144.631.877             | 27.506.900                      | 60.906.768                      |                          |                                           |                        | 259.446.943                                           | 15.225                       |
| 28   | San Antonio      | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                         | 16.508                       |
| 32   | Santo Domingo    | 24.009.951                          | 82.215.458                      | 6.501.211                | 43.862.113              | 17.508.740                      | 38.353.345                      |                          |                                           |                        | 106.225.409                                           | 25.315                       |
| 33   | Valparaíso       | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          |                                           |                        | 1.418.187.355                                         | 12.869                       |
| 35   | Viña del Mar     | 1.011.884.651                       | 2.384.248.281                   | 211.593.331              | 1.104.772.766           | 800.291.320                     | 1.279.475.515                   |                          |                                           |                        | 3.472.052.932                                         | 25.423                       |
| A    | ET-1 San Felipe  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                              |
| 2020 | Año 2020         | 4.636.508.468                       | 13.154.473.274                  | 1.362.848.553            | 7.380.370.386           | 3.273.659.915                   | 5.774.102.888                   | 6                        | 446.583.946                               | 230.924.340            | 38.722.250.028                                        | 21.284                       |



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Continuación TABLA N°13: ALTERNATIVA 2a\*\*\*

| N°   | Comuna           | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET    | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de<br>Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|------|------------------|-------------------------|------------------------|----------------------------------------------|-----------------------|-------------|--------------------------|---------------------------------|------------------------------------------------|---------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|      |                  | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]  | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                    | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3    | Calle Larga      | 18.529                  | 11.717                 | 6.812                                        | 5.608                 | 12.537.275  | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                       | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6    | Catemu           | 15.324                  | 10.280                 | 5.044                                        | 5.608                 | 15.388.703  | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                       | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15   | Llay Llay        | 22.064                  | 10.636                 | 11.428                                       | 5.608                 | 22.743.285  | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                       | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16   | Los Andes        | 15.757                  | 9.917                  | 5.840                                        | 5.608                 | 76.622.628  | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                       | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19   | Panquehue        | 17.580                  | 11.316                 | 6.263                                        | 5.608                 | 6.626.394   | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                       | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23   | Putendo          | 16.765                  | 10.580                 | 6.185                                        | 5.608                 | 21.267.399  | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                       | 55.627.114                    | 284.315.190                        | 30.667                              |
| 27   | Rinconada        | 15.486                  | 10.353                 | 5.133                                        | 5.608                 | 7.604.625   | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                       | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29   | San Esteban      | 18.635                  | 12.387                 | 6.248                                        | 5.608                 | 18.300.472  | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                       | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30   | San Felipe       | 10.806                  | 9.676                  | 1.130                                        | 5.608                 | 81.495.958  | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                       | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31   | Santa María      | 16.400                  | 10.392                 | 6.008                                        | 5.608                 | 14.541.829  | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                       | 38.035.680                    | 192.093.325                        | 30.302                              |
| A    | ET - San Felipe  | 15.257                  | 10.291                 | 4.966                                        | 5.608                 | 277.128.567 | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                       | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2    | Cabildo          | 28.678                  | 9.542                  | 19.136                                       | 0                     | 0           | 0                        | 180.515.078                     | 28.678                                         | 4.540                                       | 28.590.146                    | 209.095.224                        | 33.218                              |
| 13   | La Ligua         | 26.145                  | 9.579                  | 16.565                                       | 0                     | 0           | 0                        | 592.069.701                     | 26.145                                         | 4.540                                       | 102.822.316                   | 694.892.018                        | 30.685                              |
| 20   | Papudo           | 32.112                  | 11.149                 | 20.963                                       | 0                     | 0           | 0                        | 170.413.849                     | 32.112                                         | 4.540                                       | 24.095.690                    | 194.509.538                        | 36.652                              |
| 21   | Petorca          | 38.733                  | 10.434                 | 28.299                                       | 0                     | 0           | 0                        | 239.758.878                     | 38.733                                         | 4.540                                       | 28.105.402                    | 267.864.280                        | 43.273                              |
| 36   | Zapallar         | 31.397                  | 11.055                 | 20.342                                       | 0                     | 0           | 0                        | 284.351.268                     | 31.397                                         | 4.540                                       | 41.121.255                    | 325.472.523                        | 35.937                              |
| B    | ET - Petorca     | 29.642                  | 10.120                 | 19.522                                       | 0                     | 0           | 0                        | 1.467.108.774                   | 29.642                                         | 4.540                                       | 224.724.809                   | 1.691.833.583                      | 34.182                              |
| 7    | Con Con          | 20.301                  | 9.926                  | 10.375                                       | 0                     | 0           | 0                        | 778.648.040                     | 20.301                                         | 4.540                                       | 174.152.127                   | 952.800.168                        | 24.841                              |
| 22   | Ruchuncaví       | 15.436                  | 12.361                 | 3.075                                        | 0                     | 0           | 0                        | 142.621.549                     | 15.436                                         | 4.540                                       | 41.951.618                    | 184.573.167                        | 19.976                              |
| 26   | Quintero         | 15.272                  | 10.089                 | 5.183                                        | 0                     | 0           | 0                        | 466.311.278                     | 15.272                                         | 4.540                                       | 138.637.938                   | 604.949.216                        | 19.812                              |
| C    | ET - El Quintero | 17.760                  | 10.277                 | 7.483                                        | 0                     | 0           | 0                        | 1.387.580.867                   | 17.760                                         | 4.540                                       | 354.741.684                   | 1.742.322.550                      | 22.300                              |
| 14   | Limache          | 25.986                  | 9.546                  | 16.440                                       | 0                     | 0           | 0                        | 533.321.868                     | 25.986                                         | 4.540                                       | 93.184.650                    | 626.506.518                        | 30.527                              |
| 18   | Olmúe            | 32.181                  | 10.888                 | 21.293                                       | 0                     | 0           | 0                        | 229.706.547                     | 32.181                                         | 4.540                                       | 32.409.440                    | 262.115.987                        | 36.721                              |
| 25   | Quilpué          | 23.104                  | 9.656                  | 13.447                                       | 0                     | 0           | 0                        | 1.444.093.418                   | 23.104                                         | 4.540                                       | 283.800.531                   | 1.727.893.948                      | 27.644                              |
| 34   | Villa Alemana    | 24.177                  | 9.548                  | 14.628                                       | 0                     | 0           | 0                        | 1.346.586.223                   | 24.177                                         | 4.540                                       | 252.889.601                   | 1.599.475.825                      | 28.717                              |
| D    | ET - Marga       | 24.363                  | 9.660                  | 14.703                                       | 0                     | 0           | 0                        | 3.553.708.055                   | 24.363                                         | 4.540                                       | 662.284.222                   | 4.215.992.278                      | 28.904                              |
| 24   | Quillota         | 25.359                  | 9.744                  | 15.614                                       | 0                     | 0           | 0                        | 1.556.832.398                   | 27.027                                         | 4.540                                       | 261.542.983                   | 1.818.375.381                      | 31.567                              |
| 11   | La Calera        | 17.797                  | 10.009                 | 7.788                                        | 0                     | 0           | 0                        | 471.738.496                     | 19.472                                         | 4.540                                       | 110.001.231                   | 581.739.726                        | 24.012                              |
| 12   | La Cruz          | 21.587                  | 10.862                 | 10.725                                       | 0                     | 0           | 0                        | 174.823.369                     | 23.336                                         | 4.540                                       | 34.014.568                    | 208.837.937                        | 27.877                              |
| 10   | Hijuelas         | 21.326                  | 10.664                 | 10.661                                       | 0                     | 0           | 0                        | 234.505.939                     | 23.043                                         | 4.540                                       | 46.208.164                    | 280.714.103                        | 27.583                              |
| E    | ET - Quillota    | 22.821                  | 9.987                  | 12.834                                       | 0                     | 0           | 0                        | 2.437.900.202                   | 24.502                                         | 4.540                                       | 451.766.946                   | 2.889.667.148                      | 29.042                              |
| 1    | Algarrobo        | 14.253                  | 10.012                 | 4.241                                        | 0                     | 0           | 0                        | 102.028.456                     | 14.253                                         | 9.396                                       | 67.256.957                    | 169.285.413                        | 23.649                              |
| 4    | Cartagena        | 24.349                  | 10.940                 | 13.409                                       | 0                     | 0           | 0                        | 329.724.619                     | 24.349                                         | 9.396                                       | 127.232.928                   | 456.957.546                        | 33.745                              |
| 5    | Casablanca       | 22.503                  | 10.009                 | 12.494                                       | 0                     | 0           | 0                        | 338.782.553                     | 22.503                                         | 9.396                                       | 141.451.779                   | 480.234.332                        | 31.899                              |
| 8    | El Quisco        | 16.580                  | 12.294                 | 4.285                                        | 0                     | 0           | 0                        | 150.314.960                     | 17.149                                         | 9.396                                       | 82.355.708                    | 232.670.668                        | 26.545                              |
| 9    | El Tabo          | 11.832                  | 10.545                 | 1.287                                        | 0                     | 0           | 0                        | 94.603.027                      | 11.832                                         | 9.396                                       | 75.122.737                    | 169.725.764                        | 21.228                              |
| 17   | Nogales          | 15.225                  | 10.037                 | 5.188                                        | 0                     | 0           | 0                        | 259.446.943                     | 15.225                                         | 4.540                                       | 77.370.854                    | 336.817.797                        | 19.766                              |
| 28   | San Antonio      | 16.508                  | 9.661                  | 6.847                                        | 0                     | 0           | 0                        | 1.078.224.496                   | 16.508                                         | 9.396                                       | 613.677.982                   | 1.691.902.477                      | 25.904                              |
| 32   | Santo Domingo    | 25.315                  | 12.002                 | 13.313                                       | 0                     | 0           | 0                        | 106.225.409                     | 25.315                                         | 9.396                                       | 39.425.713                    | 145.651.122                        | 34.711                              |
| 33   | Valparaíso       | 12.869                  | 9.637                  | 3.232                                        | 0                     | 0           | 0                        | 1.418.187.355                   | 12.869                                         | 9.147                                       | 1.007.979.142                 | 2.426.166.497                      | 22.016                              |
| 35   | Viña del Mar     | 24.867                  | 9.639                  | 15.229                                       | 0                     | 0           | 0                        | 3.472.052.932                   | 25.423                                         | 4.540                                       | 620.086.723                   | 4.092.139.655                      | 29.964                              |
| A    | ET-1 San Felipe  |                         |                        |                                              |                       | 277.128.567 | 2.294                    |                                 |                                                |                                             |                               |                                    |                                     |
| 2020 | Año 2020         | 20.225                  | 9.940                  | 10.286                                       |                       | 277.128.567 |                          | 18.999.378.595                  | 21.599                                         |                                             | 5.270.337.032                 | 24.269.715.626                     | 27.591                              |



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Evaluación Económica de las Alternativas de Transporte de la Alternativa 2a

**TABLA N°14: ALTERNATIVA 2a\*\*\* Resultado Final: 3 Rellenos Sanitarios: RS SUR, CENTRO y El Molle, ET en San Felipe a Loma Los Colorados, ET en La Ligua y ET en Villa Alemana a RS Centro, Valparaíso a RS El Molle, el Resto Transporte Directo**

| N°  | Comuna             | Población | Cantidad RSU | Kilometros lineales a ET O RS | Número de Peajes en Ruta | Recolección |           | Transporte | Transporte a ET/RS y de ET a RS | Tiempos muertos | Vueltas   | Número de Recolectores 19 m² | Ocupaciones | Peaje       |
|-----|--------------------|-----------|--------------|-------------------------------|--------------------------|-------------|-----------|------------|---------------------------------|-----------------|-----------|------------------------------|-------------|-------------|
|     |                    | [hab.]    | [ton/año]    | [km]                          | Unidades                 | [hrs./año]  | [km/año]  | [h/año]    | [km/año]                        | [hrs./año]      | semanales | Unidades                     | %           | [Ch\$/año]  |
| 3   | Calle Larga        | 11.086    | 5.465        | 18                            | 0                        | 2.733       | 13.664    | 920        | 27.612                          | 390             | 15        | 2                            | 73%         | 0           |
| 6   | Catemu             | 13.606    | 6.708        | 14                            | 0                        | 3.354       | 16.771    | 886        | 26.582                          | 468             | 18        | 2                            | 85%         | 0           |
| 15  | Lluy Lluy          | 24.125    | 9.915        | 36                            | 1                        | 4.957       | 24.786    | 3.388      | 101.650                         | 702             | 27        | 4                            | 81%         | 5.616.000   |
| 16  | Los Andes          | 85.279    | 33.402       | 18                            | 0                        | 16.701      | 83.506    | 5.522      | 165.672                         | 2.340           | 90        | 10                           | 88%         | 0           |
| 19  | Panquehue          | 8.010     | 2.889        | 16                            | 0                        | 1.444       | 7.222     | 452        | 13.562                          | 208             | 8         | 1                            | 76%         | 0           |
| 23  | Putendo            | 18.803    | 9.271        | 18                            | 0                        | 4.636       | 23.178    | 1.543      | 46.280                          | 650             | 25        | 3                            | 82%         | 0           |
| 27  | Rinconada          | 8.775     | 3.315        | 14                            | 0                        | 1.658       | 8.288     | 443        | 13.291                          | 234             | 9         | 1                            | 84%         | 0           |
| 29  | San Esteban        | 19.414    | 7.978        | 15                            | 0                        | 3.989       | 19.945    | 1.129      | 33.862                          | 572             | 22        | 3                            | 68%         | 0           |
| 30  | San Felipe         | 86.449    | 35.527       | 0                             | 0                        | 17.763      | 88.817    | 0          | 0                               | 2.470           | 95        | 8                            | 91%         | 0           |
| 31  | Santa María        | 15.428    | 6.339        | 18                            | 0                        | 3.170       | 15.848    | 1.037      | 31.117                          | 442             | 17        | 2                            | 84%         | 0           |
| A   | ET - San Felipe    | 290.975   | 120.810      | 167                           | 1                        | 60.405      | 302.025   | 15.321     | 459.628                         | 8.476           | 326       | 36                           | 82%         | 5.616.000   |
| 2   | Cabildo            | 21.804    | 6.295        | 26                            | 0                        | 3.147       | 15.736    | 1.532      | 45.968                          | 442             | 17        | 2                            | 92%         | 0           |
| 13  | La Ligua           | 41.747    | 22.646       | 0                             | 0                        | 13.323      | 56.615    | 0          | 0                               | 1.586           | 61        | 5                            | 93%         | 0           |
| 20  | Papudo             | 6.174     | 5.307        | 16                            | 0                        | 2.653       | 13.267    | 832        | 24.960                          | 390             | 15        | 2                            | 70%         | 0           |
| 21  | Petorca            | 9.680     | 6.190        | 45                            | 0                        | 3.095       | 15.475    | 2.652      | 79.560                          | 442             | 17        | 3                            | 74%         | 0           |
| 36  | Zapallar           | 8.455     | 9.057        | 41                            | 0                        | 4.528       | 22.642    | 3.553      | 106.600                         | 650             | 25        | 4                            | 79%         | 0           |
| B   | ET - Petorca       | 87.860    | 49.494       | 128                           | 0                        | 24.747      | 123.736   | 8.570      | 257.088                         | 3.510           | 135       | 16                           | 82%         | 0           |
| 7   | Con Con            | 93.336    | 45.653       | 35                            | 0                        | 22.827      | 114.133   | 14.803     | 444.080                         | 3.172           | 122       | 16                           | 92%         | 0           |
| 22  | Puchuncaví         | 18.741    | 25.534       | 5                             | 0                        | 12.767      | 63.835    | 1.196      | 35.880                          | 1.794           | 69        | 7                            | 81%         | 0           |
| 26  | Quintero           | 29.063    | 30.534       | 15                            | 0                        | 15.267      | 76.335    | 4.264      | 127.920                         | 2.132           | 82        | 9                            | 87%         | 0           |
| 14  | Unicache           | 48.968    | 20.523       | 13                            | 0                        | 10.262      | 51.308    | 2.479      | 74.360                          | 1.430           | 55        | 6                            | 85%         | 0           |
| 18  | Gineu              | 17.216    | 7.138        | 0                             | 0                        | 3.569       | 17.845    | 0          | 0                               | 520             | 20        | 2                            | 74%         | 0           |
| 25  | Quilpué            | 185.176   | 62.505       | 24                            | 1                        | 31.253      | 156.263   | 13.894     | 416.832                         | 4.342           | 167       | 20                           | 89%         | 17.368.000  |
| 34  | Villa Alemana      | 163.329   | 55.697       | 23                            | 0                        | 27.849      | 139.243   | 11.880     | 356.408                         | 3.874           | 149       | 17                           | 92%         | 0           |
| D   | ET - Marga         | 414.589   | 145.864      | 60                            | 1                        | 72.932      | 364.660   | 28.253     | 847.600                         | 10.166          | 391       | 45                           | 85%         | 17.368.000  |
| 24  | Quilota            | 94.718    | 57.603       | 8                             | 3                        | 28.802      | 144.008   | 4.324      | 129.730                         | 4.004           | 154       | 15                           | 89%         | 80.080.000  |
| 11  | La Calera          | 56.954    | 24.227       | 8                             | 4                        | 12.114      | 60.568    | 1.713      | 51.376                          | 1.690           | 65        | 7                            | 80%         | 54.080.000  |
| 12  | La Cruz            | 18.230    | 7.491        | 0                             | 4                        | 8.376       | 18.729    | 0          | 0                               | 546             | 21        | 2                            | 77%         | 17.472.000  |
| 10  | Huelmo             | 20.641    | 10.177       | 21                            | 4                        | 5.089       | 25.443    | 2.048      | 61.443                          | 728             | 28        | 4                            | 71%         | 23.296.000  |
| E   | ET - 5 Quilota     | 190.543   | 99.499       | 37                            | 15                       | 49.749      | 249.747   | 8.085      | 242.549                         | 6.968           | 268       | 28                           | 79%         | 174.928.000 |
| 1   | Algarrobo          | 17.420    | 19.661       | 11                            | 0                        | 9.831       | 49.153    | 2.010      | 60.301                          | 1.378           | 53        | 6                            | 79%         | 0           |
| 4   | Cartagena          | 32.953    | 22.342       | 42                            | 0                        | 11.171      | 55.855    | 8.757      | 262.704                         | 1.560           | 60        | 9                            | 86%         | 0           |
| 5   | Casablanca         | 36.634    | 15.055       | 3                             | 0                        | 7.527       | 37.637    | 426        | 12.792                          | 1.066           | 41        | 4                            | 81%         | 0           |
| 8   | El Quisco          | 21.332    | 27.005       | 9                             | 1                        | 13.503      | 67.513    | 2.227      | 66.810                          | 1.898           | 73        | 7                            | 91%         | 15.184.000  |
| 9   | El Tabo            | 16.217    | 32.787       | 0                             | 0                        | 16.394      | 81.968    | 0          | 0                               | 2.288           | 88        | 8                            | 84%         | 0           |
| 17  | Nogales            | 28.752    | 17.040       | 15                            | 0                        | 8.520       | 42.601    | 2.392      | 71.760                          | 1.196           | 46        | 5                            | 87%         | 0           |
| 28  | San Antonio        | 104.877   | 65.314       | 22                            | 0                        | 32.657      | 163.286   | 13.468     | 404.040                         | 4.550           | 175       | 20                           | 91%         | 0           |
| 32  | Santo Domingo      | 10.213    | 6.511        | 37                            | 0                        | 3.256       | 16.278    | 2.284      | 68.515                          | 468             | 18        | 3                            | 72%         | 0           |
| 33  | Valparaíso         | 253.877   | 110.200      | 8                             | 0                        | 55.100      | 275.501   | 8.386      | 251.576                         | 7.670           | 295       | 28                           | 92%         | 0           |
| 35  | Viña del Mar       | 280.140   | 136.570      | 8                             | 0                        | 68.285      | 341.425   | 10.123     | 303.680                         | 9.490           | 365       | 35                           | 90%         | 0           |
|     | ET-1 San Felipe    | 290.975   | 120.810      | 63                            | 4                        |             |           | 12.398     | 805.896                         | 6.396           | 123       |                              | 90%         | 102.336.000 |
|     | ET - 2 Petorca     | 87.860    | 49.494       | 50                            | 0                        |             |           | 4.080      | 265.200                         | 2.652           | 51        |                              | 65%         | 0           |
|     | ET - 4 Marga Marga | 414.589   | 145.864      | 57                            | 0                        |             |           | 13.589     | 883.272                         | 7.748           | 149       |                              | 88%         | 0           |
|     | ET-5 Quilota       | 190.543   | 99.499       | 38                            | 0                        |             |           | 6.202      | 403.104                         | 5.304           | 102       |                              | 83%         | 0           |
|     | ET Casablanca      | 36.634    | 15.055       | 42                            | 0                        |             |           | 1.075      | 69.888                          | 832             | 16        |                              | 55%         | 0           |
| ### | total Región 202   | 1.927.522 | 969.874      | 759                           | 7                        | 384.327     | 1.921.635 | 139.560    | 5.493.854                       | 76.648          | 2.507     | 222                          | 82%         | 140.504.000 |



UNIVERSIDAD TECNICA  
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## Plan de Manejo Integral de Residuos Sólidos Región de Valparaíso



### Continuación TABLA N°14: ALTERNATIVA 2a\*\*\*

| N° | Comuna           | Costo Variable<br>Recolectores + TD | Costo Fijo<br>Recolectores + TD | CV Recolección<br>por km | CF Recolección por<br>h | CV Transporte a<br>RS/ET por km | CF Transporte la<br>RS/ET por h | Numero Amplirol<br>70 m³ | Costo Variable<br>Amplirol incl.<br>Peaje | Costo Fijo<br>Amplirol | Total Costo Rec.+<br>Transport +Peaje<br>Recolectores | Costo/T Rec.<br>y Transporte |
|----|------------------|-------------------------------------|---------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------------|--------------------------|-------------------------------------------|------------------------|-------------------------------------------------------|------------------------------|
|    |                  | [Ch\$/año]                          | [Ch\$/año]                      | [Ch\$/año]               | [Ch\$/año]              | [Ch\$/año]                      | [Ch\$/año]                      | Unidades                 | [Ch\$/año]                                | [Ch\$/año]             | [Ch\$/año]                                            | [Ch\$/año]                   |
| 3  | Calle Larga      | 19.051.966                          | 82.215.458                      | 8.467.790                | 55.568.878              | 10.584.177                      | 26.646.580                      |                          | 20.203.422                                | 10.446.999             | 131.917.846                                           | 24.137                       |
| 6  | Catemu           | 20.583.183                          | 82.215.458                      | 10.393.670               | 58.570.818              | 10.189.512                      | 23.644.640                      |                          | 24.798.409                                | 12.823.023             | 140.420.073                                           | 20.932                       |
| 15 | Lluy Lluy        | 54.325.144                          | 164.430.916                     | 15.361.022               | 90.093.576              | 38.964.121                      | 74.337.340                      |                          | 36.650.086                                | 18.951.413             | 279.973.559                                           | 28.239                       |
| 16 | Los Andes        | 115.256.683                         | 411.077.290                     | 51.751.623               | 279.498.339             | 63.505.060                      | 131.578.951                     |                          | 123.474.948                               | 63.847.730             | 713.656.650                                           | 21.365                       |
| 19 | Panquehue        | 9.673.932                           | 41.107.729                      | 4.475.527                | 28.214.061              | 5.198.405                       | 12.893.668                      |                          | 10.678.224                                | 5.521.609              | 66.981.495                                            | 23.188                       |
| 23 | Putendo          | 32.104.153                          | 123.323.187                     | 14.364.196               | 83.722.079              | 17.739.957                      | 39.601.108                      |                          | 34.271.743                                | 17.721.595             | 207.420.677                                           | 22.373                       |
| 27 | Rinconada        | 10.230.990                          | 41.107.729                      | 5.136.233                | 29.186.371              | 5.094.756                       | 11.921.358                      |                          | 12.254.614                                | 6.336.745              | 69.930.077                                            | 21.094                       |
| 29 | San Esteban      | 25.340.373                          | 123.323.187                     | 12.360.306               | 86.459.477              | 12.980.067                      | 36.863.710                      |                          | 29.490.633                                | 15.249.328             | 193.403.521                                           | 24.243                       |
| 30 | San Felipe       | 55.043.114                          | 328.861.832                     | 55.043.114               | 288.715.970             | 0                               | 40.145.862                      |                          | 131.328.166                               | 67.908.554             | 583.141.666                                           | 16.414                       |
| 31 | Santa María      | 21.749.314                          | 82.215.458                      | 9.821.684                | 56.055.255              | 11.927.630                      | 26.160.203                      |                          | 23.433.699                                | 12.117.345             | 139.515.816                                           | 22.008                       |
| A  | ET - San Felipe  | 363.358.851                         | 1.479.878.243                   | 187.175.166              | 1.056.084.823           | 176.183.686                     | 423.793.420                     | 6                        | 446.583.946                               | 230.924.340            | 2.526.361.381                                         | 20.912                       |
|    | 2 Cabildo        | 27.372.817                          | 82.215.458                      | 9.752.456                | 50.522.952              | 17.620.362                      | 31.692.506                      |                          | 14.407.190                                | 14.684.296             | 138.679.762                                           | 22.032                       |
| 13 | La Ligua         | 35.086.248                          | 205.538.645                     | 35.086.248               | 180.286.132             | 0                               | 25.252.513                      |                          | 51.832.510                                | 52.829.449             | 345.286.851                                           | 15.247                       |
| 20 | Papudo           | 17.789.834                          | 82.215.458                      | 8.222.216                | 56.291.507              | 9.567.617                       | 25.923.951                      |                          | 12.146.586                                | 12.380.211             | 124.532.089                                           | 23.466                       |
| 21 | Petorca          | 40.087.238                          | 123.323.187                     | 9.590.458                | 61.671.746              | 30.496.780                      | 61.651.441                      |                          | 14.167.873                                | 14.440.376             | 192.018.674                                           | 31.021                       |
| 36 | Zapallar         | 54.893.580                          | 164.430.916                     | 14.031.881               | 85.275.727              | 40.861.699                      | 79.155.189                      |                          | 20.729.137                                | 21.127.838             | 261.181.471                                           | 28.838                       |
| B  | ET - Petorca     | 175.229.717                         | 657.723.664                     | 76.683.259               | 434.048.064             | 98.546.458                      | 223.675.600                     | 3                        | 113.283.296                               | 115.462.170            | 1.061.698.847                                         | 21.451                       |
|    | 7 Con Con        | 240.955.762                         | 657.723.664                     | 70.731.905               | 367.968.135             | 170.223.857                     | 289.755.529                     |                          |                                           |                        | 898.679.426                                           | 19.685                       |
| 22 | Richuncavi       | 53.314.234                          | 287.754.103                     | 39.560.784               | 233.150.767             | 13.753.450                      | 54.603.336                      |                          |                                           |                        | 341.068.336                                           | 13.357                       |
| 26 | Quintero         | 96.341.717                          | 369.969.561                     | 47.307.678               | 260.736.398             | 49.034.039                      | 109.233.163                     |                          |                                           |                        | 466.311.278                                           | 15.272                       |
| 14 | Limache          | 60.301.096                          | 246.646.374                     | 31.797.569               | 178.612.796             | 28.503.526                      | 68.033.578                      |                          | 53.086.830                                | 37.906.743             | 397.941.042                                           | 19.390                       |
| 18 | Omeu             | 11.059.133                          | 82.215.458                      | 11.059.133               | 71.760.049              | 0                               | 10.455.409                      |                          | 18.463.496                                | 13.183.892             | 124.921.979                                           | 17.501                       |
| 25 | Quilpué          | 256.620.985                         | 822.154.580                     | 96.841.776               | 519.195.791             | 159.779.209                     | 302.958.788                     |                          | 161.679.745                               | 115.447.703            | 1.373.271.012                                         | 21.970                       |
| 34 | Villa Alemana    | 222.911.585                         | 698.831.393                     | 86.293.983               | 446.335.196             | 136.617.602                     | 252.496.197                     |                          | 144.069.943                               | 102.873.393            | 1.168.686.313                                         | 20.983                       |
| D  | ET - Marga       | 550.892.798                         | 1.849.847.804                   | 225.992.461              | 1.215.903.833           | 324.900.337                     | 633.943.972                     | 7                        | 377.300.013                               | 269.411.730            | 3.064.820.346                                         | 21.012                       |
| 24 | Quillota         | 138.974.483                         | 616.615.935                     | 89.246.792               | 478.307.663             | 49.727.691                      | 138.308.272                     |                          |                                           |                        | 835.670.418                                           | 14.507                       |
| 11 | La Calera        | 57.229.267                          | 287.754.103                     | 37.535.922               | 224.652.251             | 19.693.346                      | 63.101.852                      |                          |                                           |                        | 399.063.370                                           | 16.472                       |
| 12 | La Cruz          | 11.606.854                          | 82.215.458                      | 11.606.854               | 71.755.933              | 0                               | 10.459.525                      |                          |                                           |                        | 111.294.311                                           | 14.856                       |
| 10 | Hijuelas         | 39.319.981                          | 164.430.916                     | 15.767.697               | 106.389.095             | 23.552.285                      | 58.041.821                      |                          |                                           |                        | 227.046.897                                           | 22.310                       |
| E  | ET - 5 Quillota  | 247.130.585                         | 1.151.016.411                   | 154.157.265              | 881.104.941             | 92.973.321                      | 269.911.470                     | 4                        | 0                                         | 0                      | 1.573.074.997                                         | 15.810                       |
|    | 1 Algarrobo      | 53.576.091                          | 246.646.374                     | 30.461.525               | 183.428.479             | 23.114.566                      | 63.217.895                      |                          |                                           |                        | 300.222.465                                           | 15.270                       |
| 4  | Cartagena        | 135.314.470                         | 369.969.561                     | 34.615.298               | 192.338.442             | 100.699.172                     | 177.631.119                     |                          |                                           |                        | 505.284.031                                           | 22.616                       |
| 5  | Casablanca       | 28.228.482                          | 164.430.916                     | 23.325.078               | 137.224.579             | 4.903.404                       | 27.206.336                      |                          | 3.081.230                                 | 38.487.390             | 234.228.018                                           | 15.558                       |
| 6  | El Quisco        | 67.449.181                          | 287.754.103                     | 41.839.859               | 220.417.116             | 25.609.322                      | 67.336.987                      |                          |                                           |                        | 370.387.284                                           | 13.716                       |
| 9  | El Tabo          | 50.798.129                          | 328.861.832                     | 50.798.129               | 288.584.773             | 0                               | 40.277.059                      |                          |                                           |                        | 379.659.960                                           | 11.580                       |
| 17 | Nogales          | 53.908.298                          | 205.538.645                     | 26.401.398               | 144.631.877             | 27.506.900                      | 60.906.768                      |                          |                                           |                        | 259.446.943                                           | 15.225                       |
| 28 | San Antonio      | 256.069.916                         | 822.154.580                     | 101.194.111              | 529.830.615             | 154.875.805                     | 292.323.965                     |                          |                                           |                        | 1.078.224.496                                         | 16.508                       |
| 32 | Santo Domingo    | 36.350.846                          | 123.323.187                     | 10.087.736               | 66.831.349              | 26.263.109                      | 56.491.838                      |                          |                                           |                        | 159.674.033                                           | 24.524                       |
| 33 | Valparaíso       | 267.170.943                         | 1.151.016.411                   | 170.737.334              | 891.297.315             | 96.433.609                      | 259.719.096                     |                          |                                           |                        | 1.418.187.355                                         | 12.869                       |
| 35 | Viña del Mar     | 327.999.341                         | 1.438.770.514                   | 211.593.331              | 1.117.737.026           | 116.406.010                     | 321.033.488                     |                          | 161.219.470                               | 211.308.240            | 2.139.297.565                                         | 15.664                       |
|    | ET-1 San Felipe  |                                     |                                 |                          |                         |                                 |                                 | 6                        | 446.583.946                               | 230.924.340            |                                                       |                              |
|    | ET-2 Petorca     |                                     |                                 |                          |                         |                                 |                                 | 3                        | 113.283.296                               | 115.462.170            |                                                       |                              |
|    | ET-4 Marga Marga |                                     |                                 |                          |                         |                                 |                                 | 7                        | 377.300.013                               | 269.411.730            |                                                       |                              |
|    | ET-5 Quillota    |                                     |                                 |                          |                         |                                 |                                 | 4                        | 172.190.610                               | 153.949.560            |                                                       |                              |
|    | ET Casablanca    |                                     |                                 |                          |                         |                                 |                                 | 1                        | 29.853.480                                | 38.487.390             |                                                       |                              |
| ## | total Región 202 | 2.366.347.065                       | 9.125.915.834                   | 1.190.904.687            | 6.478.358.291           | 1.175.442.378                   | 2.647.557.543                   | 21                       | 1.139.211.345                             | 808.235.191            | 13.497.492.724                                        | 13.917                       |



UNIVERSIDAD TECNICA  
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Plan de Manejo Integral de Residuos  
Sólidos Región de Valparaíso



Continuación TABLA N°14: ALTERNATIVA 2a\*\*\*

| N° | Comuna            | Costo/ton<br>Recolector | Costo/T<br>Recolección | Costo/ton<br>Transporte<br>Directo a ET o RS | Costo/ton<br>Amplirol | Costo ET      | Costo ET por<br>Tonelada | Costo Total Rec. +<br>Trans.+ET | Costo Total/T<br>Rec. +<br>Transporte +<br>ETs | Costo de Disposici<br>ón por<br>Tonelada | Costo de<br>Disposición Total | Costo Total<br>Rec.+Trans.+ET+Dis. | Costo/T<br>Rec.+Trans.+<br>ET+Disp. |
|----|-------------------|-------------------------|------------------------|----------------------------------------------|-----------------------|---------------|--------------------------|---------------------------------|------------------------------------------------|------------------------------------------|-------------------------------|------------------------------------|-------------------------------------|
|    |                   | [Ch\$/ton]              | [Ch\$/ton]             | [Ch\$/ton]                                   | [Ch\$/ton]            | [Ch\$/año]    | [Ch\$/t]                 | [Ch\$/año]                      | [Ch\$/t]                                       | [Ch\$/t]                                 | [Ch\$/año]                    | [Ch\$/año]                         | [Ch\$/ton]                          |
| 3  | Calle Larga       | 18.529                  | 11.717                 | 6.812                                        | 5.608                 | 12.537.275    | 2.294                    | 144.455.120                     | 26.431                                         | 6.000                                    | 32.792.557                    | 177.247.677                        | 32.431                              |
| 6  | Cateru            | 15.324                  | 10.280                 | 5.044                                        | 5.608                 | 15.388.703    | 2.294                    | 155.808.776                     | 23.226                                         | 6.000                                    | 40.250.767                    | 196.059.543                        | 29.226                              |
| 15 | Llay Llay         | 22.064                  | 10.636                 | 11.428                                       | 5.608                 | 22.743.285    | 2.294                    | 302.716.844                     | 30.533                                         | 6.000                                    | 59.487.448                    | 362.204.292                        | 36.533                              |
| 16 | Los Andes         | 15.757                  | 9.917                  | 5.840                                        | 5.608                 | 76.622.628    | 2.294                    | 790.279.278                     | 23.659                                         | 6.000                                    | 200.414.524                   | 990.693.802                        | 29.659                              |
| 19 | Panquehue         | 17.580                  | 11.316                 | 6.263                                        | 5.608                 | 6.626.394     | 2.294                    | 73.607.888                      | 25.482                                         | 6.000                                    | 17.332.028                    | 90.939.917                         | 31.482                              |
| 23 | Putendo           | 16.765                  | 10.580                 | 6.185                                        | 5.608                 | 21.267.399    | 2.294                    | 228.688.076                     | 24.667                                         | 6.000                                    | 55.627.114                    | 284.315.190                        | 30.667                              |
| 23 | Rinconada         | 15.486                  | 10.353                 | 5.133                                        | 5.608                 | 7.604.625     | 2.294                    | 77.534.703                      | 23.388                                         | 6.000                                    | 19.890.695                    | 97.425.398                         | 29.388                              |
| 29 | San Esteban       | 18.635                  | 12.387                 | 6.248                                        | 5.608                 | 18.300.472    | 2.294                    | 211.703.992                     | 26.537                                         | 6.000                                    | 47.866.804                    | 259.570.796                        | 32.537                              |
| 30 | San Felipe        | 10.806                  | 9.676                  | 1.130                                        | 5.608                 | 81.495.958    | 2.294                    | 664.637.624                     | 18.708                                         | 6.000                                    | 213.161.230                   | 877.798.854                        | 24.708                              |
| 31 | Santa María       | 16.400                  | 10.392                 | 6.008                                        | 5.608                 | 14.541.829    | 2.294                    | 154.057.645                     | 24.302                                         | 6.000                                    | 38.035.680                    | 192.093.325                        | 30.302                              |
| A  | ET - San Felipe   | 15.257                  | 10.291                 | 4.966                                        | 5.608                 | 277.128.567   | 2.294                    | 2.803.489.948                   | 23.206                                         | 6.000                                    | 724.858.848                   | 3.528.348.795                      | 29.206                              |
| 2  | Cabikto           | 17.410                  | 9.576                  | 7.834                                        | 4.622                 | 23.842.405    | 3.788                    | 162.522.167                     | 25.819                                         | 4.136                                    | 26.032.424                    | 188.554.591                        | 29.955                              |
| 13 | La Ligua          | 10.626                  | 9.510                  | 1.115                                        | 4.622                 | 85.777.424    | 3.788                    | 431.064.275                     | 19.035                                         | 4.136                                    | 93.656.419                    | 524.720.694                        | 23.171                              |
| 20 | Papudo            | 18.844                  | 12.157                 | 6.688                                        | 4.622                 | 20.101.339    | 3.788                    | 144.633.427                     | 27.254                                         | 4.136                                    | 21.947.726                    | 166.581.153                        | 31.389                              |
| 21 | Petorca           | 26.399                  | 11.512                 | 14.887                                       | 4.622                 | 23.446.360    | 3.788                    | 215.465.034                     | 34.808                                         | 4.136                                    | 25.600.000                    | 241.065.034                        | 38.944                              |
| 36 | Zapallar          | 24.217                  | 10.965                 | 13.252                                       | 4.622                 | 34.304.570    | 3.788                    | 295.486.041                     | 32.626                                         | 4.136                                    | 37.455.580                    | 332.941.621                        | 36.762                              |
| B  | ET - Petorca      | 16.829                  | 10.319                 | 6.510                                        | 4.622                 | 187.472.097   | 3.788                    | 1.249.170.944                   | 25.239                                         | 4.618                                    | 204.692.149                   | 1.453.863.093                      | 29.374                              |
| 7  | Con Con           | 19.685                  | 9.609                  | 10.076                                       |                       |               |                          | 898.679.426                     | 19.685                                         | 4.136                                    | 188.806.080                   | 1.087.485.506                      | 23.821                              |
| 22 | Puchuncaví        | 13.357                  | 10.680                 | 2.677                                        |                       |               |                          | 341.068.336                     | 13.357                                         | 4.136                                    | 105.600.387                   | 446.668.723                        | 17.493                              |
| 26 | Quintero          | 15.272                  | 10.089                 | 5.183                                        |                       |               |                          | 466.311.278                     | 15.272                                         | 4.136                                    | 126.279.326                   | 592.590.604                        | 19.407                              |
| 14 | Limache           | 14.956                  | 10.252                 | 4.704                                        | 4.434                 | 40.591.156    | 1.978                    | 438.532.199                     | 21.367                                         | 4.136                                    | 84.877.884                    | 523.410.083                        | 25.503                              |
| 18 | Olmue             | 13.067                  | 11.603                 | 1.465                                        | 4.434                 | 14.117.525    | 1.978                    | 139.039.504                     | 19.479                                         | 4.136                                    | 29.520.363                    | 168.559.868                        | 23.615                              |
| 25 | Quilpué           | 17.259                  | 9.856                  | 7.403                                        | 4.434                 | 123.623.276   | 1.978                    | 1.496.894.288                   | 23.948                                         | 4.136                                    | 258.501.679                   | 1.755.395.967                      | 28.084                              |
| 34 | Villa Alemana     | 16.549                  | 9.563                  | 6.986                                        | 4.434                 | 110.158.501   | 1.978                    | 1.278.844.814                   | 22.961                                         | 4.136                                    | 230.346.245                   | 1.509.191.059                      | 27.096                              |
| D  | ET - Marga        | 16.459                  | 9.885                  | 6.574                                        | 4.434                 | 288.490.459   | 1.978                    | 3.353.310.805                   | 22.989                                         | 4.136                                    | 603.246.171                   | 3.956.556.976                      | 27.125                              |
| 24 | Quillota          | 13.117                  | 9.853                  | 3.264                                        |                       |               |                          | 835.670.418                     | 14.507                                         | 4.136                                    | 238.228.238                   | 1.073.898.656                      | 18.643                              |
| 11 | La Calera         | 14.240                  | 10.822                 | 3.417                                        |                       |               |                          | 399.063.370                     | 16.472                                         | 4.136                                    | 100.195.383                   | 499.258.753                        | 20.607                              |
| 12 | La Cruz           | 12.524                  | 11.128                 | 1.396                                        |                       |               |                          | 111.294.311                     | 14.856                                         | 4.136                                    | 30.982.405                    | 142.276.716                        | 18.992                              |
| 10 | Hijuelas          | 20.021                  | 12.003                 | 8.017                                        |                       |               |                          | 227.046.897                     | 22.310                                         | 4.136                                    | 42.089.026                    | 269.135.924                        | 26.445                              |
| E  | ET- 5 Quillota    | 14.052                  | 10.405                 | 3.647                                        | 0                     | 0             | 0                        | 1.573.074.997                   | 15.810                                         | 4.136                                    | 411.495.052                   | 1.984.570.049                      | 19.946                              |
| 1  | Algarrobo         | 15.270                  | 10.879                 | 4.391                                        |                       |               |                          | 300.222.465                     | 15.270                                         | 9.396                                    | 184.729.790                   | 484.952.255                        | 24.666                              |
| 4  | Cartagena         | 22.616                  | 10.158                 | 12.458                                       |                       |               |                          | 505.284.031                     | 22.616                                         | 9.396                                    | 209.919.789                   | 715.203.820                        | 32.012                              |
| 5  | Casablanca        | 12.797                  | 10.664                 | 2.133                                        | 2.761                 | 82.255.354    | 5.464                    | 316.483.373                     | 21.022                                         | 9.396                                    | 141.451.779                   | 457.935.152                        | 30.418                              |
| 8  | El Quisco         | 13.153                  | 9.711                  | 3.442                                        |                       |               |                          | 370.387.284                     | 13.716                                         | 9.396                                    | 253.732.159                   | 624.119.444                        | 23.111                              |
| 9  | El Tabo           | 11.580                  | 10.351                 | 1.228                                        |                       |               |                          | 379.659.960                     | 11.580                                         | 9.396                                    | 308.058.371                   | 687.718.331                        | 20.975                              |
| 17 | Nogales           | 15.225                  | 10.037                 | 5.188                                        |                       |               |                          | 259.446.943                     | 15.225                                         | 4.136                                    | 70.473.778                    | 329.920.721                        | 19.361                              |
| 28 | San Antonio       | 16.508                  | 9.661                  | 6.847                                        |                       |               |                          | 1.078.224.496                   | 16.508                                         | 9.396                                    | 613.677.982                   | 1.691.902.477                      | 25.904                              |
| 32 | Santo Domingo     | 24.524                  | 11.814                 | 12.710                                       |                       |               |                          | 159.674.033                     | 24.524                                         | 9.396                                    | 61.175.712                    | 220.849.744                        | 33.919                              |
| 33 | Valparaíso        | 12.869                  | 9.637                  | 3.232                                        |                       |               |                          | 1.418.187.355                   | 12.869                                         | 4.136                                    | 455.752.562                   | 1.873.939.917                      | 17.005                              |
| 35 | Viña del Mar      | 12.937                  | 9.734                  | 3.203                                        | 2.728                 | 374.056.094   | 2.739                    | 2.513.353.659                   | 18.403                                         | 4.136                                    | 564.810.287                   | 3.078.163.946                      | 22.539                              |
|    | ET-1 San Felipe   |                         |                        |                                              |                       | 277.128.567   | 2.294                    |                                 |                                                |                                          |                               |                                    |                                     |
|    | ET - 2 Petorca    |                         |                        |                                              |                       | 187.472.097   | 3.788                    |                                 |                                                |                                          |                               |                                    |                                     |
|    | ET- 4 Marga Marga |                         |                        |                                              |                       | 288.490.459   | 1.978                    |                                 |                                                |                                          |                               |                                    |                                     |
|    | ET-5 Quillota     |                         |                        |                                              |                       | 272.520.235   | 2.739                    |                                 |                                                |                                          |                               |                                    |                                     |
|    | ET Casablanca     |                         |                        |                                              |                       | 82.255.354    | 5.464                    |                                 |                                                |                                          |                               |                                    |                                     |
| ## | total Región 202  | 11.849                  | 7.907                  | 3.942                                        |                       | 1.107.866.711 |                          | 14.706.895.295                  | 15.164                                         |                                          | 4.396.579.376                 | 19.103.474.671                     | 19.697                              |