
ANNEX 9
TRAFFIC FLOW BACKGROUND

1 INTRODUCTION

This document provides details about the traffic flow estimation delivered in Tables N° 8 and 9 of the Road Impact Study (Annex 14 EIA)¹ and the daily estimated flow from Puente Alto and San José de Maipo² according to what has been requested by the authority in the ICSARA N° 1 of the Alto Maipo Hydroelectric Project Environmental Impact Study.

The data presented in Table N° 8, are associated to the flow in one traffic direction by the concept of transport of cement, dry goods, timber, among other goods necessary for the construction of the project. While the data pointed out in Table N° 9, correspond to the traffic flow by the concept of commuting of people on buses.

The flow traffic analysis by the concept of transport of people in light weight cars and that might be detailed in Table N° 10 of the Road Study is not presented, because is not possible to estimate in this stage of the project the detail of distribution of this flow over time. Because of the above, it is theoretically presumed that the maximum flow delivered in the Road Impact Study, this is 14 vehicles per hour, will be permanent during the construction stage of the project³.

With regards the analysis of Tables 8 and 9, this will be per separate and stressing those important aspects to be considered at the moment of interpreting the requested data.

As part of this report you will also find a global flow analysis which as a whole has already been assessed in the Road Impact Study presented in Annex 14 of EIA. Such study, incorporated a work methodology which corresponds to the current guidelines for the development of the Road Impact Study of SEREMI of Transport and Telecommunication of the Metropolitan Region, SEREMI of Housing and Urban development and the Road Directorate of the Ministry of Public Works.

In this sense, it has been considered the most unfavorable scenario, corresponding to a maximum flow in one direction of the transit potentially able to be registered during the construction stage of the project, concentrated in one hour. Namely, transport of loads = 3 trucks per hour; for transport of personnel = 19 buses and 14 light weight vehicles, both per hour. With the previous data, it was able to determine from the capacity of the assessed tranches point of view, there will be no changes at service level attributable to the carry out of the project. This assessment considered this maximum flow of project in the hours of maximum forecast vehicle demand, which confers to the assessment an adequate security margin.

¹ Enquiry 44, section 1 of the Addenda.

² Enquiry 51, section 1 of the Addenda.

³ Is taken from Table N° 10, that the real calculated flow is 1 vehicle per hour. Nevertheless it has been adapted to 14 per hour. In practice, 14 vehicles per day will be distributed, which in any case will be transported at a same hour.

On the other hand and according to what has been stated before, the maximum flow in both directions of transit will correspond to 3 trucks with three (3) trips one way and three (3) trips back, 19 buses with 19 trips one way and 19 trips back, and finally 14 Light Weight vehicles with 14 trips one way and 14 trips back.

As it will be seen later on, the most unfavorable situation assessed, might be sporadically registered and limited to a short period of time. In general, most part of the time, the flows will be far from the maximum assessed.

Finally, It is important to bear in mind that the flows estimated here are presented in a relation of time concordant with the timetable of EIA, which can potentially vary given that it depends on RCA. In this sense, the works might start 3 to 4 months after the RCA is obtained. In this case, the only works that will not be able to carry out immediately will be the civil superficial works of El Volcán and El Yeso areas, which will be able to start only in the months of October and April of the first year. This variation over time will not alter the values of maximum flow assessed.

2 DETAIL OF THE FLOWS

2.1 LOAD FLOWS MONTHLY ESTIMATION (TABLE 8)

The total monthly load flows estimation are presented next in Table 8, which have been estimated according to the goods demand projected as per the timetable of the works of the project (Annex 2 of EIA).

It is not possible to provide neither daily nor weekly details of the load flow, because these will be subject to the proper logistics of the supplying company. In this sense, and according to the monthly calculations which will be presented ahead, will not be over, in any case, to 3 trips of the trucks per hour declared in EIA and assessed in the Road Impact Study. The above, due to the maximum monthly estimated flow will be about 753 trips⁴, estimating an exact amount of 3 trips per hour, a situation that will not be repeated in the other months.

By part of the Owner, a logistic system with supplying companies and its contractors will be kept, in order to coordinate the entry and return of trucks from and towards the municipality to be distributed in an optimum way, taking in consideration the schedule commitments of circulation of trucks established in the Addenda.

In relation to the monthly flow calculation methodology, it is important to consider that the flow has been estimated from the load capacity trucks equal to 6, 8 and 18 Ton (See Table 8 Road Study). In the practice, trucks with greater capacity will be able to be used and thus, reduce the estimated flow. The above, always considering compliance to what has been stated by D.S N° 158 which establishes weight limits per shaft and total gross weight limits.

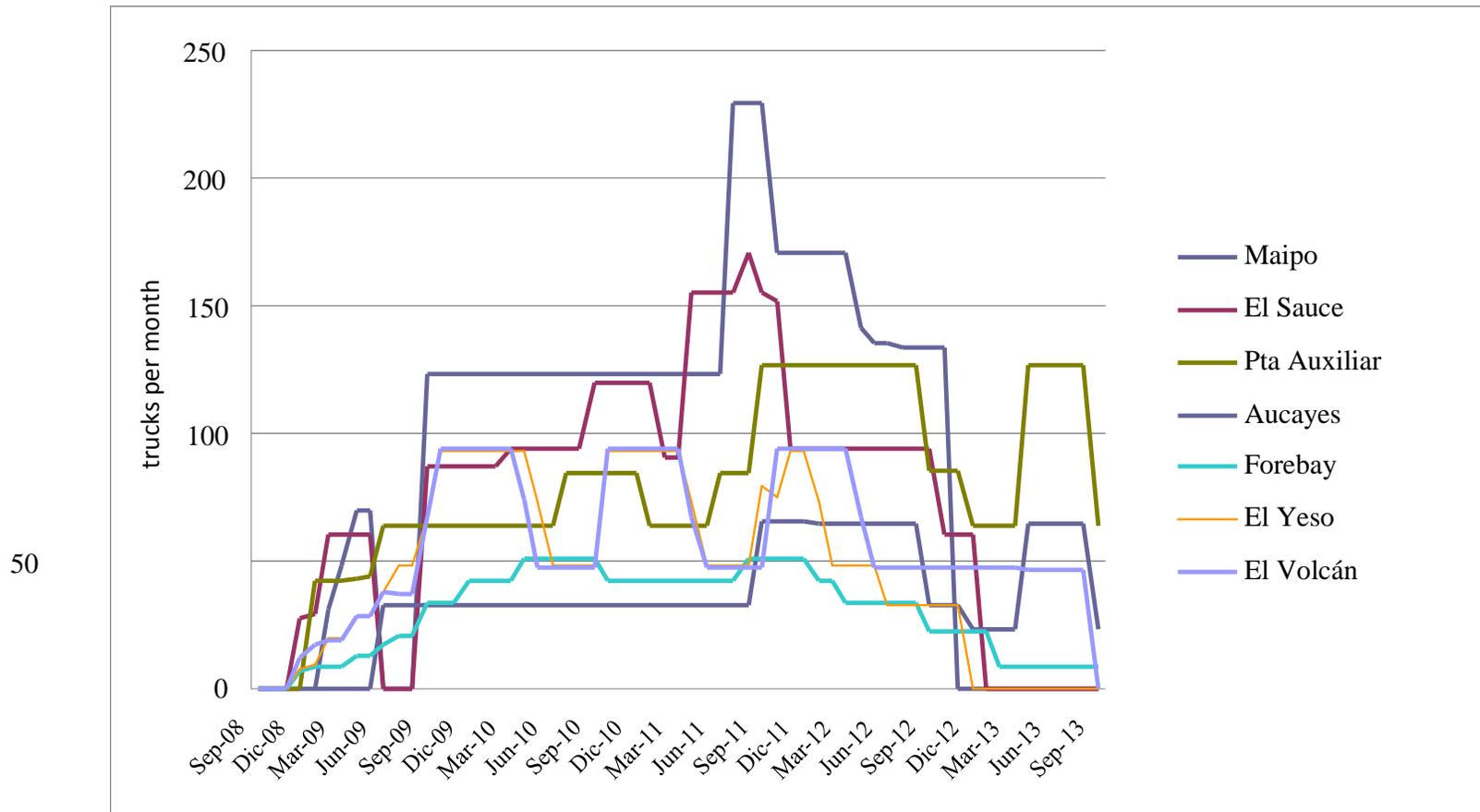
The details of the monthly flows as per load transport, is pointed out in Table 1. Additionally, a chart of the flow behavior over time is presented.

⁴ 753 trips which will be distributed in 27 days, each day with 9 Hrs. of work.

Table 1

Truck flows as per monthly load transport								
Date	Maipo	El Sauce	Pta Auxiliar	Aucayes	Forebay	El Yeso	El Volcán	Total
Sep-08	0	0	0	0	0	0	0	0
Oct-08	0	0	0	0	0	0	0	0
Nov-08	0	0	0	0	0	0	0	0
Dec-08	0	28	0	0	7	8	12	55
Jan-09	0	29	42	0	9	9	17	107
Feb-09	31	60	42	0	9	20	19	181
Mar-09	48	60	42	0	9	20	19	198
Apr-09	70	60	43	0	13	28	28	242
May-09	70	60	44	0	13	28	28	243
Jun-09	0	0	63	32	17	38	38	188
Jul-09	0	0	63	33	21	48	37	202
Aug-09	0	0	63	33	21	48	37	202
Sep-09	123	87	63	33	34	67	67	474
Oct-09	123	87	63	33	34	93	94	527
Nov-09	123	87	63	33	34	93	94	527
Dec-09	123	87	63	33	42	93	94	536
Jan-10	123	87	63	33	42	93	94	536
Feb-10	123	87	63	33	42	93	94	536
Mar-10	123	94	63	33	42	93	94	543
Apr-10	123	94	63	33	51	93	74	531
May-10	123	94	63	32	51	73	47	483
Jun-10	123	94	63	32	51	49	47	459
Jul-10	123	94	85	32	51	49	47	480
Aug-10	123	94	85	32	51	49	47	480
Sep-10	123	120	85	32	51	49	47	506
Oct-10	123	120	85	32	42	93	94	589
Nov-10	123	120	85	32	42	93	94	589
Dec-10	123	120	85	32	42	93	94	589
Jan-11	123	120	63	32	42	93	94	568
Feb-11	123	91	63	32	42	93	94	539
Mar-11	123	91	63	32	42	93	94	539
Apr-11	123	155	63	32	42	73	67	556
May-11	123	155	63	32	42	49	47	512
Jun-11	123	155	85	32	42	49	47	533
Jul-11	229	155	85	32	42	49	47	639
Aug-11	229	171	85	32	51	49	47	663
Sep-11	229	155	127	66	51	79	47	753
Oct-11	171	152	127	66	51	75	94	735
Nov-11	171	94	127	66	51	93	94	695
Dec-11	171	94	127	66	51	93	94	695
Jan-12	171	94	127	65	42	73	94	666
Feb-12	171	94	127	65	42	49	94	641
Mar-12	171	94	127	65	34	49	94	633
Apr-12	141	94	127	65	34	49	67	576
May-12	135	94	127	65	34	49	47	550
Jun-12	135	94	127	65	34	32	47	534
Jul-12	134	94	127	65	34	32	47	533
Aug-12	134	94	127	65	34	32	47	533
Sep-12	134	94	85	33	22	32	47	448
Oct-12	134	60	85	33	22	32	47	414
Nov-12	0	60	85	33	22	32	47	280
Dec-12	0	60	63	24	22	0	47	217
Jan-13	0	0	63	24	22	0	47	156
Feb-13	0	0	63	24	8	0	47	142
Mar-13	0	0	63	24	8	0	47	142
Apr-13	0	0	127	65	8	0	47	247
May-13	0	0	127	65	8	0	47	247
Jun-13	0	0	127	65	8	0	47	247
Jul-13	0	0	127	65	8	0	47	247
Aug-13	0	0	127	65	8	0	47	247
Sep-13	0	0	63	24	8	0	0	95
Total	5.585	4.478	4.844	2.194	1.833	2.850	3.425	25.226

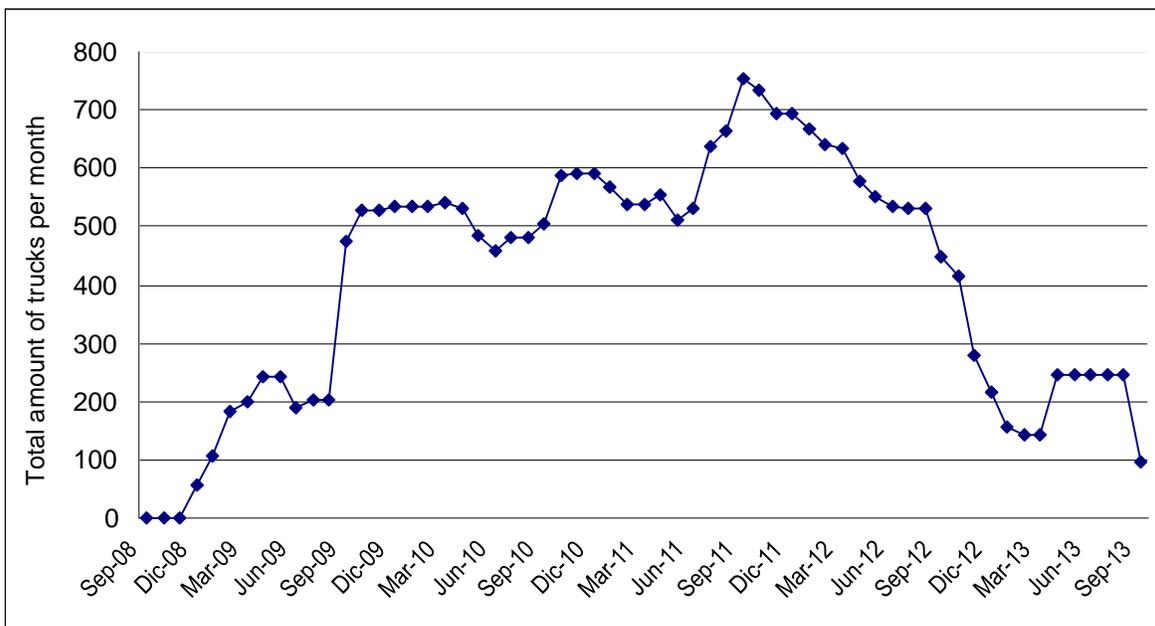
Chart 1
Amount of Trucks per Month to be used for Load Transport in Each Workplace.



With regards the behavior of this flow over time, and then the analysis of the data presented in the mentioned table 1 and chart 1, it is observed that the greatest number of trucks will be used in the Las Lajas area during the last term of 2011 and the first quarter of 2012.

On the other hand and in order to assess the peak of flow concentration, the following chart delivers the total behavior of the truck trips over time, determining that in September 2011 a greater concentration of flow will be presented and where is possible to register 3 trips per hour. In the remaining months, the amount of trips per truck due to load transport will be significantly lower.

Chart 2
Total Amount of Trucks per Month



2.2 DAILY, WEEKLY, AND MONTHLY MAXIMUM ESTIMATION OF TRIPS AS PER PERSONNEL TRANSPORT (TABLE 9)

Next in Table 2, the monthly and weekly vehicular flows by this concept, which contrary to the load transport, it is possible to foresee at this detail level (weekly) because dates, information about shifts and personal requirements are already managed. An estimation of the daily flows which are foreseen to occur is presented as well, with an average of twice a week⁵.

⁵ Enquiry 51 of section 1 of the Addenda, where the amount of fortnight or daily trips to San José and Puente Alto are required.

Some considerations taken for the calculation were:

- Shifts have been considered for those workers that stay in camp sites, these will be four (4) per week, staying three (3) at the works and one (1) to day off.
- 100% of the workers will remain in their camp sites both in the works of El Volcán as El Yeso areas. According to the above, the transport and personnel flow will come from the change of personnel in the camp sites. This change, and following the established shifts, is 3 shifts of work and one to rest, it is foreseen to carry out an average of 2 times per week.
- For Aucayes area, it is considered 90% of the workers will spend the night in the camp site, while the remaining 10% will daily commute to San José de Maipo or Puente Alto. In the Alfalfal area, it is foreseen that 40% of the workers will come from San José de Maipo or Puente Alto, while the remaining 60% will stay in the camp site. In the case of Las Lajas Area, 40% of the workers will stay in their camp site. The remaining 60% will daily commute from Puente Alto and from the municipality San José de Maipo itself;
- Taking in consideration the above, in the previously described areas (Aucayes, Alfalfal and Las Lajas), there will be both flow from the shift changes of the personnel coming from camp sites as well as daily transport of the personnel from San José de Maipo and Puente Alto to the working faces. Due to this, in Table N° 2 the amount of total trips per week for both directions is presented, and additionally the daily flow attributable only to the transport of personnel which do not stay in camp sites. For these areas, the total amount of trips and maximum estimated, will be only presented in those days where there is shift change (2 times per week, average) and daily transport of the personnel;
- Workers of the Discharge works in Maipo River area, will come at a 100% from Puente Alto and from San José de Maipo;

The monthly, weekly and daily maximum details of the flows for the matters of transport of personnel are detailed in Table 2. Additionally, in charts 3 and 4 the behavior of the flows over time are presented.

Insert Table 2

Chart 3
Maximum Daily Buses per Work Area over Time

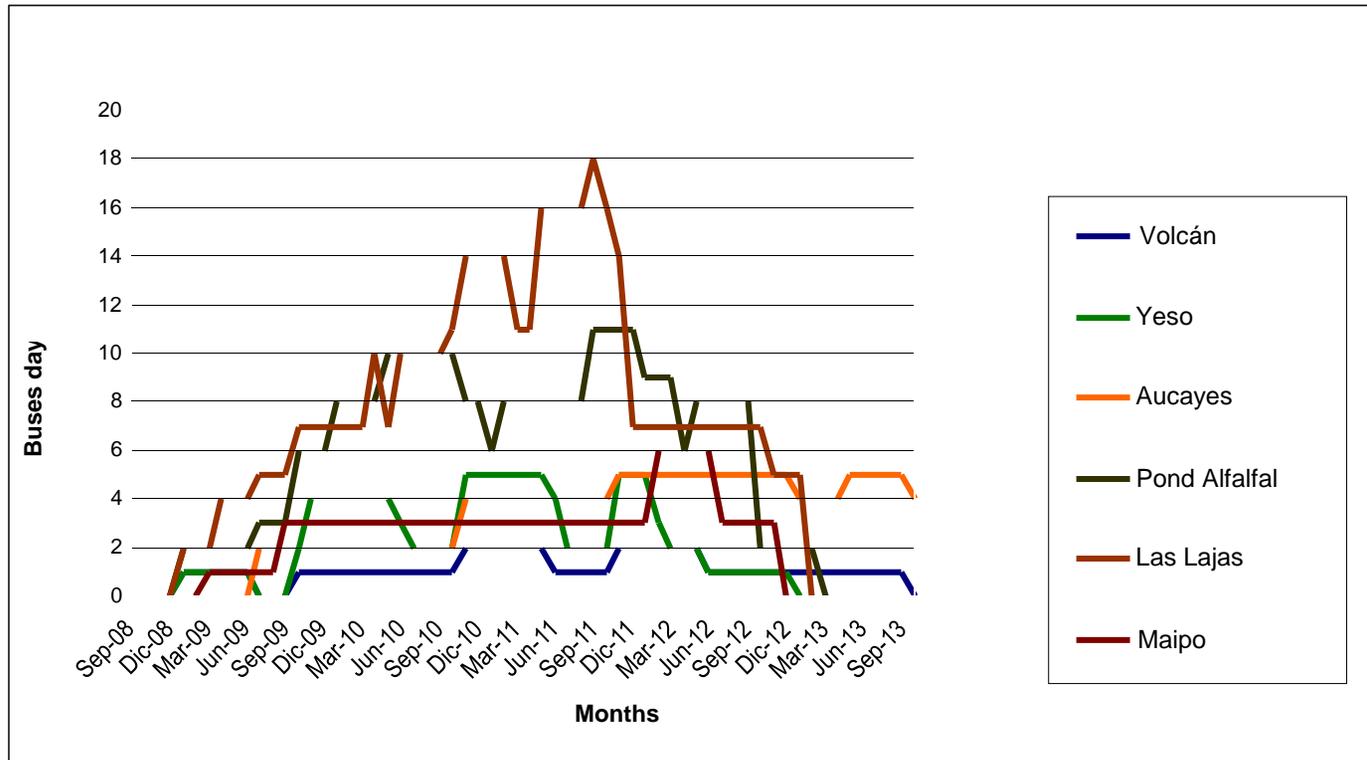
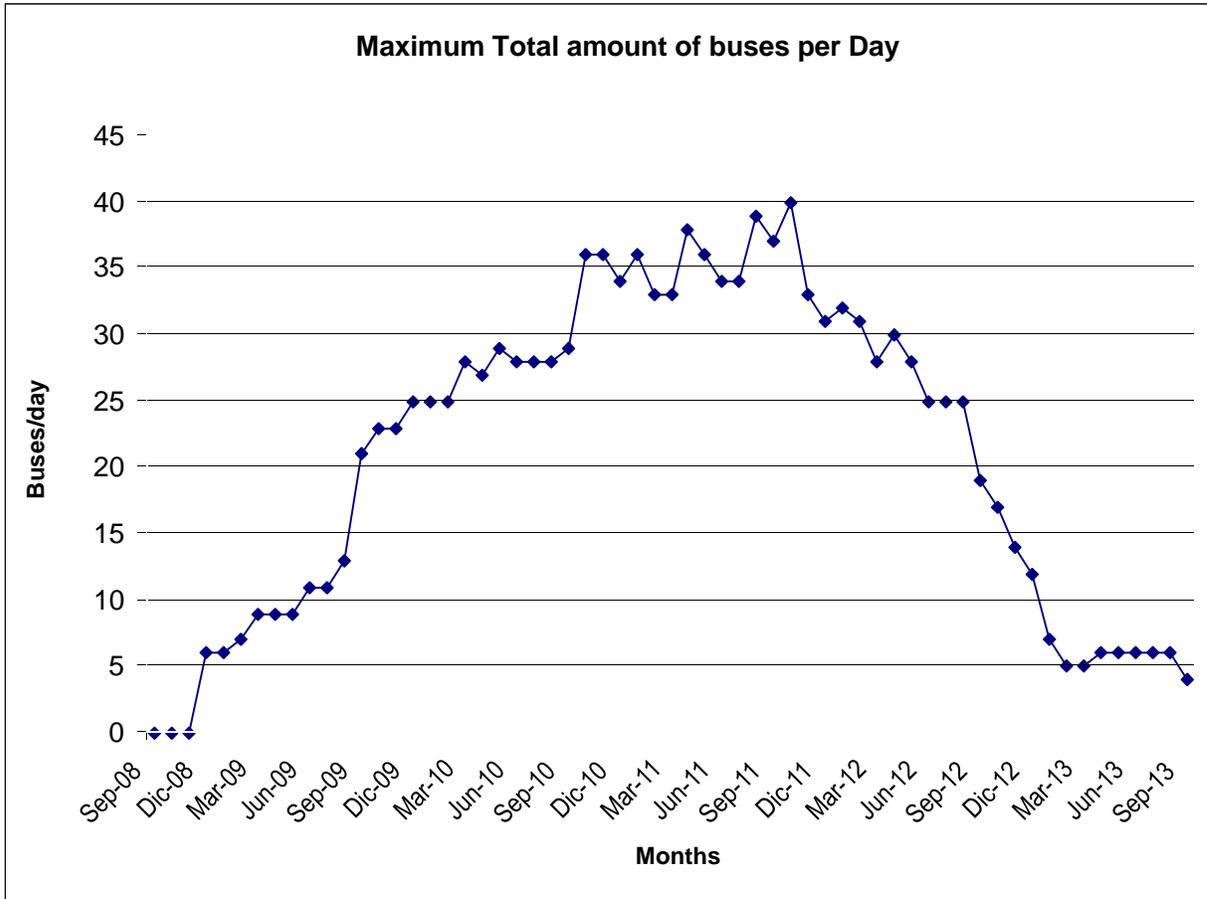


Chart 4
Total Amount of Daily Buses per Month of Construction



This chart illustrates the total flow behavior of buses over time. Regarding this, and after analyzing the data presented in Table N° 2 and charts N°3 and 4, a greater concentration of maximum daily flows are observed during the months August to October of 2011⁶. During the other periods of time, the flows will be considerably lower.

It is worth to remember that the maximum daily buses will be registered on the day that the transport of personnel from San José de Maipo and Puente Alto (daily) is done and at the same time the change of personnel due to shift of camp site is done as well.

⁶ In the Road Impact study, a maximum of 19 buses per hour was calculated. As it is observed, the maximum estimated vehicles per day could reach up to 40 buses. Therefore it is foreseen that in the period of greater traffic, the flow will not be over the maximum declared in the Road Study, which is 19 buses per hour.

3 DATA GLOBAL ANALYSIS

When analyzing tables 1 and 2, it is observed that the amount of vehicles to be used by the project during the construction stage, will present its peak between the years 2011 and 2012, specifically between the second term of 2011 and the first term of 2012. It is in this period of time when the scenarios assessed on the Road Impact Study might be registered. During the rest of the months, a significant lower flow will be presented.

Without prejudice of the before mentioned, it is foreseen that actually the total flows will be lower, as for the case of trucks, these have been under dimensioned in their capacity, it has been estimated an amount of light weight vehicles adapted to a superior value compared to the real one and on the other hand, in some cases, it has been considered a full capacity bus for transport of a lower amount of passengers. In these cases, the same bus will be used to transport people in El Volcán and El Yeso, A similar situation is foreseen for the camp sited located in the Colorado area.

On the other hand, the daily maximum for the case of buses, consider the worst case scenario, in the occasion where traffic will be generated due to the change of shifts from the camp site and added to the daily flow of the commute from San José de Maipo and Puente Alto. A situation which will be only generated twice in a week.

Finally, it is important to bear in mind that all the flows here presented, do not have the same transit circuit, allowing a spatial distribution of them, over the routes G-345, G-25 and G-455.

Further details about the road assessment was presented in Annex 14 of EIA.