Environmental and Social Impact Assessment (Draft)

March 2018

THA: Chonburi Power Plant Project
(Part 3 of 6)

Prepared by Gulf SRC Company Limited for the Asian Development Bank.

CHAPTER 5

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIONS

5.1 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIONS FOR POWER PLANT

5.1.1 PHYSICAL RESOURCES

5.1.1.1 Air Quality

(1) Construction period

During the construction period, there was no factor that would change the characteristics of meteorological conditions in the project area. Air quality might be affected by the construction activities as the main activities to cause distribution of particles. These activities included the modification of the foundations and buildings which involve excavating, plowing, filling, flattening and crushing. The quantity of dispersed particles varies depending on the length of construction time, wind speed and direction, humidity of the soil and the site. In addition, some pollutants may be released from construction equipment. Therefore, it is necessary to assess air quality impact during the construction period, using AERMOD Version 8.9, the latest mathematical model (as of September 2015). Details of the study are as follows.

(1.1) Model selection

Because the source of air substances caused by the Project is characterized as point source with open area source. So model to be used must be the one capable of calculating the concentration from various sources and select locations of receiving points and point sources, independently. Therefore, in this study, the consultants chose AERMOD, a mathematical model which has been widely recognized and used. AERMOD predicts the concentration of substances in the air based on the theory of Planetary Boundary Layer with the range between around 100 m during the night and 1 to 2 km during the day. The classification consists of Convective Boundary Layer (CBL) representing the layer where there is movement of air mass due to convection (Sensible Heat Flux, H),

and Stable Boundary Layer (SBL) representing the layer that has not been influenced by convection but is affected from the friction of the earth surface. In addition, AERMOD is a Steady-State Plume Model in which SBL's distribution of concentration is assumed to be similar to Gaussian distribution in both vertical and horizontal directions. CBL's distribution of concentration is similar to Gaussian distribution only in horizontal direction while its distribution of concentration in vertical direction is similar to Bi-Gaussian Probability Density Function.

(1.2) Eliminating particles from Excavation

The project area covers approximately 450 rais or 720,000 m^2 of land in Hemaraj ESIE where the plot of land had already been filled and adjusted prior to the delivery of the land to the project. As a result, the project's construction activities were limited to excavation for laying building foundations and to construct ponds which cover 306,891.9 m^2. The excavation activities are expected to last 18 months (540 days). The ground surface will be open cut to lay pipe racks on which metal sheets will be welded intermittently in line with the construction of the power plant. Therefore, during the construction period, approximately 568.3 m^2/day of ground surface will be excavated and the activities last 8 hr during the daytime (08.00 a.m. to 17.00 p.m.). Therefore, impacts in form of particles from excavation and open cut activities during construction of pipe racks has been merged with the impacts from laying of building foundations.

(1.3) Input data for the model

(a) Meteorological data

Meteorological data was critical information used in the study and the assessment of concentration of substances in the air with the use of a mathematical model, specifically the information of wind speed and direction as it could influence the distribution of substances released into the atmosphere. In the study, the consultants provided meteorological data during 2012-2014 using AERMET Program and calculated factors of the atmosphere next to the earth surface in the study area according to the User's Manual for assessment of the distribution of air substances by the Office of Natural Resources and Environmental Policy and Planning (ONEP), dated 24 September 2013. The data was used as input in the mathematical model AERMOD. The meteorological data to be processed came from the ambient air quality monitoring stations located closest to the area. The metrological data consisted of surface data from the Department of Pollution

Control's ambient air quality monitoring station (AQMS) at Ta Sit Sub-district Administration Organization (Ta Sit SAO) in Pluak Daeng District, Rayong province, which is located 2.7 km east-northeast (ENE) of the project area, and the Meteorological Department's AQMS in Laem Chabang, Chon Buri Province, which is located 34.8 km west-northwest (WNW) of the project area. The upper air data had been taken from Bangna station. Details are as follows:

- **Metrological surface data** comprised of wind speed and direction as shown in **Figure 5.1.1.1-1** to **Figure 5.1.1.1-4**, dry bulb temperature, relative humidity and specific characteristics of the surface area within the study area from the Department of Pollution Control's AQMS at Ta Sit Sub-district Administrative Organization in Pluak Daeng District, Rayong province, during 2012-2014, which provided hourly data. However, in 2014, the station was operated until 15 July 2014 and was closed permanently. The station was relocated to the Public Health Office in Pluak Daeng District, which is approximately 9.2 km away from the previous location. The consultants decided to use data from the previous year to compensate for the missing section. Data of cloud cover and cloud ceiling height had been gathered from the Meteorological Department's Laem Chabang station during 2012-2014.

Metrological surface data gathered from Laem Chabang station was monitored every 3 hr which differed from metrological surface data gathered from the station at Ta Sit Sub-district Administrative Organization which was hourly data. So the data had to be converted to hourly data prior to entering into the AERMET Program. Methods for data preparation is as follows.

- Ceiling height, in case of complete data, was from Step-wise Linear Interpolation, while in case of incomplete data, data from the previous year was used for substitution. In absence of the previous year data, the average value of hourly data in each month was used for substitution. Cloud cover data was monitored every 3 hr and was used for Step-wise Linear Interpolation to convert to hourly data.

- **Meteorological upper data** comprise of wind speed and direction, temperature and dynamic height. Such data came from Bangna station, Bangkok, which was daily monitored. Meteorological upper data was monitored at different standard pressure levels ranging from about 100 m from the surface to 20 km altitude (data required

by AERMET must be available up to 3,000 m altitude). Methods for data preparation is as follows.

- In case of missing 1 data value, Linear Interpolation of data from before and after was used. In case of missing more than 1 data value, data on the same day of the previous year was used.

Meteorological data of the areas with land utilization included values of Surface Roughness Length, Bowen Ratio and Albedo. The consultants considered based on the characteristics of land utilization at AQMS at Ta Sit Sub-district Administrative Organization, using the Land Development Department's latest map that shows characteristics of land use in Rayong province (2013). As Thailand is located in the tropical zone, the consultants considered values used during summer as defined in the User's Guide for the AERMOD Meteorological Preprocessor (AERMET), U.S. EPA 2004, and applied the calculation method from ADEC Guidance re AERMET Geometric Means How to Calculate the Geometric Mean Bowen Ratio and the Inverse-Distance Weighted Geometric Mean Surface Roughness Length in Alaska, 2009. Details are as follows:

- Surface Roughness Length value was from inverse distance weighted geometric average with radius of 3 km. The study area was divided into 8 sections in which the values of each section are shown in **Figure 5.1.1.1-5**.

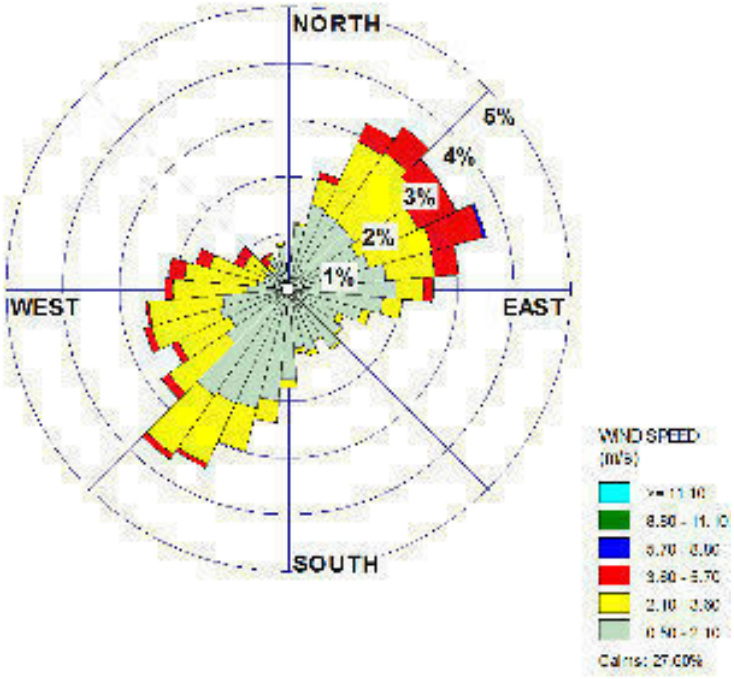


FIGURE 5.1.1.1-1 : WIND SPEED AND DIRECTION OF AMBIENT AIR QUALITY MONITORING STATION (AQMS) AT TA SIT SUB-DISTRICT ADMINISTRATION ORGANIZATION (TA SIT SAO) DURING 2012

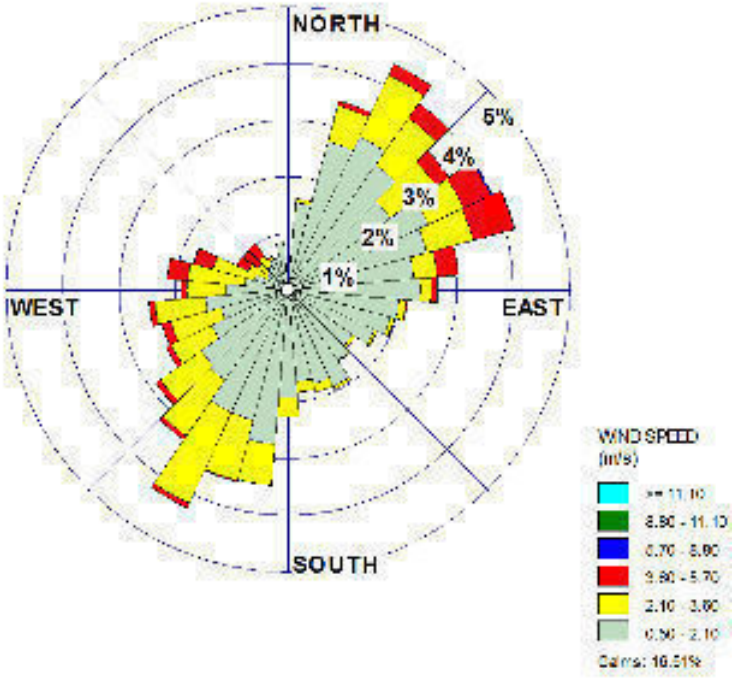


FIGURE 5.1.1.1-2 : WIND SPEED AND DIRECTION OF AMBIENT AIR QUALITY MONITORING STATION (AQMS) AT TA SIT SUB-DISTRICT ADMINISTRATION ORGANIZATION (TA SIT SAO) DURING 2013

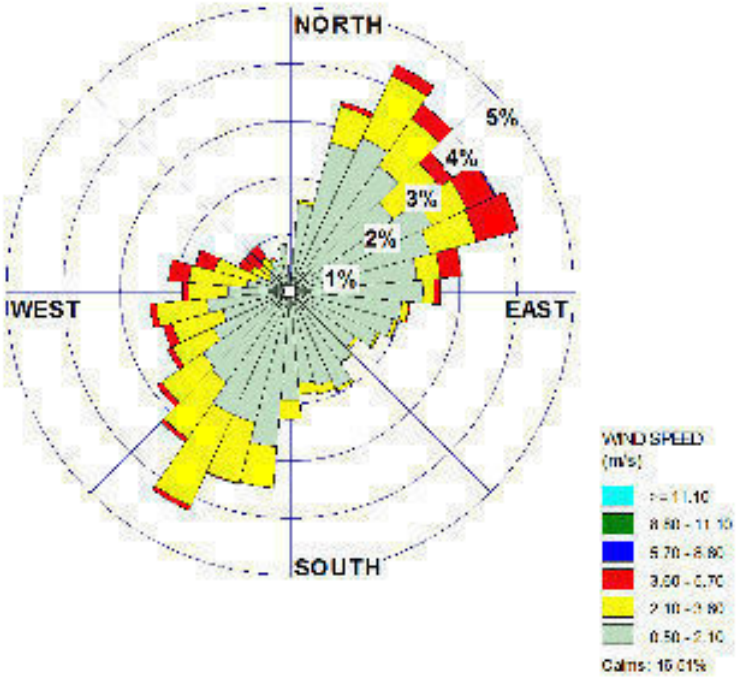


FIGURE 5.1.1.1-3 : WIND SPEED AND DIRECTION OF AMBIENT AIR QUALITY MONITORING STATION (AQMS) AT TA SIT SUB-DISTRICT ADMINISTRATION ORGANIZATION (TA SIT SAO) DURING 2014

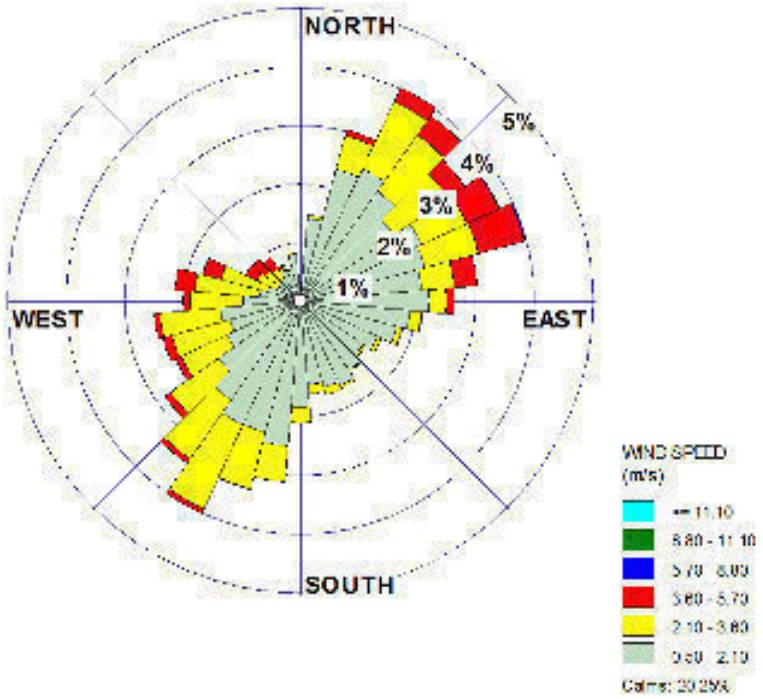


FIGURE 5.1.1.1-4 : WIND SPEED AND DIRECTION OF AMBIENT AIR QUALITY MONITORING STATION (AQMS) AT TA SIT SUB-DISTRICT ADMINISTRATION ORGANIZATION (TA SIT SAO) DURING 2012-2014

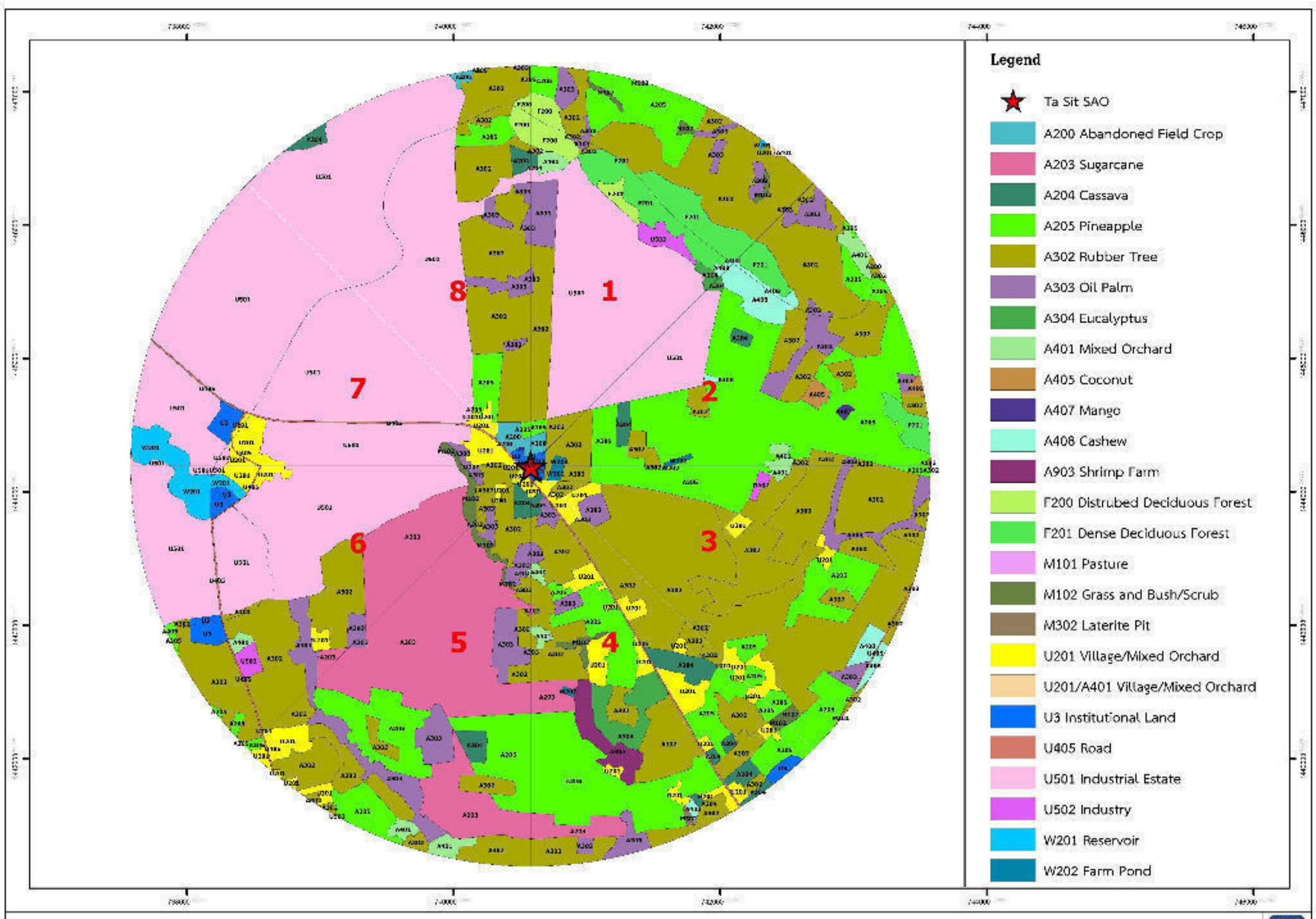


FIGURE 5.1.1.1-5 : THE LAND UTILIZATION IN 3 KM RADIUS FROM AQMS TA SIT SAO STATION

- Albedo value was from unweighted arithmetic average within the area of 10 km × 10 km **(Figure 5.1.1.1-6)**.
- Bowen Ratio value was from unweighted arithmetic average within the area of 10 km × 10 km **(Figure 5.1.1.1-6)**. The calculation was divided into two ranges: dry range and wet range. Data input to the mathematical model (AERMET) was divided according to seasonal months, the dry range spanned from November to April while the wet range was between May to October.

(b) Data from receptor sources

For the study of the distribution of air substances caused by the project, the consultants specified the study area to include a radius of 15 km from the fence of the project area (referring to the project compound's barricade where the general public cannot enter without permission). Widths or the distances of Grid Receptor are as follows:

- The distance of the project area's outer edge of the fence line to 1.5 km outside the fence is 100 m.
- The distance of 1.5-3.0 km outside the fence is 250 m.
- The distance of 3.0-15.0 km is 500 m.

In addition, the study also used data of the height level of the area of SRTM3/SRTM1 to assess air quality. The study was specified as Elevated Terrain and considered additional receptor points affected by air substances. Sensitive receptors consisted hospitals, temples and schools located within the study area. The consideration was made to incorporate activities in each area, characteristics of land use, geographical coordinates and the trend of potential impacts from local meteorological conditions so that all this information could be used for consideration of the trend of air substances caused by the project that might directly affect the health of people living around the study area. The group of sensitive receptors affected from air substances consisted 21 representatives. Details are shown in **Table 5.1.1.1-1**.

(c) Use of existing data from ambient air quality monitoring

The consultants specified the use of existing data from ambient air quality monitoring for the assessment of impact on air quality of the study. The study used the highest values from monitoring stations or monitoring points where there were also receptor points as specified by the project. In absence of data from those points, the project used existing data from ambient air quality monitoring and noise level from the stations or the monitoring points near the receptor points. Details are as follows:

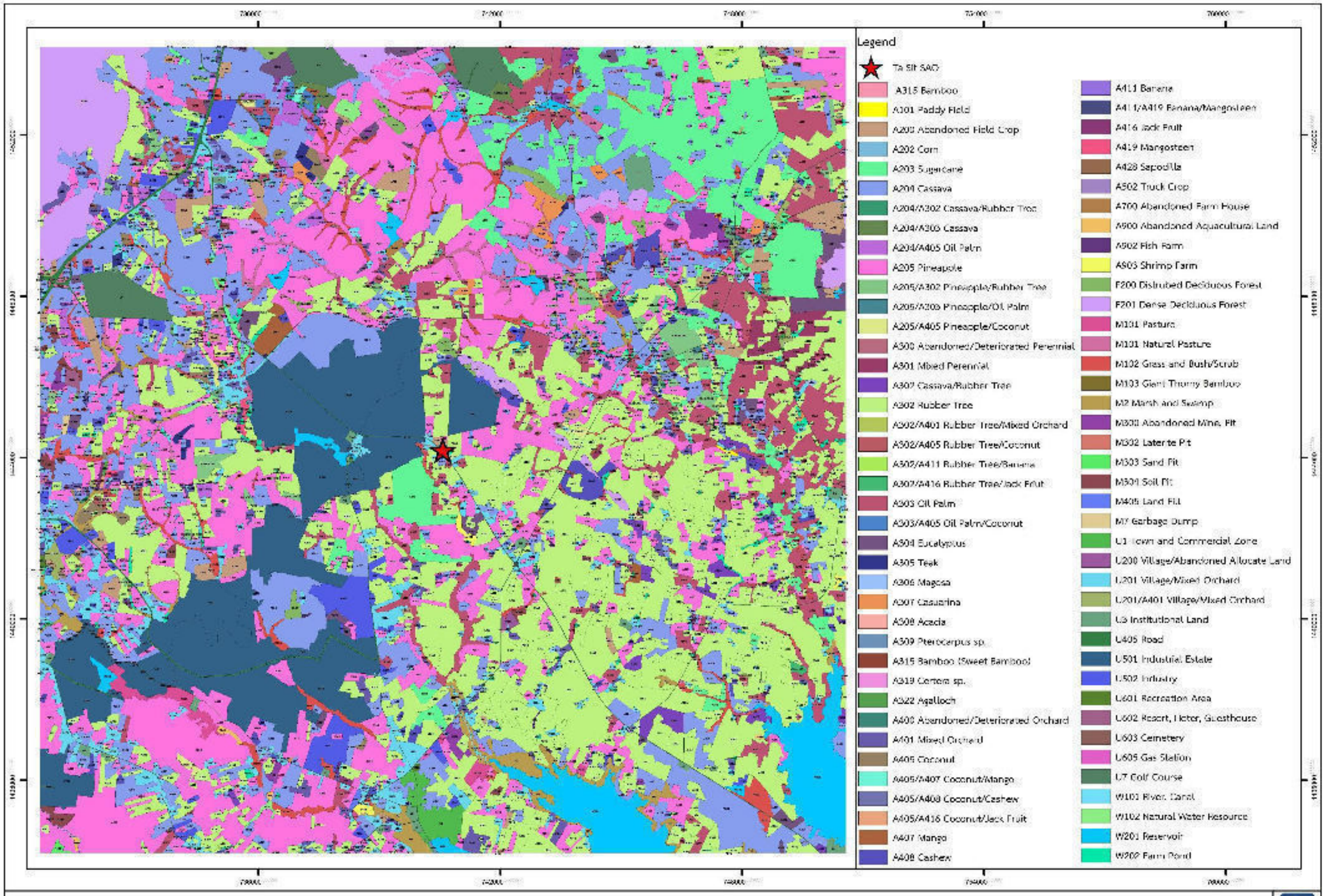


FIGURE 5.1.1.1-6 : THE LAND UTILIZATION IN THE AREA OF 10 KM X 10 KM AROUND AQMS TA SIT SAO STATION

TABLE 5.1.1.1-1

COORDINATE AND DISTANCE OF SENSITIVE AREA FROM EDGE OF PROJECT

No.	Sensitive area	Coordinate		Distance from edge of project (km) / direction
1	The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	0736670 E	1444193 N	0.72 km / NE
2	Ban Rawoeng School	0739465 E	1447937 N	4.15 km / NE
3	Ban Surasak School	0735513 E	1445160 N	1.70 km / NW
4	Chumchon Borisat Namtan Tawan-aok School	0738240 E	1443962 N	0.25 km / NE
5	Ban Khlong Kram School	0739608 E	1440828 N	2.70 km / SE
6	Wat Rawoeng Rangsan	0734481 E	1447753 N	4.00 km / NE
7	Wat Surasak	0734982 E	1445653 N	2.47 km / NW
8	Wat Chompon Chao Phraya	0738141 E	1442890 N	0.21 km / S
9	Wat Khlong Kram	0739585 E	1440745 N	2.77 km / SE
10	Wat Khao Noi	0742503 E	1441962 N	4.50 km / SE
11	Wat Sri Phumpo	0734479 E	1442349 N	2.99 km / SW
12	Moo 7 Ban Rawoeng, Khao Khansong Sub-district	0739638 E	1447844 N	4.77 km / NE
13	Moo 5 Ban Surasak, Khao Khansong Sub-district	0735432 E	1445557 N	3.23 km / NW
14	Moo 7 Ban Nong Kang Pla, Bowin Sub-district	0734933 E	1443371 N	2.90 km / W
15	Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	0736244 E	1446493 N	3.43 km / NW
16	Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	0740242 E	1440895 N	3.47 km / SE
17	Moo 1 Ban Khlong Kram, Ta Sit Sub-district	0739736 E	1440895 N	3.12 km / SE
18	Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	0738415 E	1444169 N	0.88 km / NE
19	Chompon Community, Chompon Chao Phraya Sub-district Municipality	0738514 E	1444249 N	1.00 km / NE
20	The Praow Village	0737840 E	1442928 N	0.08 km / S
21	The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	0738385 E	1444332 N	0.59 km / NE

(c.1) Highest values measured by the project which were conducted 2 times at each of the 5 monitoring stations during 4-11 February 2014 and 14-21 August 2014. The stations were the Child Development Center of Chomphon Chao Phraya Sub-district Municipality, Ban Khlong Kram School, Wat Rawoeng Rangsan and Ban Nong Kang Pla. The values are shown in **Table 5.1.1.1-2**.

Notably, while performing data monitoring, it was found that during 4-11 February 2014, land fill and land adjustment activities in the area had caused particles to disperse in the air. Consequently, the highest values of the existing data of 24 hr average total suspended particulates (TSP) and particulate matter less than 10 microns (PM-10) excluded 24 hr average TSP and PM-10 measured during the said period in the project area. Only data measured during 14-21 August 2014 was used. Details are shown in **Table 5.1.1.1-3**.

TABLE 5.1.1.1-2

RESULTS OF AMBIENT AIR QUALITY MEASUREMENT OF THE PROJECT

Monitoring Stations	Measurement Date	Concentration of Pollutants in Ambient Air (µg/m^3)				
		TSP Avg. 24 hr	PM-10 Avg. 24 hr	NO_2 Avg. 1 hr	SO_2 Avg. 24 hr	SO_2 Avg. 1 hr
Project Area	4-11/02/2014	128-220	58-99	21.08-42.15	5.24-6.29	6.03-11.27
	14-21/08/2014	35-153	21-81	27.10-47.23	4.45-5.24	4.98-7.08
The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	4-11/02/2014	71-129	43-67	18.82-31.80	4.72-6.29	7.34-11.53
	14-21/08/2014	40-61	27-41	18.63-30.67	4.45-5.76	5.24-7.86
Ban Khlong Kram School	4-11/02/2014	83-131	41-61	28.23-37.26	4.72-5.76	7.08-9.43
	14-21/08/2014	45-100	27-58	19.19-28.98	4.19-4.98	4.72-6.03
Wat Rawoeng Rangsan	4-11/02/2014	57-93	29-42	22.02-38.01	3.93-5.76	5.50-9.43
	14-21/08/2014	30-42	19-30	9.22-20.14	4.19-5.24	5.24-6.29
Ban Nong Kang Pla	4-11/02/2014	62-118	25-45	18.63-33.12	4.19-7.34	5.76-12.84
	14-21/08/2014	33-49	18-30	22.77-34.25	3.67-4.98	4.45-6.03
Standard		**330**[1/]	**120**[1/]	**320**[2/]	**300**[1/]	**780**[3/]

Remark : [1/] Notification of National Environment Board No.24 (B.E.2557) re: Standard of Ambient Air Quality

[2/] Notification of National Environment Board No.33 (B.E.2552) re: Standard of Nitrogen Dioxide in Ambient Air

[3/] Notification of National Environment Board No.12 (B.E.2538) re: Standard of 1 hr sulfur dioxide in Ambient Air

Source: Team Consulting Engineering and Management Co., Ltd., 2015

TABLE 5.1.1.1-3

HIGHEST VALUES FROM AMBIENT AIR QUALITY MONITORING NEAR THE PROJECT AREA

Monitoring stations	Concentration of substances in atmosphere (µg/ m^3)[1/]									
	NO_2 average 1 hr	NO_2 average 1 yr	SO_2 average 1 hr	SO_2 average 24 hr	SO_2 average 1 yr	TSP average 8 hr [2/]	TSP average 24 hr	TSP average 1 yr	PM-10 average 24 hr	PM-10 average 1 yr
Project area	47.23	7.69[2/]	11.27	6.29	1.93[2/]	190.60	153	47.01[2/]	81	24.89[2/]
the Child Development Center of Chomphon Chao Phraya Sub-district Municipality	31.80	5.18[2/]	11.53	6.29	1.93[2/]	160.70	129	39.64[2/]	67	20.59[2/]
Ban Khlong Kram School	37.26	6.06[2/]	9.43	5.76	1.77[2/]	163.19	131	40.25[2/]	61	18.74[2/]
Wat Rawoeng Rangsan	38.01	6.19[2/]	9.43	5.76	1.77[2/]	115.85	93	28.58[2/]	42	12.91[2/]
Ban Nong Kang Pla	34.25	5.57[2/]	12.84	7.34	2.26[2/]	147.00	118	36.26[2/]	45	13.832/
AQMS Ta Sit SAO	50.81	13.17	57.65	28.72	15.72	-	-	-	99.80	43.00
AQMS Hemaraj ESIE	102.63	15.44	106.91	56.06	11.26	212.85	170.86	49.15	102	33.92
Highest values	**102.63**	**15.44**	**106.91**	**56.06**	**15.72**	**212.85**	**170.86**	**49.15**	**102**	**43.00**
Standard values [3/]	**320**	**57**	**780**	**300**	**100**	**15,000**	**330**	**100**	**120**	**50**

Remark : 1/ Highest values from data monitoring at each station as follows.

- The project's monitoring stations including the Child Development Center of Chomphon Chao Phraya Sub-district Municipality, Ban Khlong Kram School, Wat Rawoeng Rangsan and Ban Nong Kang Pla: Using the highest values from data monitoring during 4-11 February 2014 and 14-21 August 2014. However, for 24 hr average TSP and PM-10, only data measured during 14-21 August 2014 was used because during 4-11 February 2014, land fill and adjustment activities were conducted.
- AQMS at Ta Sit Sub-district Administrative Organization: Using the highest values from data monitoring during 2010-2014. However, for 24 hr average PM-10, unusually high value was eliminated and used the next highest value instead.
- AQMS at Hemaraj ESIE : Used the highest values from data monitoring during 2012-2014. However, for 1 hr average NO_2 and 24 hr average TSP and PM-10, unusually high value was eliminated and used the next highest value instead.

2/ Calculated using an equation as follows:

$C_1/C_2 = (t_2/t_1)^n$ (Referenced from User's Manual on Air Pollution: Original and Control, 2nd Edition, Harper Collins Publisher, 1981)

when C_1 and C_2 = concentration value at t_1 and t_2 respectively

n = constant value equals 0.17-0.20 (n equals 0.2)

t_1 and t_2 = any period of time (minute)

- 1 yr average NO_2 calculated from 1 hr average NO_2 concentration
- 1 yr average SO_2 calculated from 24 hr average SO_2 concentration
- 8 hr average TSP calculated from 24 hr average TSP concentration
- 1 yr average TSP calculated from 24 hr average TSP concentration
- 1 yr average PM-10 calculated from 24 hr average PM-10 concentration

3/ Referenced from

- The National Environment Board's Notification No. 10 (B.E. 2538) and No. 24 (B.E.2547) re: Prescribing Ambient Air Quality Standards
- The National Environment Board's Notification No. 33 (B.E. 2552) re: Prescribing Ambient Nitrogen Dioxide Standards
- The National Environment Board's Notification No. 21 (B.E.2554) re: Prescribing Ambient 1 hr sulfur dioxide Standards
- OSHA Standard, Part title: Safety and health regulations for construction, Subpart title: Occupational health and environmental controls, Standard number 1926.55 App A

(c.2) The highest values from the Department of Pollution Control's AQMS at Ta Sit Sub-district Administrative Organization (SAO) which is located 2.7 km east-northeast (ENE) of the project area, retrieving from data monitoring for NO_2, SO_2 and PM-10 during 2010-2015, shown that most values were in accordance with the standard values, except 24 hr average PM-10 that exceeded the standard value. Details are as follows:

- 1 hr average NO_2 was between 0 – 50.81 µg/m^3
- 1 yr average NO_2 was between 7.53 – 13.17 µg/m^3
- 1 hr average SO_2 was between 0 – 57.65 µg/m^3
- 24 hr average SO_2 was between 0 – 28.72 µg/m^3
- 1 yr average SO_2 was between 2.62 – 15.72 µg/m^3
- 24 hr average PM-10 was between 0 – 152.33 µg/m^3
- 1 yr average PM-10 was between 33.4- 43.00 µg/m^3

Notably, information acquired from Khao Khansong Highway Unit revealed that there was a contract to expand traffic lanes from two lands to four lands on Highway 3574 from KM.22+700 to KM.29+800 where Ta Sit Sub-district Administrative Organization is situated which corresponded to data monitoring for PM-10 that was found higher than normal as shown in **Figure 5.1.1.1-7**. Therefore, the consultants eliminated such abnormal values and used the second highest value instead as shown in **Figure 5.1.1.1-8** and **Table 5.1.1.1-3**.

(c.3) The highest values from ambient air quality monitoring at Hemaraj ESIE's station which is located approximately 3 km north of the project area were of NO_2 SO_2 TSP and PM-10 during 2012-2014, which led to a conclusion that most of the values were in line with the standard, except 1 hr average NO_2 and 24 hr average PM-10 with the highest values exceeding the standard. Details are as follows.

- 1 hr average NO_2 was between 0 – 427.17 µg/m^3
- 1 yr average NO_2 was between 10.65 – 15.44 µg/m^3
- 1 hr average SO_2 was between 0 – 106.91 µg/m^3
- 24 hr average SO_2 was between 0 – 56.06 µg/m^3
- 1 yr average SO_2 was between 2.55 – 11.26 µg/m^3
- 24 hr average TSP was between 0 - 303 µg/m^3
- 1 yr average TSP was between 43.64 – 49.15 µg/m^3
- 24 hr average PM-10 was between 0 - 123 µg/m^3
- 1 yr average PM-10 was between 29.00 – 33.92 µg/m^3

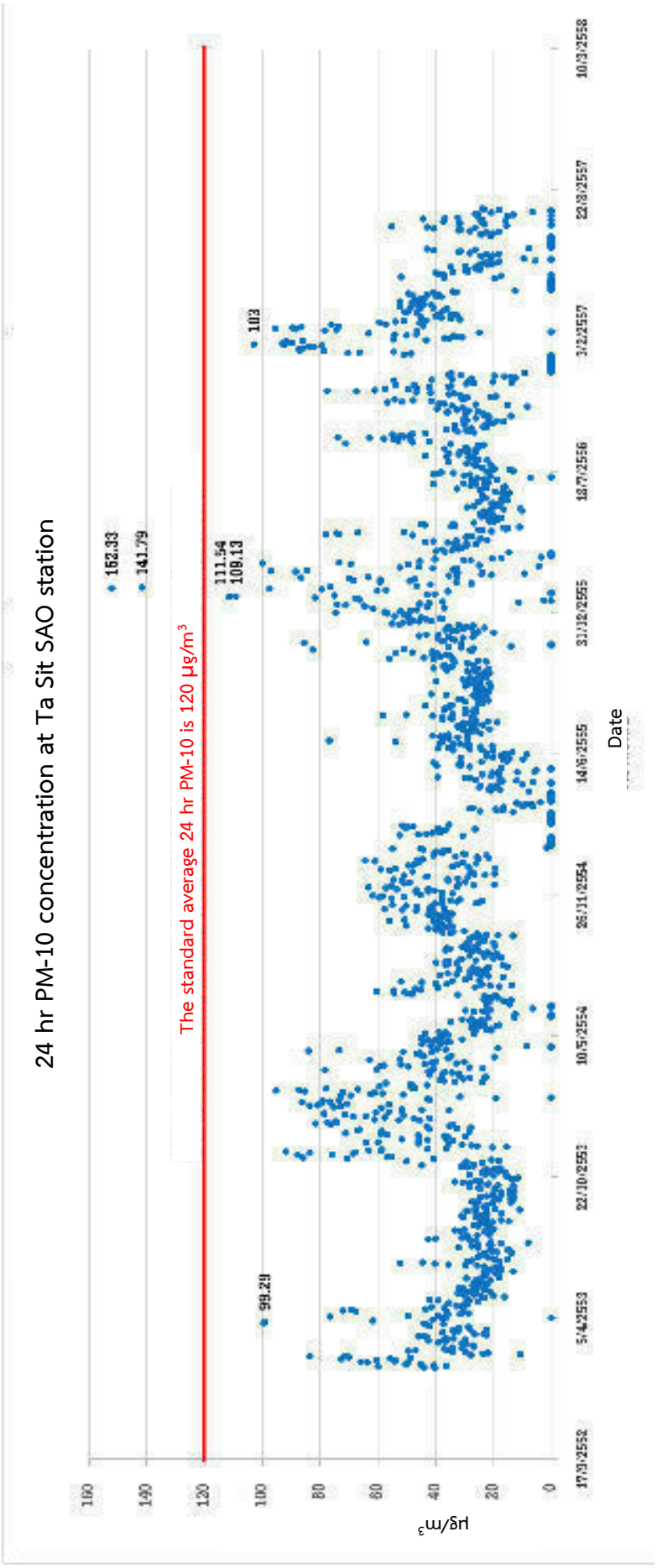


FIGURE 5.1.1.1-7 : THE 24 HR AVERAGE PM-10 CONCENTRATION AT THE TA SIT SAO STATION BETWEEN 2010-2014

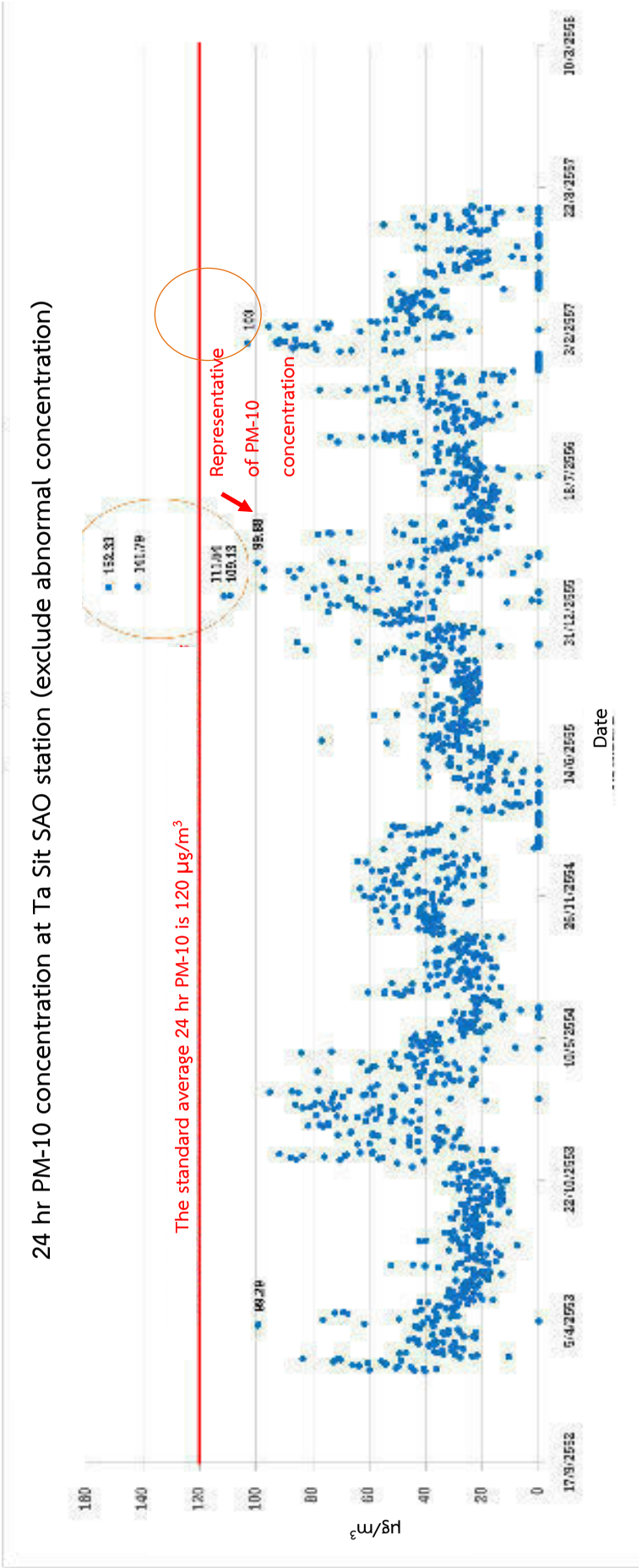


FIGURE 5.1.1.1-8 : THE 24 HR AVERAGE PM-10 CONCENTRATION AT THE TA SIT SAO STATION BETWEEN 2010-2014
(EXCLUDE ABNORMAL CONCENTRATION)

Notably, data monitoring for 1 hr average NO_2 and 24 hr average PM-10 revealed that values in some ranges were higher than normal as shown in **Figure 5.1.1.1-9** to **Figure 5.1.1.1-10**. Therefore, the consultants eliminated such abnormal values and used the second highest values instead as shown in **Figure 5.1.1.1-11** to **Figure 5.1.1.1-12** and **Table 5.1.1.1-3**.

Therefore, the study used the highest values at monitoring stations or monitoring points where they were also receptor points as specified by the project. For sensitive areas where there was no data monitoring, the project used data from the ambient air quality monitoring at the stations or the monitoring points near the receptor points. Details are summarized as shown in **Table 5.1.1.1-4**.

(d) Study results of construction period

Study results were divided into two cases, including before implementing measures and after implementing a measure (spraying water 2 times a day). The parameters used to assess the impact were 8 hr average, 24 hr average and 1 yr average TSP. The study found that the values of air quality in the general areas and the sensitive receptor areas were lower than ambient air quality standard value. Details are as follows:

- **8 hr average TSP**

Before implementing measures

The operation of the project resulted in the general areas having the highest 8 hr average TSP concentration, before implementing measures, at coordinates: 737978E 1443411N. The value was 346.22 µg/m^3 or 2.31% of the OSHA standard (8 hr average TSP must not exceed 15,000 µg/m^3). Details are shown in **Table 5.1.1.1-5**.

The above values when combined with the existing data (the highest value from the calculation of monitoring data, during 14-21 August 2014, on 24 hr average TSP adjusted to 8 hr average was 190.60 µg/m^3), the highest 8 hr average TSP concentration in the atmosphere was 536.82 µg/m^3 or 3.58 % of the OSHA standard as shown in **Table 5.1.1.1-5**.

After implementing a measure (spraying water 2 times a day)

The operation of the project resulted in the general areas having the highest 8 hr average TSP concentration, after implementing a measure (spraying water 2 times a day) at coordinates: 737978E 1443411N. The value was 173.11 µg/m^3 or 1.15 % of the OSHA standard. Details are shown in **Table 5.1.1.1-5**.

The above values when combined with the existing data (the highest value from the calculation of monitoring data, during 14-21 August 2014, on 24 hr average TSP adjusted to 8 hr average was 190.60 µg/m^3), the highest 8 hr average TSP concentration in the atmosphere was 363.71 µg/m^3 or 2.43 % of the OSHA standard as shown in **Table 5.1.1.1-5**.

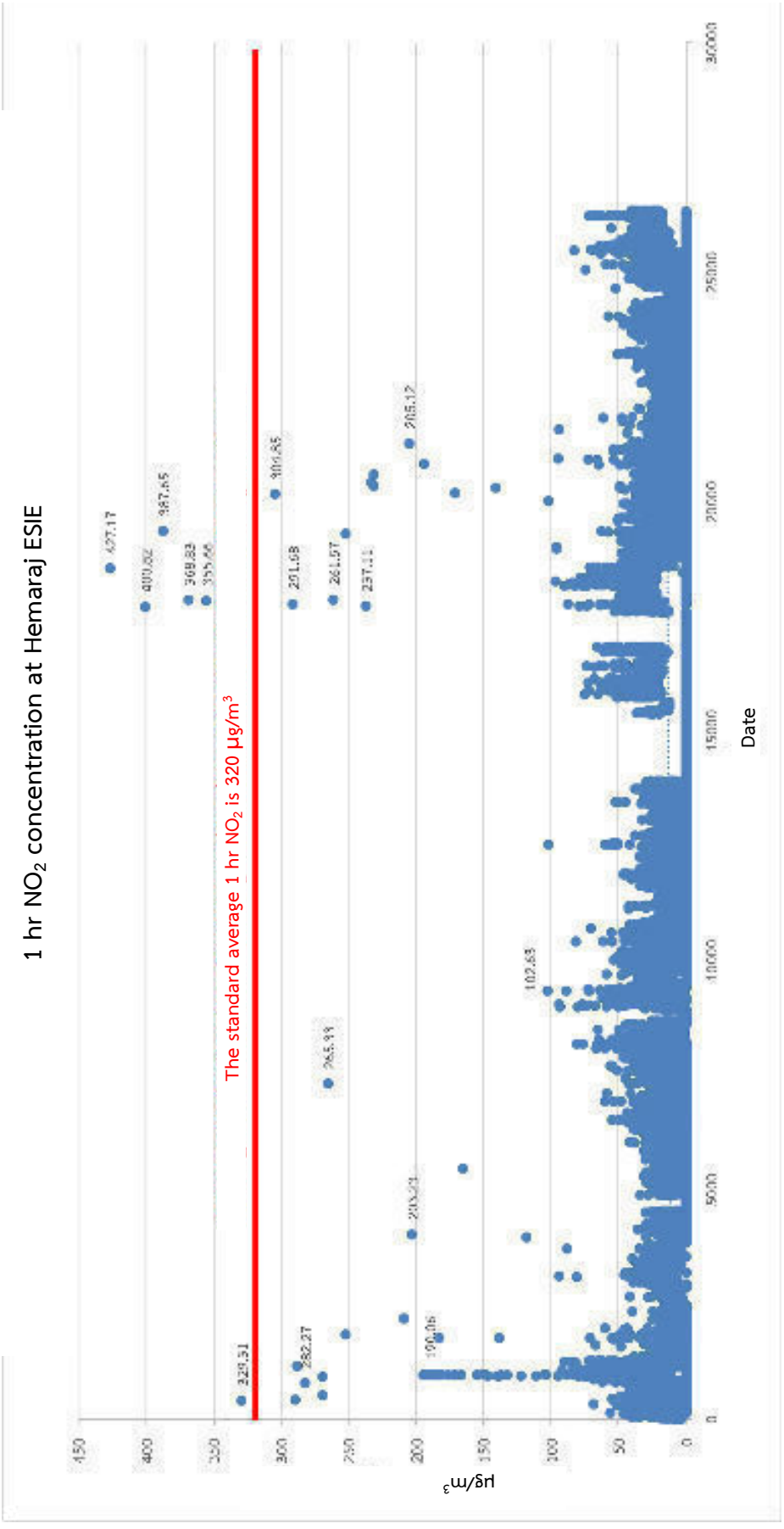


FIGURE 5.1.1.1-9 : THE 1 HR AVERAGE NO_2 CONCENTRATION AT AQMS HEMARAJ ESIE STATION BETWEEN 2012-2014

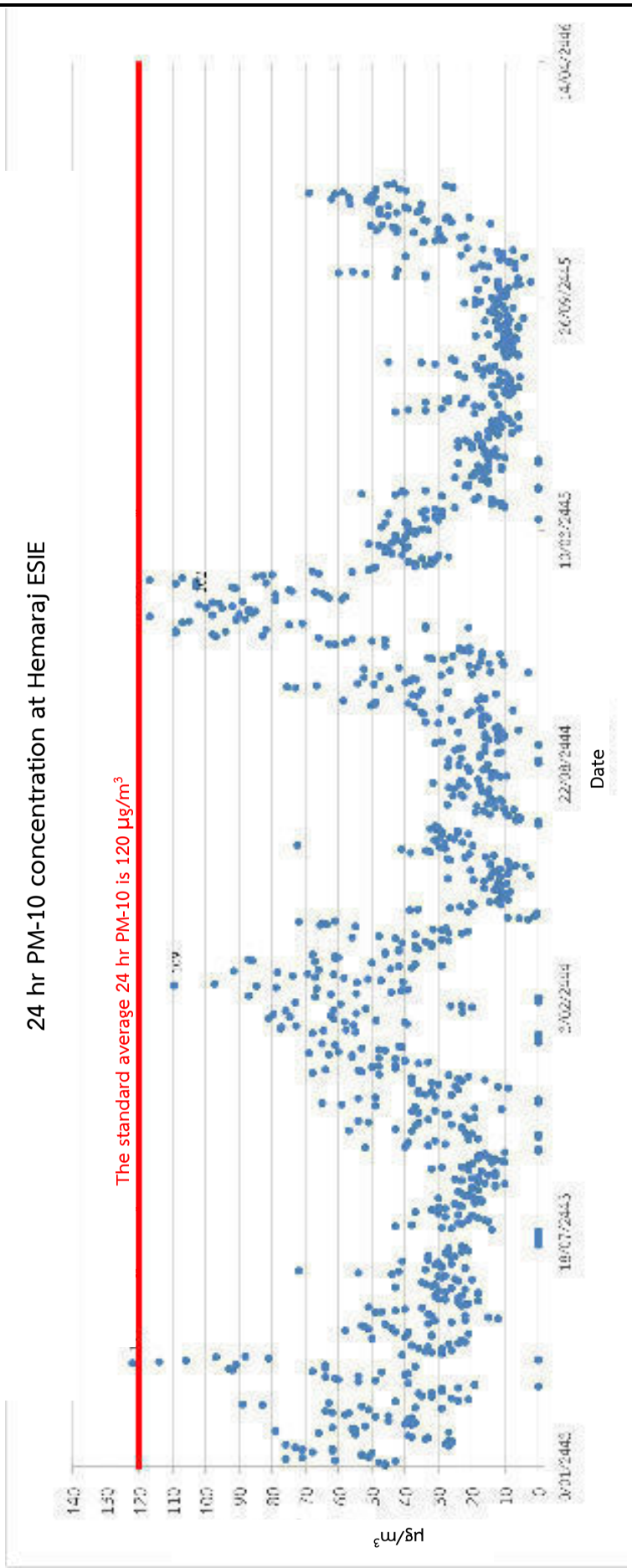


FIGURE 5.1.1.1-10 : THE 24 HR AVERAGE PM-10 CONCENTRATION AT AQMS HEMARAJ ESIE STATION BETWEEN 2012-2014

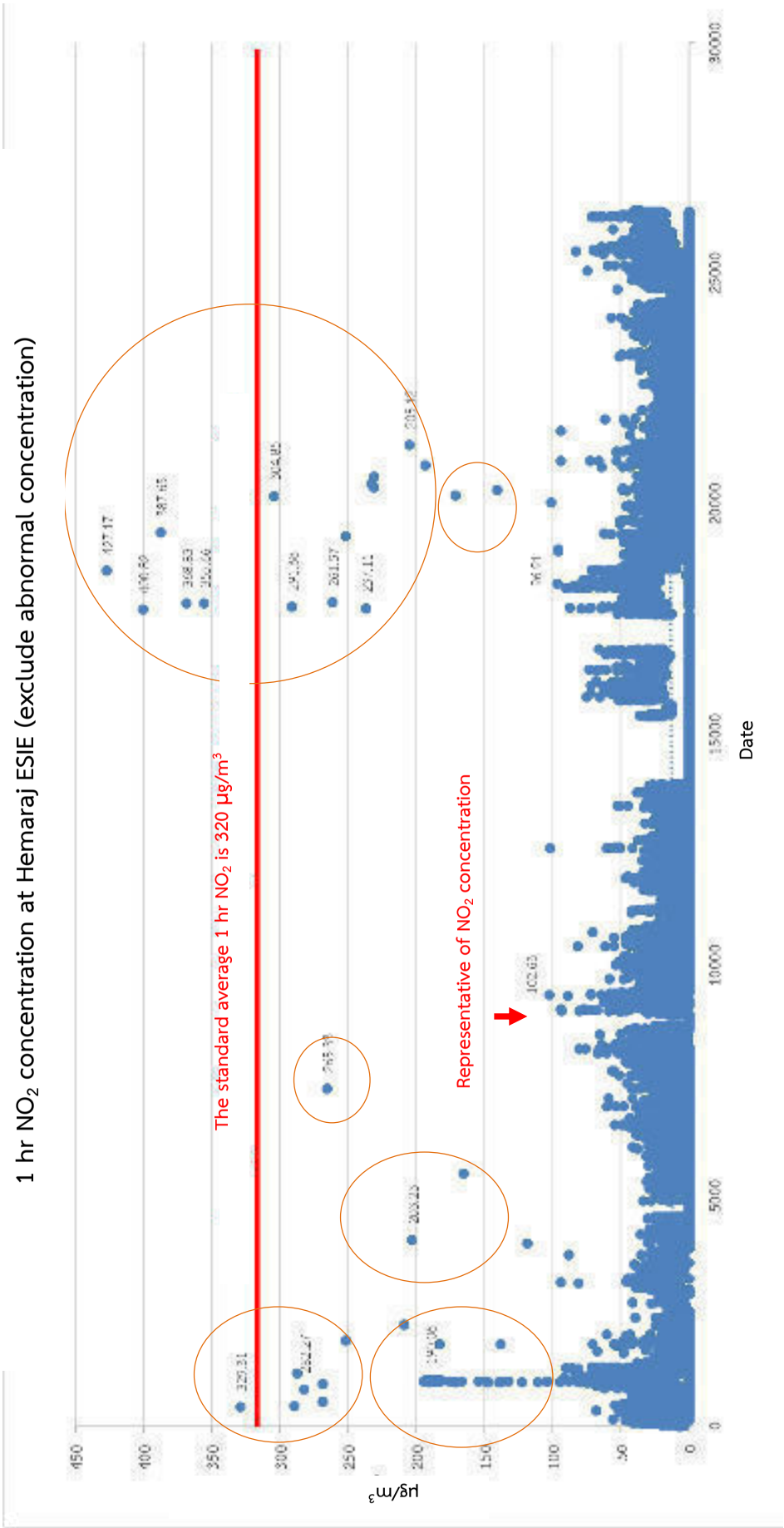


FIGURE 5.1.1.1-11 : THE 1 HR AVERAGE NO_2 CONCENTRATION AT AQMS HEMARAJ ESIE STATION BETWEEN 2012-2014 (EXCLUDE ABNORMAL CONCENTRATION)

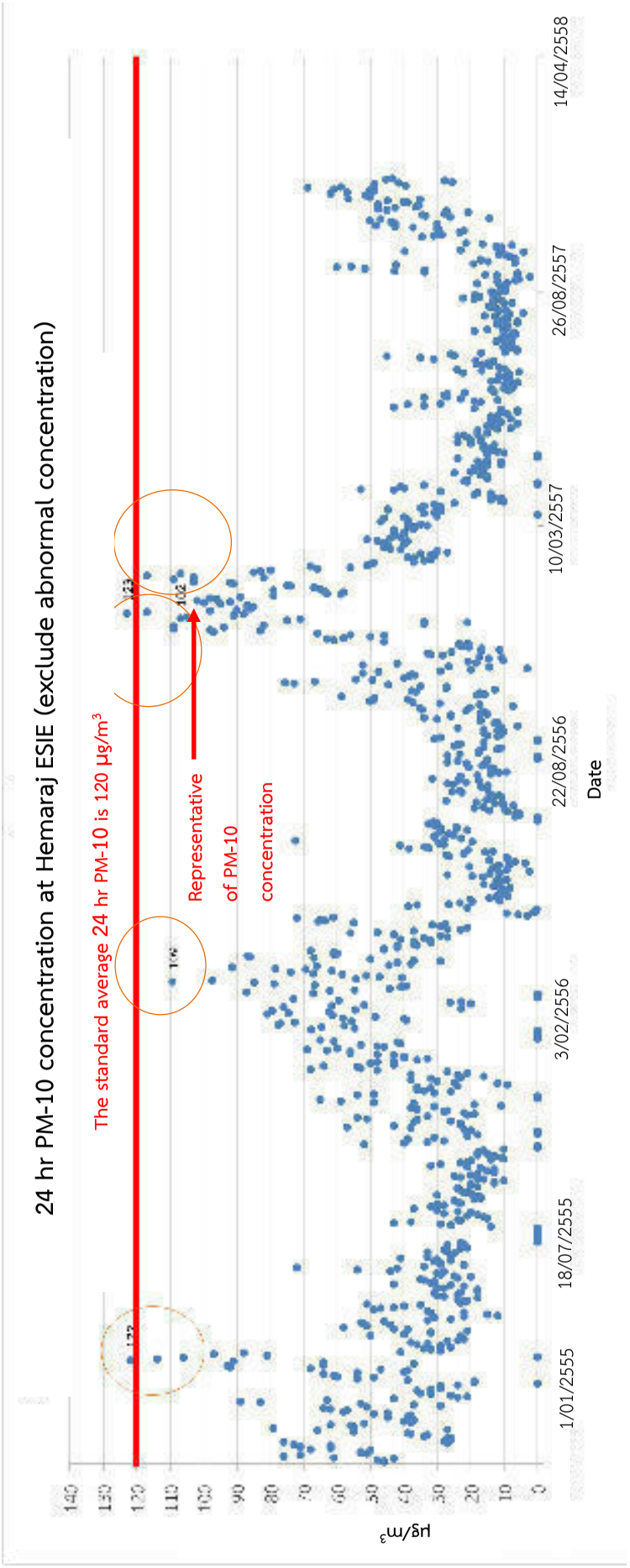


FIGURE 5.1.1.1-12 : THE 24 HR AVERAGE PM-10 CONCENTRATION AT AQMS HEMARAJ ESIE STATION BETWEEN 2012-2014 (EXCLUDE ABNORMAL CONCENTRATION)

TABLE 5.1.1.1-4

HIGHEST VALUE OF THE CURRENT AIR QUALITY MONITORING USED AS REPRESENTATIVE AT SENSITIVE RECEPTORS

Receptor	Monitoring station	Concentration of pollutant in ambient (µg/m³)									
		NO_2 average 1 hr	NO_2 average 1 yr [11/]	SO_2 average 1 hr	SO_2 average 24 hr	SO_2 average 1 yr [11/]	TSP average 8 hr [11/]	TSP average 24 hr	TSP average 1 yr [11/]	PM-10 average 24 hr	PM-10 average 1 yr [11/]
1. Ban Nong Kangkao Tambon Health Promoting Hospital	2/	31.80	5.18	11.53	6.29	1.93	160.70	129	39.64	67	20.59
2. Ban Rawoeng School	4/	38.01	6.19	9.43	5.76	1.77	115.85	93	28.58	42	12.91
3. Ban Surasak School	1/	47.23	7.69	11.27	6.29	1.93	190.60	153	47.01	81	24.89
4. Chumchon Borisat Namtan Tawan-aok School	2/	31.80	5.18	11.53	6.29	1.93	160.70	129	39.64	67	20.59
5. Ban Khlong Kram School	3/	37.26	6.06	9.43	5.76	1.77	163.19	131	40.25	61	18.74
6. Wat Rawoeng Rangsan	4/	38.01	6.19	9.43	5.76	1.77	115.85	93	28.58	42	12.91
7. Wat Surasak	1/	47.23	15.44	12.84	7.34	15.72	147.50	118	49.15	45	43.00
8. Wat Chompon Chao Phraya	1/	47.23	15.44	11.27	6.29	15.72	191.25	153	49.15	81	43.00
9. Wat Khlong Kram	3/	37.26	6.06	9.43	5.76	1.77	163.19	131	40.25	61	18.74
10. Wat Khao Noi	3/	37.26	6.06	9.43	5.76	1.77	163.19	131	40.25	61	18.74
11. Wat Sri Phumpo	5/	34.25	5.57	12.84	7.34	2.26	147.00	118	36.26	45	13.83
12. Moo 7 Ban Rawoeng, Khao Khansong Sub-district	4/	38.01	6.19	9.43	5.76	1.77	115.85	93	28.58	42	12.91

TABLE 5.1.1.1-4 (Cont'd)

HIGHEST VALUE OF THE CURRENT AIR QUALITY MONITORING USED AS REPRESENTATIVE AT SENSITIVE RECEPTORS

Receptor	Monitoring station	Concentration of pollutant in ambient (µg/m^3)									
		NO_2 average 1 hr	NO_2 average 1 yr [11/]	SO_2 average 1 hr	SO_2 average 24 hr	SO_2 average 1 yr [11/]	TSP average 8 hr [11/]	TSP average 24 hr	TSP average 1 yr [11/]	PM-10 average 24 hr	PM-10 average 1 yr [11/]
13. Moo 5 Ban Surasak, Khao Khansong Sub-district	1/	47.23	7.69	11.27	6.29	1.93	190.60	153	47.01	81	24.89
14. Moo 7 Ban Nong Kang Pla, Bowin Sub-district	5/	34.25	5.57	12.84	7.34	2.26	147.00	118	36.26	45	13.83
15. Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	6/	102.63	15.44	106.91	56.06	11.26	212.85	170.86	49.15	102	33.92
16. Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	3/	37.26	6.06	9.43	5.76	1.77	163.19	131	40.25	61	18.74
17. Moo 1 Ban Khlong Kram, Ta Sit Sub-district	3/	37.26	6.06	9.43	5.76	1.77	163.19	131	40.25	61	18.74
18. Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	2/	31.80	5.18	11.53	6.29	1.93	160.70	129	39.64	67	20.59

TABLE 5.1.1.1-4 (Cont'd)

HIGHEST VALUE OF THE CURRENT AIR QUALITY MONITORING USED AS REPRESENTATIVE AT SENSITIVE RECEPTORS

Receptor	Monitoring station	Concentration of pollutant in ambient (µg/m³)									
		NO_2 average 1 hr	NO_2 average 1 yr [11/]	SO_2 average 1 hr	SO_2 average 24 hr	SO_2 average 1 yr [11/]	TSP average 8 hr [11/]	TSP average 24 hr	TSP average 1 yr [11/]	PM-10 average 24 hr	PM-10 average 1 yr [11/]
19. Chompon Community, Chompon Chao Phraya Sub-district Municipality	2/	31.80	5.18	11.53	6.29	1.93	160.70	129	39.64	67	20.59
20. The Praow Village	1/	47.23	7.69	11.27	6.29	1.93	190.60	153	47.01	81	24.89
21. The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	2/	31.80	5.18	11.53	6.29	1.93	160.70	129	39.64	67	20.59
Standard		**320[7/]**	**57[7/]**	**780[8/]**	**300[9/]**	**100[9/]**	**15,000[10/]**	**330[9/]**	**100[9/]**	**120[9/]**	**50[9/]**

Remark : 1/ Project Area

2/ The Child Development Center of Chomphon Chao Phraya Sub-district Municipality

3/ Ban Khlong Kram school

4/ Wat Rawoeng Rangsan

5/ Ban Nong Kang Pla

6/ AQMS Hemaraj ESIE

7/ Ambient nitrogen dioxides in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)

8/ Ambient sulfur dioxides on 1 hour in accordance with the notification of National Environmental Committee Vol. 21 B.E.2544 (2001)

9/ Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 10 B.E.2538 (1995) and Vol. 24 B.E.2547 (2004)

10/ OSHA Standard, Part title: Safety and health regulations for construction, Subpart title: Occupational health and environmental controls, Standard number 1926.55 App A

11/ Concentration of 1 yr average NO_2, 1 yr average SO_2, 8 hr. average TSP, 1 yr average TSP, and 1 yr average PM-10 is value calculation, show as Table 5.1.1.1-3.

TABLE 5.1.1.1-5

ASSESSMENT RESULTS OF 8 HR AVERAGE TSP FROM PROJECT'S CONSTRUCTION ACTIVITIES

Details	Concentration of 8 hr average TSP (µg/m³)				
	Assessment results from using AERMOD model		Concentration value from data monitoring[2/]	Combining results of values from using model and data monitoring	
	Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]		Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]
Highest concentration value	346.22	173.11	190.60	536.82	363.71
Coordinates	737978E, 1443411N				
Area	Project area				
Direction and distance	-				
Land utilization	Industrial estate				
Standard[3/]	**15,000**				

Remark : 1/ Implementing a measure (spraying water 2 times a day at the construction area) reduced the amount of particles by 50 %.
(Source: National Pollution Inventory (NPI), Emission Estimation Technique Manual for Mining, Version 3.1, National Pollutant Inventory, Canberra, Australia, January 2012 : Table 4)

2/ Calculated from the highest 24 hr average TSP concentration from data monitoring in the project area during 14-21 August 2015 using equation $C_1/C_2 = (t_2/t_1)^n$ (Referenced to User's Manual on Air Pollution: Original and Control, 2nd Edition, Harper Collins Publisher (1981)
when C_1 and C_2 = concentration value at time t_1 and t_2 respectively
n = constant value equals 0.17-0.20 (n equals 0.2)
t_1 and t_2 = any period of time (minute)

3/ OSHA Standard, Part title: Safety and Health regulations for Construction, Subpart title. : Occupational health and environmental controls, Standard number 1926.55 App A

Source: Team Consulting Engineering and Management Co., Ltd., 2015

- **24 hr average TSP**

Before implementing measures

The operation of the project resulted in the general areas having the highest 24 hr average TSP concentration at coordinates: 737778E 1443511N. The value was 190.46 µg/m³ or 57.72 % of the ambient air quality standard (24 hr average TSP must not exceed 330 µg/m³. For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 2.20-23.64 µg/m³ or 0.67-7.16 % of the ambient air quality standard as shown in **Table 5.1.1.1-6**.

The above value when combined with the existing data, the highest 24 hr average TSP concentration in the atmosphere was 343.46 µg/m³ or 104.08 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 97.90-178.86 µg/m³ or 29.67-54.20 % of the ambient air quality standard as shown in **Table 5.1.1.1-6**.

TABLE 5.1.1.1-6

ASSESSMENT RESULTS OF 24 HR AVERAGE TSP FROM PROJECT'S CONSTRUCTION ACTIVITIES

Details	Concentration of 24 hr average TSP (µg/m^3)				
	Assessment results from using AERMOD model		Concentration value from data monitoring[3/]	Combining results of values from using model and data monitoring	
	Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]		Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]
Highest concentration value	190.46	95.23	153[2/]	343.46	248.23
Coordinates	737778E, 1443511N				
Area	Project area				
Direction and distance	-				
Land utilization	Industrial Estate				
Sensitive Area					
Ban Nong Kangkao Tambon Health Promoting Hospital	6.69	3.34	129	135.69	132.34
Ban Rawoeng School	4.90	2.45	93	97.90	95.45
Ban Surasak School	2.65	1.33	153	155.65	154.33
Chumchon Borisat Namtan Tawan-aok School	18.83	9.42	129	147.83	138.42
Ban Khlong Kram School	5.67	2.83	131	136.67	133.83
Wat Rawoeng Rangsan	5.35	2.68	93	98.35	95.68
Wat Surasak	2.20	1.10	118	120.20	119.10
Wat Chompon Chao Phraya	23.64	11.82	153	176.64	164.82
Wat Khlong Kram	5.40	2.70	131	136.40	133.70
Wat Khao Noi	2.28	1.14	131	133.28	132.14
Wat Sri Phumpo	3.52	1.76	118	121.52	119.76
Moo 7 Ban Rawoeng, Khao Khansong Sub-district	6.84	3.42	93	99.84	96.42
Moo 5 Ban Surasak, Khao Khansong Sub-district	2.58	1.29	153	155.58	154.29
Moo 7 Ban Nong Kang Pla, Bowin Sub-district	7.77	3.89	118	125.77	121.89
Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	8.00	4.00	170.86	178.86	174.86
Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	6.13	3.07	131	137.13	134.07
Moo 1 Ban Khlong Kram, Ta Sit Sub-district	4.98	2.49	131	135.98	133.49
Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	13.00	6.50	129	142.00	135.50

TABLE 5.1.1.1-6 (Cont'd)

ASSESSMENT RESULTS OF 24 HR AVERAGE TSP FROM PROJECT'S CONSTRUCTION ACTIVITIES

Details	Concentration of 24 hr average TSP (µg/m^3)				
	Assessment results from using AERMOD model		Concentration value from data monitoring[3/]	Combining results of values from using model and data monitoring	
	Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]		Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]
Chompon Community, Chompon Chao Phraya Sub-district Municipality	12.15	6.08	129	141.15	135.08
The Praow Village	14.30	7.15	153	167.30	160.15
The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	15.80	7.90	129	144.80	136.90
Standard	**330[4/]**				

Remark : [1/] Implementing a measure (spraying water 2 times a day at the construction area) reduced the amount of particles by 50 %.
(Source: National Pollution Inventory (NPI), Emission Estimation Technique Manual for Mining, Version 3.1, National Pollutant Inventory, Canberra, Australia, January 2012 : Table 4)
[2/] The highest values from monitoring at project area during 14-21 August 2015.
[3/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.
[4/] Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 24 B.E.2547 (2004)

Source : TEAM Consulting Engineering and Management Co., Ltd., 2015

After implementing a measure (spraying water 2 times a day)

The operation of the project resulted in the general areas having the highest 24 hr average TSP concentration, after implementing a measure (spraying water 2 times a day), at coordinates: 737778E, 1443511N. The value was 95.23 µg/m^3 or 28.86 % of the ambient air quality standard (24 hr average TSP must not exceed 330 µg/m^3. For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 1.10-11.82 µg/m^3 or 0.33-3.58 % of the ambient air quality standard as shown in **Table 5.1.1.1-6**.

The above value when combined with the existing data, the highest 24 hr average TSP concentration in the atmosphere was 248.23 µg/m^3 or 75.22 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 95.45-174.86 µg/m^3 or 28.92-52.99 % of the ambient air quality standard as shown in **Table 5.1.1.1-6**.

- **1 yr average TSP**

Before implementing measures

The operation of the project resulted in the general areas having the highest 1 yr average TSP concentration at coordinates: 737778E 1443511N, before implementing measures. The value was 0.009 µg/m^3 or 0.009 % of the ambient air quality standard (1 yr average TSP must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the 1 yr average TSP concentration in the atmosphere was between 0.000004-0.00032 µg/m^3 or 0.0000004-0.00032 % of the ambient air quality standard as shown in **Table 5.1.1.1-7**.

The above value when combined with the existing data, the highest 1 yr average TSP concentration in the atmosphere was 49.159 µg/m^3 or 49.159 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 28.58002-49.15004 µg/m^3 or 28.58002-49.15004 % of the ambient air quality standard as shown in **Table 5.1.1.1-7**.

After implementing a measure (spraying water 2 times a day)

The operation of the project resulted in the general areas having the highest 1 yr average TSP concentration, after implementing a measure (spraying water 2 times a day), at coordinates: 737778E, 1443511N. The value was 0.005 µg/m^3 or 0.005 % of the ambient air quality standard (1 yr average TSP must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the 1 yr average TSP concentration in the atmosphere was between 0.000002-0.000162 µg/m^3 or 0.000002-0.000162 % of the ambient air quality standard as shown in **Table 5.1.1.1-7**.

The above value when combined with the existing data, the highest 1 yr average TSP concentration in the atmosphere was 49.155 µg/m^3 or 49.155 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 28.58001-49.15002 µg/m^3 or 28.58001-49.15002 % of the ambient air quality standard as shown in **Table 5.1.1.1-7**.

(2) Operation period

During the operation period, the major impact will be from fuel combustion that releases substances through ventilation. The main substances, consisting total suspended particulates (TSP), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2), were discharged through Heat Recovery Steam Generator (HRSG). Accordingly, the project defined control values for substances released by the project in line with the actual conditions of operation in various cases. Details are as follows:

TABLE 5.1.1.1-7

ASSESSMENT RESULTS OF 1 YR AVERAGE TSP FROM PROJECT'S CONSTRUCTION ACTIVITIES

Details	Concentration of 1 yr average TSP (µg/m^3)				
	Assessment results from using AERMOD model		Concentration value from data monitoring[3/]	Combining results of values from using model and data monitoring	
	Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]		Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]
Highest concentration value	0.009	0.005	49.15[2/]	49.159	49.155
Coordinates	737778E, 1443511N				
Area	Project area				
Direction and distance	-				
Land utilization	Industrial Estate				
Sensitive Area					
Ban Nong Kangkao Tambon Health Promoting Hospital	0.00008	0.000042	39.64	39.64008	39.640042
Ban Rawoeng School	0.00002	0.000010	28.58	28.58002	28.580010
Ban Surasak School	0.00001	0.000006	47.01	47.01001	47.010006
Chumchon Borisat Namtan Tawan-aok School	0.00032	0.000162	39.64	39.64032	39.640162
Ban Khlong Kram School	0.00001	0.000003	40.25	40.25001	40.250003
Wat Rawoeng Rangsan	0.00002	0.000011	28.58	28.58002	28.580011
Wat Surasak	0.00001	0.000004	49.15	49.15001	49.150004
Wat Chompon Chao Phraya	0.00004	0.000019	49.15	49.15004	49.150019
Wat Khlong Kram	0.00001	0.000003	40.25	40.25001	40.250003
Wat Khao Noi	0.000004	0.000002	40.25	40.250004	40.250002
Wat Sri Phumpo	0.00002	0.000009	36.26	36.26002	36.260009
Moo 7 Ban Rawoeng, Khao Khansong Sub-district	0.00002	0.000011	28.58	28.58002	28.580011
Moo 5 Ban Surasak, Khao Khansong Sub-district	0.00001	0.000005	47.01	47.01001	47.010005
Moo 7 Ban Nong Kang Pla, Bowin Sub-district	0.00002	0.000010	36.26	36.26002	36.260010
Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	0.00001	0.000006	49.15	49.15001	49.150006
Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	0.00002	0.000009	40.25	40.25002	40.250009
Moo 1 Ban Khlong Kram, Ta Sit Sub-district	0.00000	0.000002	40.25	40.25000	40.250002
Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	0.00015	0.000074	39.64	39.64015	39.640074
Chompon Community, Chompon Chao Phraya Sub-district Municipality	0.00011	0.000057	39.64	39.64011	39.640057

TABLE 5.1.1.1-7 (Cont'd)

ASSESSMENT RESULTS OF 1 YR AVERAGE TSP FROM PROJECT'S CONSTRUCTION ACTIVITIES

Details	Concentration of 1 yr average TSP (µg/m^3)				
	Assessment results from using AERMOD model		Concentration value from data monitoring[3/]	Combining results of values from using model and data monitoring	
	Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]		Before implementing measures	After implementing a measure (spraying water 2 times/day)[1/]
The Praow Village	0.00009	0.000047	47.01	47.01009	47.010047
The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	0.00013	0.000067	39.64	39.64013	39.640067
Standard	100[4/]				

Remark : [1/] Implementing a measure (spraying water 2 times a day at the construction area) reduced the amount of particles by 50 %.
(Source: National Pollution Inventory (NPI), Emission Estimation Technique Manual for Mining, Version 3.1, National Pollutant Inventory, Canberra, Australia, January 2012 : Table 4)

[2/] Reference **Table 5.1.1.1-3** Highest values from ambient air quality monitoring near the project area.

[3/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.

[4/] Ambient nitrogen dioxides in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)

Source : TEAM Consulting Engineering and Management Co., Ltd., 2015

(2.1) Model selection

To select a mathematical model to assess long-term impact on climate, the consultants selected AERMOD Version 8.9, which is the latest version. Details on the preparation of data to be put into the model are shown in the section on assessment of air quality during the construction period.

(2.2) Emission Source Data

Sriracha Power Plant uses natural gas as its primary fuel and diesel as a backup source. The process releases air substances through HRSG's 4 stacks, each is 60 m high from the ground level with a diameter of 7.01 m. One of the major substances released through the production process is nitrogen oxides (NO_X), which will be controlled to keep the amount of the substance under the standard value. The project uses Dry Low

NO_X (DLN) for electricity production with natural gas while a water injection system will be used if the electricity production uses diesel. Besides, the additional installation of Selective Catalytic Reduction (SCR) helps to control the amount of nitrogen oxides (NO_X) before releasing through HRSG's stacks. The consultants also considered the emission of sulfur dioxide (SO_2) and total suspended particulates (TSP) which may disperse and cause negative impact to nearby communities. Emission source data to be put into the model include:

- Stack location of each emission source
- Stack height (m)
- Stack diameter (m)
- Exit temperature (K)
- Exit velocity (m/s)
- Emission rate (g/s)

The consultants modelled the project's impact assessment to include existing data from ambient air quality monitoring using the highest values from monitoring stations or monitoring points where there were also receptor points as specified by the project. For sensitive areas where there was no data, the project used data from ambient air quality monitoring from the stations or the monitoring points near the receptor points (**Table 5.1.1.1-4**) in 6 scenarios. The assessment was based on the highest capacity at 100 % load and the minimum operation (60 % load for production with natural gas and 69 % load for production with diesel). Details are as follows:

- Scenario 1: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load.
- Scenario 2: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 60 % load.
- Scenario 3: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.

- Scenario 4: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load.
- Scenario 5: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 69 % load.
- Scenario 6: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.

To support the prediction for the environmental impact assessment on air quality after the development of the project, the project also used data from emission sources at other industrial projects within the study area that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location. Details of sources and status of the projects are shown in **Table 5.1.1.1-8**. There are 2 groups as follows:

(1) Other industrial projects within the study area that have been approved in the environmental impact assessment report but have not yet released any air substance are limited to power plants. They are 5 power plants operated by Gulf Group Company, a power plant project operated by Glow Energy PLC, a natural gas power plant project operated by Amata B.Grimm Power (Rayong) 3 Limited and a natural gas power plant project operated by Amata B.Grimm Power (Rayong) 4 Limited.

(2) Gulf Group Company's power plant project under a study for an environmental impact report is Pluak Daeng Power Plant located within the radius of 15 km from the project location.

Regarding the result of the assessment of impact of PM-10 during the project operation in both cases of using natural gas and using diesel as fuel, together with the results from the assessment of current impact by other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location which

consist 9 natural gas power plants, the consults accordingly established hypotheses regarding particle sources to put into the model, consisting 2 components.

- The amount of particle at power plants that use natural gas as fuel was based on an assumption that ratio of PM-10/TSP equals 1.00.
- The amount of particle at power plants that use diesel as fuel was based on an assumption that ratio of PM-10/TSP equals 0.82 (referenced from AP-42: Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines).

Details of sources and substance emission values are shown in **Table 5.1.1.1-9** to **Table 5.1.1.1-10** and **Figure 5.1.1.1-13.**

In addition, the consultants considered data for emission stack design according to Good Engineering Practice (GEP) and Guidelines for Determination of Good Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised) U.S.EPA (1985), using an equation as follows.

$$Hg = H+1.5L \quad (1)$$

When Hg = appropriate stack height (m)

H = nearby building's height (m)

L = consider the minimum value between the width of nearby building and the height of nearby building (m)

TABLE 5.1.1.1-8

DETAILS OF SOURCES AND STATUS OF THE INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASED ANY AIR SUBSTANCE AND THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION.

Pollutant sources	Generating capacity (MW)	Project owners	Project location	Project status	Sources of information
Wang Ta Phin Power Plant	137	Gulf VTP Company Limited	Eastern Seaboard Industrial Estate	Approved by ONEP and construction has begun	Report on changes of project details in the report on environmental impact analysis of Eastern Seaboard Industrial Estate Project (Rayong), Eastern Seaboard Industrial Estate Company (Rayong)
Ta Sit Power Plant 1	137	Gulf TS1 Company Limited	Eastern Seaboard Industrial Estate	Approved by ONEP and construction has begun	
Ta Sit Power Plant 2	137	Gulf TS2 Company Limited	Eastern Seaboard Industrial Estate	Approved by ONEP and construction has begun	
Ta Sit Power Plant 3	137	Gulf TS3 Company Limited	Hemaraj Eastern Seaboard Industrial Estate	Approved by ONEP but construction has not begun	Report on changes of project details in the 2nd report on environmental impact analysis of Hemaraj Eastern Seaboard Industrial Estate Project, Hemaraj Eastern Seaboard Industrial Estate Company Limited
Ta Sit Power Plant 4	137	Gulf TS4 Company Limited	Hemaraj Eastern Seaboard Industrial Estate	Approved by ONEP but construction has not begun	
Pluak Daeng Power Plant	2,650	Gulf PD Company Limited	Rojana Industrial Park Pluak Daeng	Has been being studied on environmental impact	Gulf PD Company Limited
Glow Power Plant	1,126	Glow Hemaraj Power Company Limited	Hemaraj Eastern Seaboard Industrial Estate	Approved by ONEP but construction has not begun	Certificate for emission rates of air substances of Combined Cycle Power Plant Project, Glow Hemaraj Power Company in Hemaraj Eastern Seaboard Industrial Estate (Rayong), issued on 5 November 2015
Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 3 Limited	142.1	Amata B.Grimm Power (Rayong) 3 Limited	Amata City Industrial Estate (Rayong)	Approved by ONEP but construction has not begun	Report on environmental impact analysis of Natural Gas Power Plant Project, Amata B.Grimm Power (Rayong) 3 Limited
Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 4 Limited	142.1	Amata B.Grimm Power (Rayong) 4 Limited	Amata City Industrial Estate (Rayong)	Approved by ONEP but construction has not begun	Report on environmental impact analysis of Natural Gas Power Plant Project, Amata B.Grimm Power (Rayong) 4 Limited

TABLE 5.1.1.1-9

POLLUTANT EMISSION RATE FROM THE PROJECT

Details	Unit	Natural Gas		Diesel Oil		Standard[1],[2]		Hemaraj ESIE enforces [3]	
		100% load	60% load	100% load	69% load	Natural Gas	Diesel Oil	Natural Gas	Diesel Oil
Capacity	MW	625	375	455.2	375				
Stack number	ปล่อง	4	4	4	4				
Stack height	m	60	60	60	60				
Stack diameter (inner)	m	7.01	7.01	7.01	7.01				
Temperature at end of stack	°C	82.4	75.3	148.0	143.7				
Speed at end of stack	m/s	23.5	16.2	27.5	22.9				
Excessive O_2 (operation condition/dry)	Vol %	11.99	12.82	13.41	13.38				
Stack end air quantity (dry condition)	m^3/s	612.8	433.9	615.3	518.3				
Pollutant concentration									
– NO_x as NO_2 @ 7 % O_2	ppmvd	24.8	24.8	29.4)	29.4	120	180	25	30
– SO_x as SO_2 @ 7 % O_2	ppmvd	5.5	5.5	20	20	20	260	14	28
– TSP @ 7 % O_2	mg/m^3	20	20	35	35	60	120	32	44
Pollutant emission rate/ Stack									
– NO_2	g/s	20.00	12.84	20.00	16.92			20	20
– SO_2	g/s	6.17	3.96	18.95	16.02			15.79	25.79
– TSP	g/s	7.86	5.04	11.60	9.81			12.35	14.22
Air Pollutant Control System		Dry Low NO_x Combustion		Water Injection System					
		Selective Catalytic Reduction (SCR)							

Remark : (1) standard value according to the notification of the Ministry of Natural Resource and Environment for the controlling standard of air pollutant emission of new power plant dated 20 December B.E.2552 (2008)

(2) standard value according to the Notification of the Ministry of Industry B.E.2547 (2004) for pollutant emission from power plant or electricity distribution

(3) The Hemaraj Eastern Seaboard Industrial Estate enforces emission standards for IPP as stipulated in environmental impact mitigation and preventive measures Plan included in the Project Detail Modification Report under the Hemaraj Eastern Seaboard Industrial Estate Environment Impact Assessment Report No.2, 2015

Source : Gulf SRC Co., Ltd. 2015.

TABLE 5.1.1.1-10

SOURCE DATA AND POLLUTANT EMISSION RATE FROM THE OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASED ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

Industrial's Name	Source	Stack		Temperature at end of stack (°K)	Speed at end of stack (m/s)	Pollutant emission rate			
		Height (m)	Diameter (m)			NO_2 (g/s)	SO_2 (g/s)	TSP (g/s)	PM-10 (g/s)
1. Pluak Daeng Power Plant [1/]									
(Natural Gas)	HRSG 1	60	7.01	356	24.0	57.8	15.79	12.35	12.35
	HRSG 2	60	7.01	356	24.0	57.8	15.79	12.35	12.35
	HRSG 3	60	7.01	356	24.0	57.8	15.79	12.35	12.35
	HRSG 4	60	7.01	356	24.0	57.8	15.79	12.35	12.35
(Diesel Oil)	HRSG 1	60	7.01	421	27.5	75	25.79	14.22	11.66
	HRSG 2	60	7.01	421	27.5	75	25.79	14.22	11.66
	HRSG 3	60	7.01	421	27.5	75	25.79	14.22	11.66
	HRSG 4	60	7.01	421	27.5	75	25.79	14.22	11.66
2. Ta Sit Power Plant 1 [2/]	HRSG 1	40	3.00	373	19.6	7.4	1.0	1.8	1.8
	HRSG 2	40	3.00	373	19.6	7.4	1.0	1.8	1.8
3. Ta Sit Power Plant 2 [2/]	HRSG 1	40	3.00	373	19.6	7.4	1.0	1.8	1.8
	HRSG 2	40	3.00	373	19.6	7.4	1.0	1.8	1.8
4. Ta Sit Power Plant 3 [3/]	HRSG 1	40	3.00	373	19.6	7.4	1.0	1.8	1.8
	HRSG 2	40	3.00	373	19.6	7.4	1.0	1.8	1.8
5. Ta Sit Power Plant 4 [3/]	HRSG 1	40	3.00	373	19.6	7.4	1.0	1.8	1.8
	HRSG 2	40	3.00	373	19.6	7.4	1.0	1.8	1.8
6. Wang Ta Phin Power Plant [2/]	HRSG 1	40	3.00	373	19.6	7.4	1.0	1.8	1.8
	HRSG 2	40	3.00	373	19.6	7.4	1.0	1.8	1.8
7. Hemaraj Glow Power Co., Ltd. [4/]	HRSG 1	50	6.5	373	22.61	74.4	0	0	0
	HRSG 2	50	6.5	373	22.61	74.4	0	0	0
	HRSG 3	50	6.5	373	22.61	74.4	0	0	0

TABLE 5.1.1.1-10

SOURCE DATA AND POLLUTANT EMISSION RATE FROM THE OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASED ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION (Cont'd)

Industrial's Name	Source	Stack		Temperature at end of stack (°K)	Speed at end of stack (m/s)	Pollutant emission rate			
		Height (m)	Diameter (m)			NO_2 (g/s)	SO_2 (g/s)	TSP (g/s)	PM-10 (g/s)
8. Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 3 Limited 5/	HRSG 1	45	3.03	376.15	19.40	7.33	1.70	1.30	1.30
	HRSG 2	45	3.03	376.15	19.40	7.33	1.70	1.30	1.30
9. Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 4 Limited 6/	HRSG 1	45	3.03	376.15	19.40	7.33	1.70	1.30	1.30
	HRSG 2	45	3.03	376.15	19.40	7.33	1.70	1.30	1.30

Source : 1/ Gulf PD Co., Ltd. 2015

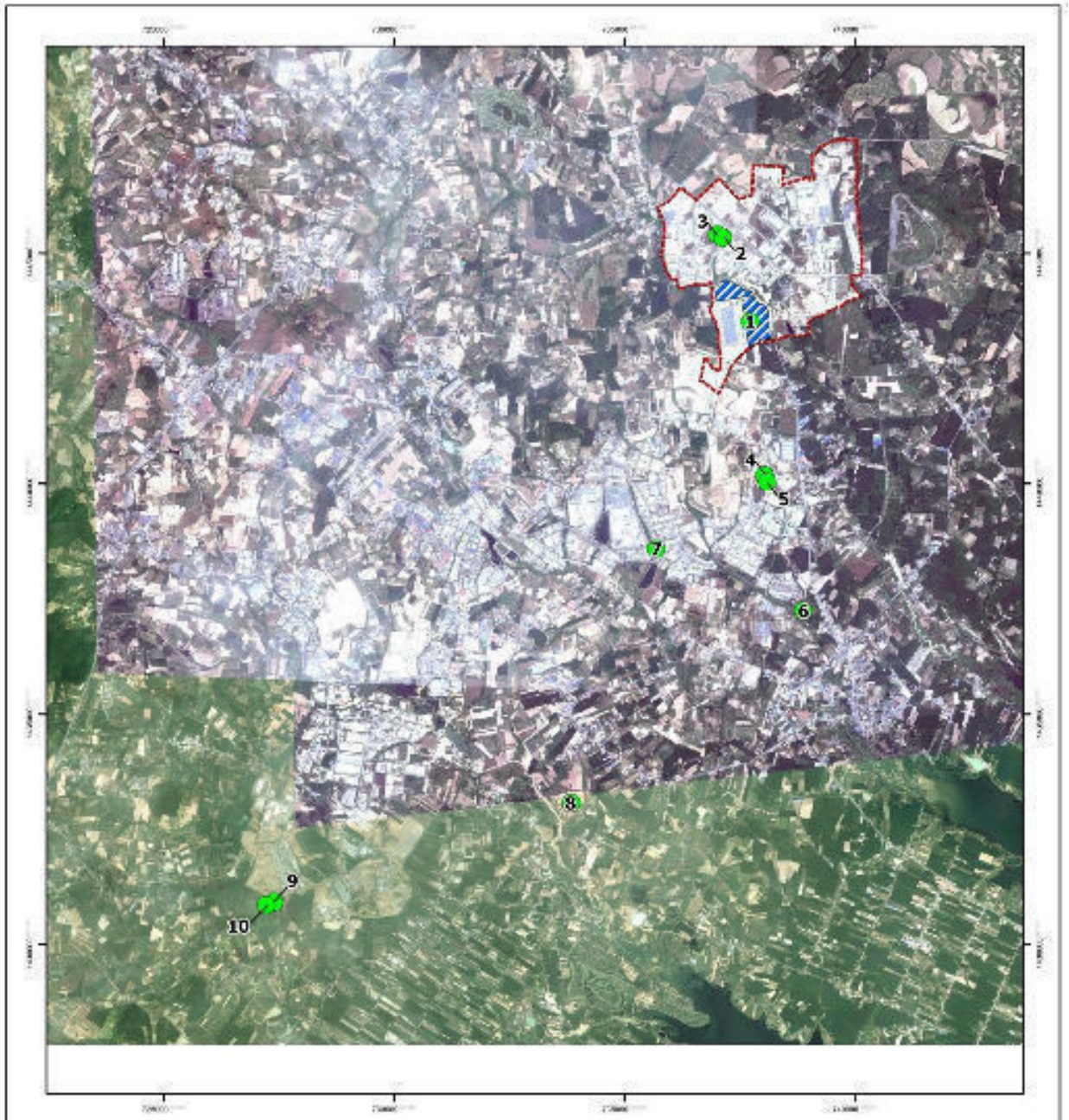
2/ The Project Detail Modification Report under the Eastern Seaboard Industrial Estate (Rayong) Environment Impact Assessment Report No.2 of Eastern Seaboard Industrial Estate (Rayong) Co., Ltd., 2015

3/ The Project Detail Modification Report under the Hemaraj Eastern Seaboard Industrial Estate Environment Impact Assessment Report No.2 of Hemaraj Eastern Seaboard Industrial Estate Co., Ltd., 2015

4/ Pollutant emission rate Guarantee of Cogeneration Power Plant Project of Hemaraj Glow Power Co., Ltd. in Hemaraj Eastern Seaboard (Rayong), 5 November 2014.

5/ Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 3 Limited Environmental Impact Assessment Report (Final Report), 2014

6/ Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 4 Limited Environmental Impact Assessment Report (Final Report), 2014



Project Area

Hemaraj Eastern Seaboard Industrial Estate

Stack Locations:

1. Sriracha Power Plant x 4 stacks.
2. Ta Sit Power Plant 4 x 2 stacks.
3. Ta Sit Power Plant 3 x 2 stacks.
4. Ta Sit Power Plant 1 x 2 stacks.
5. Ta Sit Power Plant 2 x 2 stacks
6. Glow Hemaraj Power x 3 stacks.
7. Wang Ta Phin Power Plant x 2 stacks.
8. Pluak Daeng Power Plant x 4 stacks.
9. Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 4 Limited x 2 stacks.
10. Natural Gas Power Plant, Amata B.Grimm Power (Rayong) 3 Limited x 2 stacks.

FIGURE 5.1.1.1-13 : AIR POLLUTANT SOURCE LOCATION FOR MODEL

Regarding the emission stack of Heat Recovery Steam Generator (HRSG), it was found that in the vicinity, the HRSG building is about 28 m high and 25.12-m wide. When replace the value of (1), result equals to:

$$Hg = 28\ m + (1.5 \times 25.12\ m)$$
$$= 65.68\ m$$

However, the height of the Project's emission stack is 60 m which is not in line with the criteria. The consultants made further assessment of the impact from the emission of air substances of all 6 scenarios in conjunction with occurrence of downwash. The scenarios for the assessment of impact on air quality of all the projects consist of the following:

1) Normal circumstance (with no influence from downwash)

- Scenario 1: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load.
- Scenario 2: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 60 % load.
- Scenario 3: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.
- Scenario 4: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load.
- Scenario 5: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 69 % load.
- Scenario 6: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.

2) Circumstance with influence of downwash

- Scenario 1: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load.
- Scenario 2: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 60 % load.
- Scenario 3: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.
- Scenario 4: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load.
- Scenario 5: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 69 % load.
- Scenario 6: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.

(2.3) Study results of operation period

For the prediction of the concentration of nitrogen dioxide in the atmosphere caused by project development and the operation of other industrial factories in the study area, the consultants specified the values for Conversion Factor of NO_2/NO_X by using PVMRM assessment method because the concentration of ozone gas by the Department of Pollution Control's AQMS at Ta Sit Sub-district Administrative Organization was monitored hourly and used data during 2012-2014.

Equilibrium NO_2/NO_X Ratio equals to 0.90 while In-stack NO_2/NO_X Ratio of the power plant projects that use natural gas as fuel equals to 0.091 (referenced from Gas Turbine: Modeling Compliance of The Federal 1-Hour NO_2 NAAQS, The California Air

Pollution Control Officers Association (CAPCOA), 2011) [1]. NO_2/NO_X Ratio of the power plants that use diesel as fuel equals to 0.50 (referenced to default values in accordance with the use of the model to assess the distribution of air pollution).

Results from the assessment on ambient air quality using mathematical model AERMOD to find the 1 hr average NO_2 concentration and 1 yr average NO_2 concentration, the 1 hr average SO_2 concentration and 24 hr average SO_2 concentration and 24 hr average TSP concentration, 1 yr average TSP concentration, 24 hr average PM-10 concentration and 1 yr average PM-10 concentration in correspondence with the air quality standard, shows that the values of the air quality in the general areas and sensitive receptor areas were lower than the values of ambient air quality standard in all indices. Details are as follows:

[1] Petrochemical Division, Office of National Resources and Environmental Policy and Planning B.E. 2557 "Instack NO_2/NO_X of air pollution source from industrial factories in Map Ta Phut, Mueang Rayong District, Rayong Province (EMISSION SOURCES DATA IN MAP TA PHUT AREA) used as Air Modeling"

1) Normal circumstance (with no influence of downwash)

(a) Scenario 1: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load

- **1 hr average and 1 yr average NO_2**

NO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average NO_2 concentration at 10.34 km north-northwest (NNW) of the project at coordinates: 731878E 1452011N where Nam Jone Mountain is located. The value was 71.52 µg/m^3 or 22.35 % of the ambient air quality standard (1 hr average NO_2 must not exceed 320 µg/m^3). For 21 sensitive receptor areas, the 1 hr average NO_2 concentration in the atmosphere was between 11.67-22.74 µg/m^3 or 3.65-7.11 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-14**.

When combining the above with the highest value from the current measurement, the highest 1 hr average NO_2 concentration in the atmosphere was 175.15 µg/m^3 or 54.42 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 47.40-125.37 µg/m^3 or 14.81-39.18 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

The highest 1 yr average NO_2 concentration was found 0.81 km northeast (NE) of the project area at coordinates: 738278E 1444211N where it is a vacant area within Hemaraj ESIE. The value was 1.67 µg/m^3 or 2.93 % of the ambient air quality standard (NO_2 1 yr average must not exceed 57 µg/m^3). For 21 sensitive receptor areas, the 1 yr average NO_2 concentration in the atmosphere was between 0.55-1.65 µg/m^3 or 0.97-2.90 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-15**.

When combining the above with the highest value from the current measurement, the highest 1 yr average NO_2 concentration in the atmosphere was 17.11 µg/m^3 or 30.02 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 6.35-16.61 µg/m^3 or 11.14-29.14 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

TABLE 5.1.1.1-11

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 1: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100 % LOAD

Unit : µg/m^3

Study Area	Highest concentration value from results of assessment, case 1																										
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
Highest concentration value	71.52	102.63[1/]	174.15	1.67	15.44[1/]	17.11	62.21	106.91[1/]	169.12	9.28	56.06[1/]	65.34	1.14	15.72[1/]	16.86	11.82	170.86[1/]	182.68	1.45	49.15[1/]	50.60	11.82	102[1/]	113.82	1.45	43[1/]	44.45
Coordinates	731878E, 1452011N			738278E, 1444211N			731878E, 1452011N			731878E, 1453011N			732378E, 1454511N			731878E, 1453011N			732378E, 1454511N			731878E, 1453011N			732378E, 1454511N		
Area	Nam Jone Mountain			vacant area within Hemaraj ESIE			Nam Jone Mountain			Nam Jone Mountain			Chomphu Mountain			Nam Jone Mountain			Chomphu Mountain			Nam Jone Mountain			Chomphu Mountain		
Direction and distance	NNW (10.34 km)			NE (0.81 km)			NNW (10.34 km)			NNW (11.27 km)			NNW (12.34 km)			NNW (11.27 km)			NNW (12.34 km)			NNW (11.27 km)			NNW (12.34 km)		
Land utilization	Mountain			vacant area			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain		
Sensitive Area																											
1. Ban Nong Kangkao Tambon Health Promoting Hospital	17.68	31.8	49.48	1.56	5.18	6.74	7.22	11.53	18.75	1.76	6.29	8.05	0.62	1.93	2.55	2.24	129	131.24	0.79	39.64	40.43	2.24	67	69.24	0.79	20.59	21.38
2. Ban Rawoeng School	19.31	38.01	57.32	0.75	6.19	6.94	6.88	9.43	16.31	1.27	5.76	7.03	0.27	1.77	2.04	1.61	93	94.61	0.34	28.58	28.92	1.61	42	43.61	0.34	12.91	13.25
3. Ban Surasak School	17.48	47.23	64.71	0.74	7.69	8.43	8.61	11.27	19.88	1.13	6.29	7.42	0.27	1.93	2.20	1.44	153	154.44	0.34	47.01	47.35	1.44	81	82.44	0.34	24.89	25.23
4. Chumchon Borisat Namtan Tawan-aok School	19.59	31.8	51.39	1.63	5.18	6.81	10.28	11.53	21.81	2.73	6.29	9.02	0.73	1.93	2.66	3.47	129	132.47	0.93	39.64	40.57	3.47	67	70.47	0.93	20.59	21.52
5. Ban Khlong Kram School	12.66	37.26	49.92	0.57	6.06	6.63	6.57	9.43	16.00	1.39	5.76	7.15	0.24	1.77	2.01	1.77	131	132.77	0.3	40.25	40.55	1.77	61	62.77	0.3	18.74	19.04
6. Wat Rawoeng Rangsan	19.95	38.01	57.96	0.77	6.19	6.96	7.05	9.43	16.48	1.28	5.76	7.04	0.27	1.77	2.04	1.63	93	94.63	0.35	28.58	28.93	1.63	42	43.63	0.35	12.91	13.26
7. Wat Surasak	18.35	47.23	65.58	0.64	15.44	16.08	8.36	12.84	21.20	1.08	7.34	8.42	0.23	15.72	15.95	1.37	118	119.37	0.29	49.15	49.44	1.37	45	46.37	0.29	43	43.29
8. Wat Chompon Chao Phraya	18.47	47.23	65.70	1.17	15.44	16.61	12.13	11.27	23.40	2.5	6.29	8.79	0.47	15.72	16.19	3.18	153	156.18	0.6	49.15	49.75	3.18	81	84.18	0.6	43	43.60
9. Wat Khlong Kram	12.51	37.26	49.77	0.55	6.06	6.61	6.58	9.43	16.01	1.39	5.76	7.15	0.23	1.77	2.00	1.77	131	132.77	0.29	40.25	40.54	1.77	61	62.77	0.29	18.74	19.03
10. Wat Khao Noi	11.69	37.26	48.95	0.58	6.06	6.64	6.2	9.43	15.63	1.13	5.76	6.89	0.21	1.77	1.98	1.44	131	132.44	0.27	40.25	40.52	1.44	61	62.44	0.27	18.74	19.01
11. Wat Sri Phumpo	13.15	34.25	47.40	0.78	5.57	6.35	7.2	12.84	20.04	1.08	7.34	8.42	0.29	2.26	2.55	1.37	118	119.37	0.37	36.26	36.63	1.37	45	46.37	0.37	13.83	14.20
12. Moo 7 Ban Rawoeng, Khao Khansong Sub-district	19.84	38.01	57.85	0.76	6.19	6.95	7.06	9.43	16.49	1.24	5.76	7.00	0.27	1.77	2.04	1.58	93	94.58	0.34	28.58	28.92	1.58	42	43.58	0.34	12.91	13.25
13. Moo 5 Ban Surasak, Khao Khansong Sub-district	18.74	47.23	65.97	0.7	7.69	8.39	8.96	11.27	20.23	1.16	6.29	7.45	0.25	1.93	2.18	1.48	153	154.48	0.32	47.01	47.33	1.48	81	82.48	0.32	24.89	25.21
14. Moo 7 Ban Nong Kang Pla, Bowin Sub-district	14.49	34.25	48.74	0.82	5.57	6.39	8.62	12.84	21.46	1.12	7.34	8.46	0.3	2.26	2.56	1.43	118	119.43	0.39	36.26	36.65	1.43	45	46.43	0.39	13.83	14.22
15. Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	22.74	102.63	125.37	0.7	15.44	16.14	9.02	106.91	115.93	1.26	56.06	57.32	0.25	11.26	11.51	1.6	170.86	172.46	0.32	49.15	49.47	1.6	102	103.60	0.32	33.92	34.24
16. Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	11.67	37.26	48.93	1	6.06	7.06	6.6	9.43	16.03	1.1	5.76	6.86	0.37	1.77	2.14	1.4	131	132.40	0.47	40.25	40.72	1.4	61	62.40	0.47	18.74	19.21
17. Moo 1 Ban Khlong Kram, Ta Sit Sub-district	12.41	37.26	49.67	0.58	6.06	6.64	6.23	9.43	15.66	1.35	5.76	7.11	0.24	1.77	2.01	1.72	131	132.72	0.3	40.25	40.55	1.72	61	62.72	0.3	18.74	19.04
18. Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	18.56	31.8	50.36	1.64	5.18	6.82	9.01	11.53	20.54	2.48	6.29	8.77	0.68	1.93	2.61	3.16	129	132.16	0.87	39.64	40.51	3.16	67	70.16	0.87	20.59	21.46

TABLE 5.1.1.1-11

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 1: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100 % LOAD (Cont'd)

Unit : µg/m^3

Study Area	Highest concentration value from results of assessment, case 1																							
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
19. Chompon Community, Chompon Chao Phraya Sub-district Municipality	18.11	31.8	49.91	1.62	5.18	6.80	8.18	11.53	19.71	2.26	6.29	8.55	0.65	1.93	2.58	2.88	129	131.88	0.83	39.64	40.47	2.88	67	69.88	0.83	20.59	21.42
20. The Praow Village	17.03	47.23	64.26	1.09	7.69	8.78	10.45	11.27	21.72	1.79	6.29	8.08	0.44	1.93	2.37	2.28	153	155.28	0.56	47.01	47.57	2.28	81	83.28	0.56	24.89	25.45
21. The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	19.22	31.8	51.02	1.65	5.18	6.83	8.33	11.53	19.86	2.7	6.29	8.99	0.67	1.93	2.60	3.44	129	132.44	0.86	39.64	40.50	3.44	67	70.44	0.86	20.59	21.45
Standard[3/]	320			57			780			300			100			330			100			120			50		

Remark : [1/] Reference **Table 5.1.1.1-3** Highest values from ambient air quality monitoring near the project area.

[2/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.

[3/] Standard reference:

- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 24 B.E.2547 (2004)
- Ambient nitrogen dioxide standard in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)
- Ambient sulfur dioxide 1 hour standard in accordance with the notification of National Environmental Committee Vol. 12 B.E.2538 (1995)
- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 10 B.E.2538 (1995)

Source : Team Consulting Engineering and Management Co., Ltd., 2015

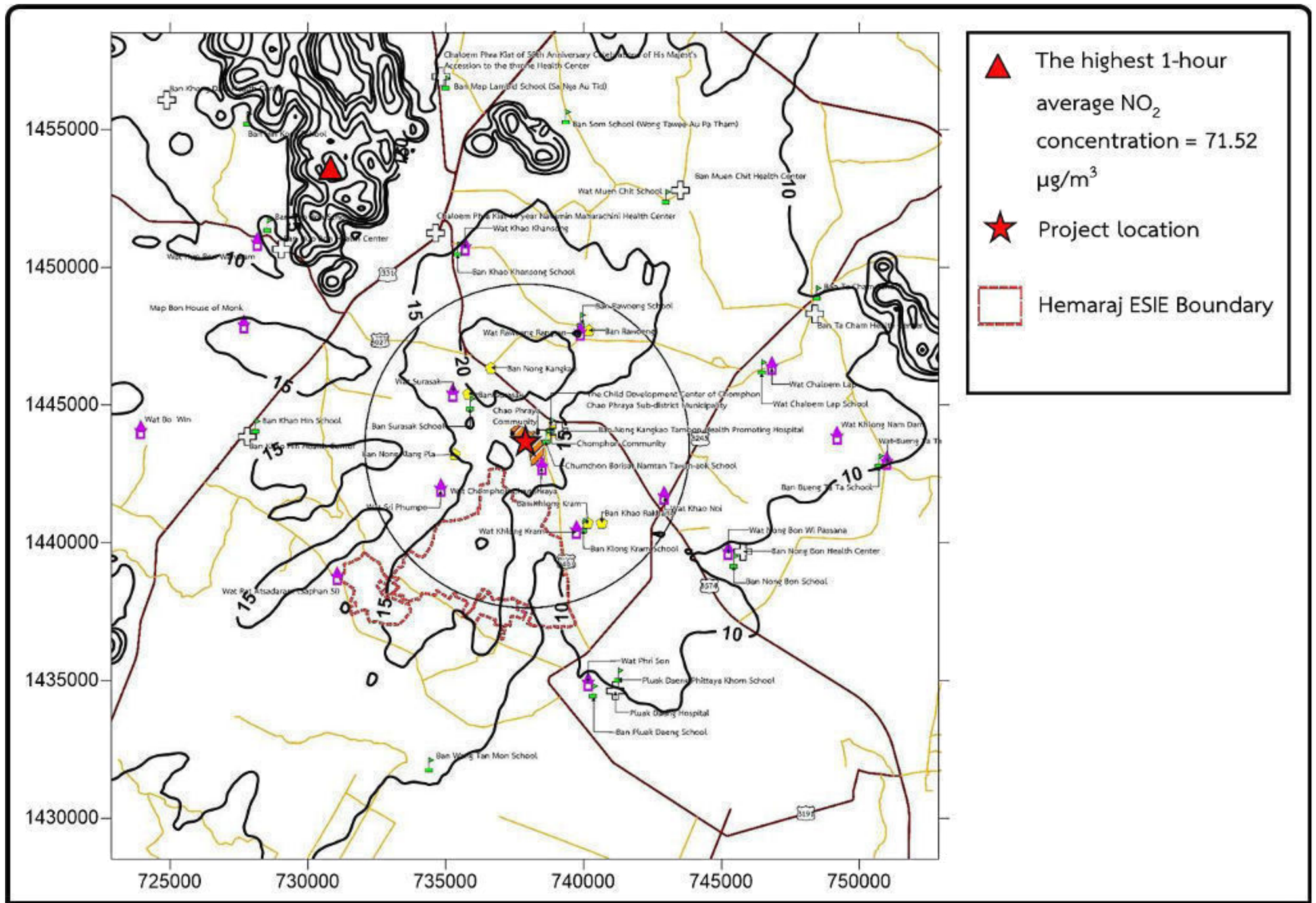


FIGURE 5.1.1.1-14 : CONTOUR MAP OF 1 HR AVERAGE NO_2 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

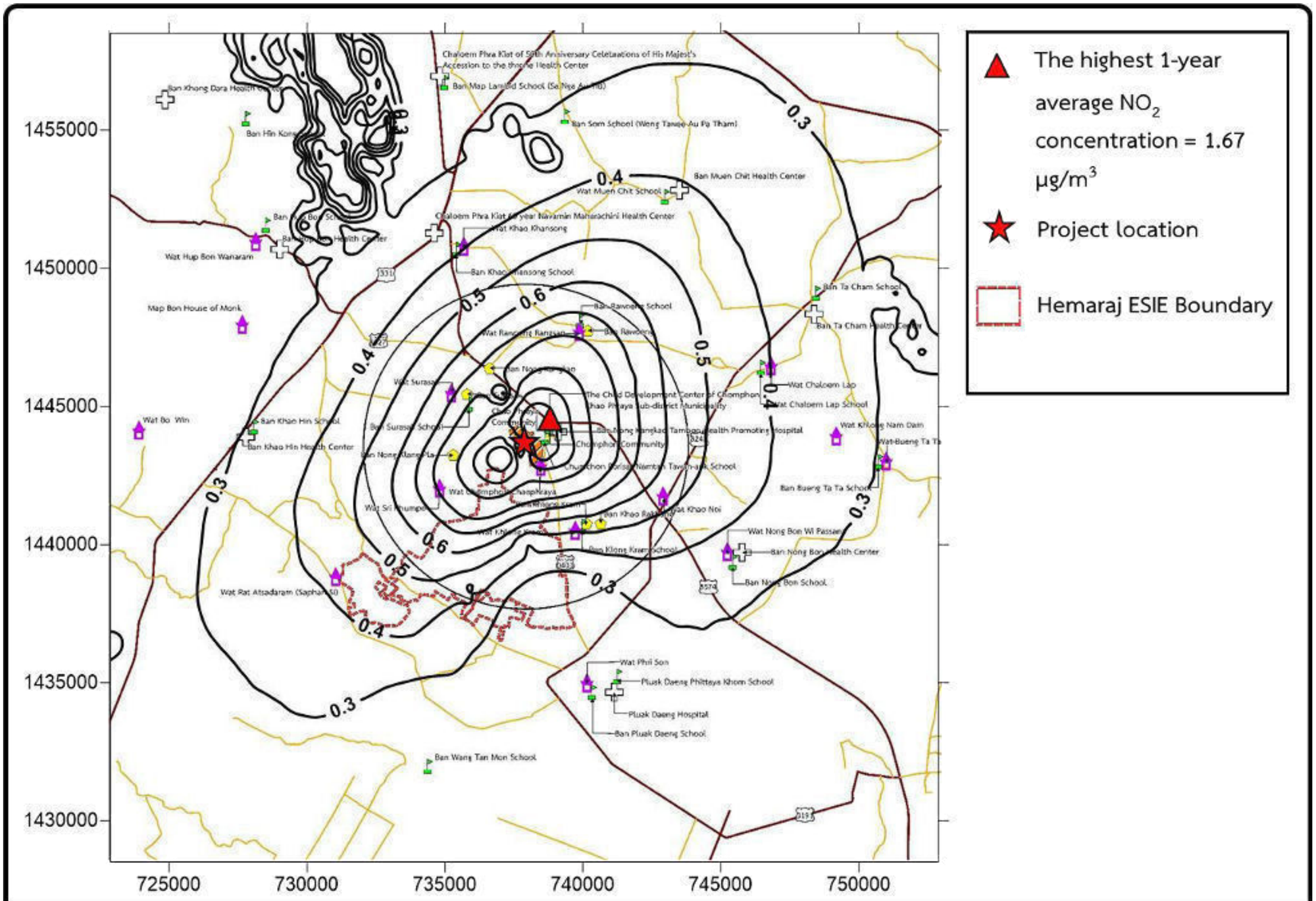


FIGURE 5.1.1.1-15 : CONTOUR MAP OF 1 YR AVERAGE NO_2 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

- **1 hr average, 24 hr average and 1 yr average SO_2**

SO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average SO_2 concentration at 10.34 km north-northwest (NNW) of the project area at coordinates: 731878E 1452011N where Nam Jone Mountain is located. The value was 62.21 µg/m^3 or 7.98 % of the ambient air quality standard (SO_2 1 hr average must not exceed 780 µg/m^3). For 21 sensitive receptor areas, the 1 hr average SO_2 concentration in the atmosphere was between 6.20-12.13 µg/m^3 or 0.79-1.56 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-16**.

When combining the above with the highest value from the current measurement, the highest SO_2 1 hr average concentration in the atmosphere was 169.12 µg/m^3 or 21.68 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 15.63-115.93 µg/m^3 or 2.00-14.86 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

The highest SO_2 24 hr average concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 9.28 µg/m^3 or 3.09 % of the ambient air quality standard (SO_2 24 hr average must not exceed 300 µg/m^3). For 21 sensitive receptor areas, the 24 hr average SO_2 concentration in the atmosphere was between 1.08-2.73 µg/m^3 or 0.36-0.91 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-17**.

When combining the above with the highest value from the current measurement, the highest 24 hr average SO_2 concentration in the atmosphere was 65.34 µg/m^3 or 21.78 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 6.86-57.32 µg/m^3 or 0.36-0.91 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

The highest SO_2 1 yr average concentration was found 12.34 km north-northwest (NNW) of the project area at coordinates: 732378E 1454511N where Chomphu Mountain is located. The value was 1.14 µg/m^3 or 1.14 % of the ambient air quality standard (SO_2 1 yr average must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the SO_2 1 yr average concentration in the atmosphere was between 0.21-0.73 µg/m^3 or 0.21-0.73 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-18**.

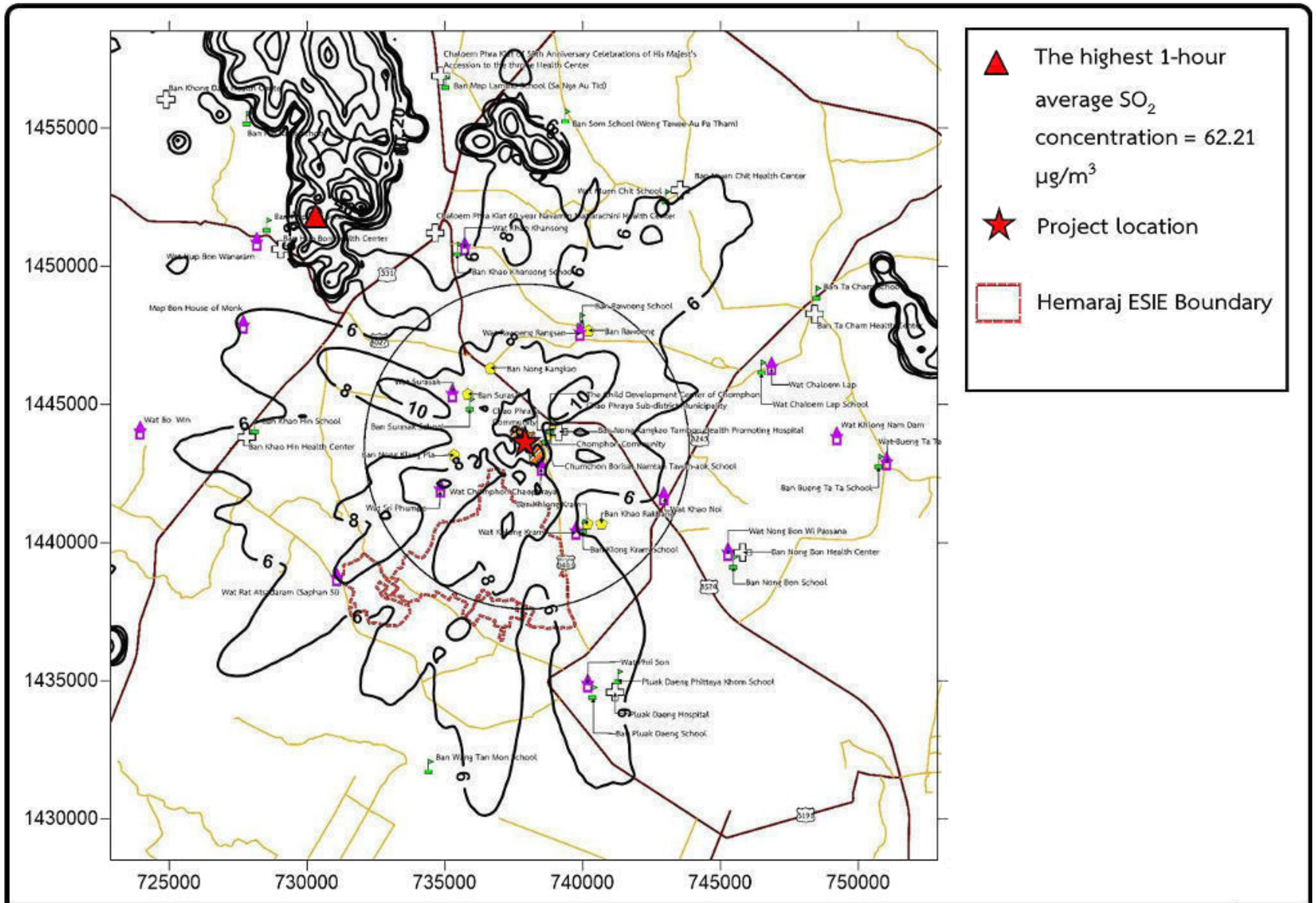


FIGURE 5.1.1.1-16 : CONTOUR MAP OF 1 HR AVERAGE SO_2 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

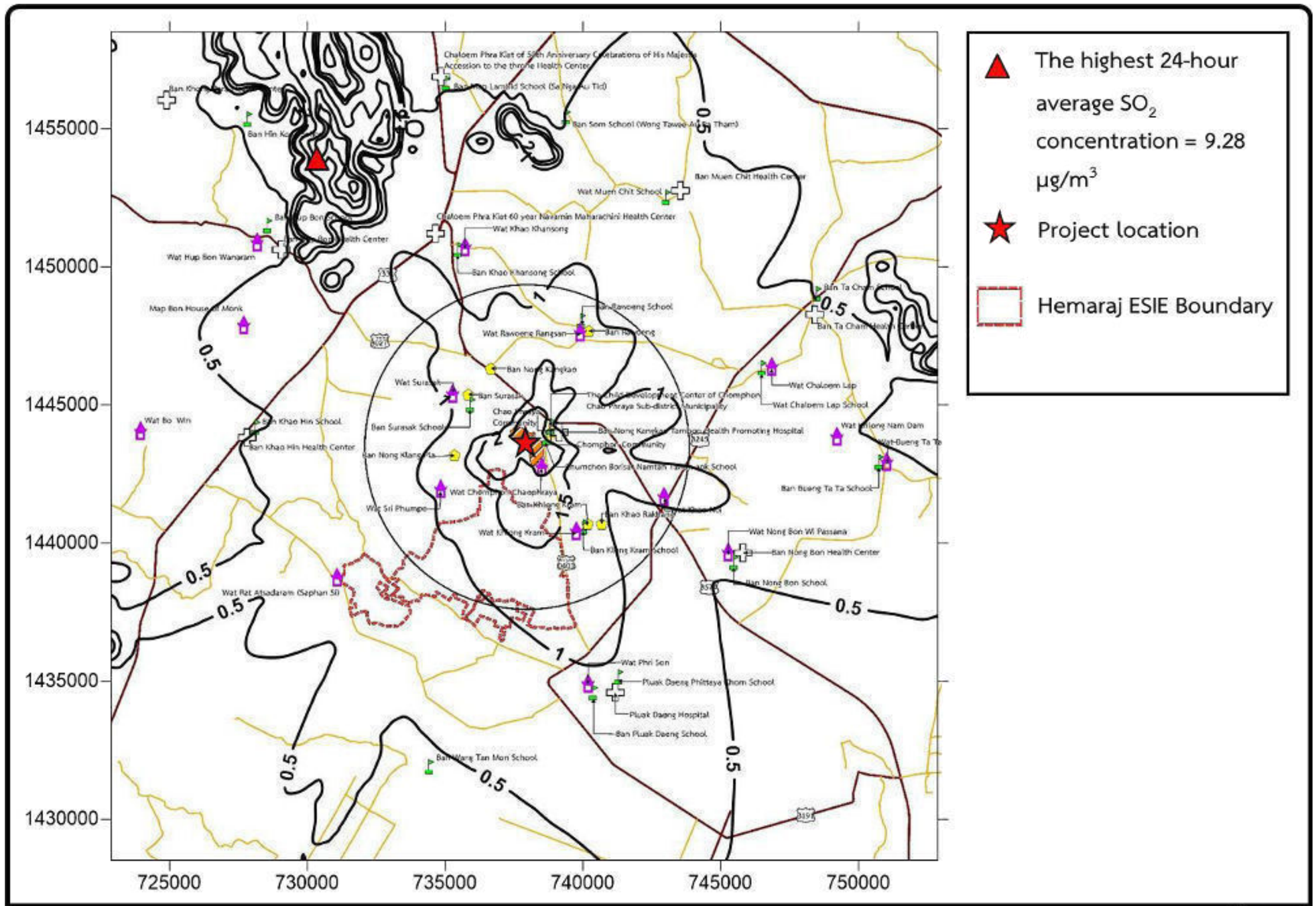


FIGURE 5.1.1.1-17 : CONTOUR MAP OF 24 HR AVERAGE SO_2 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

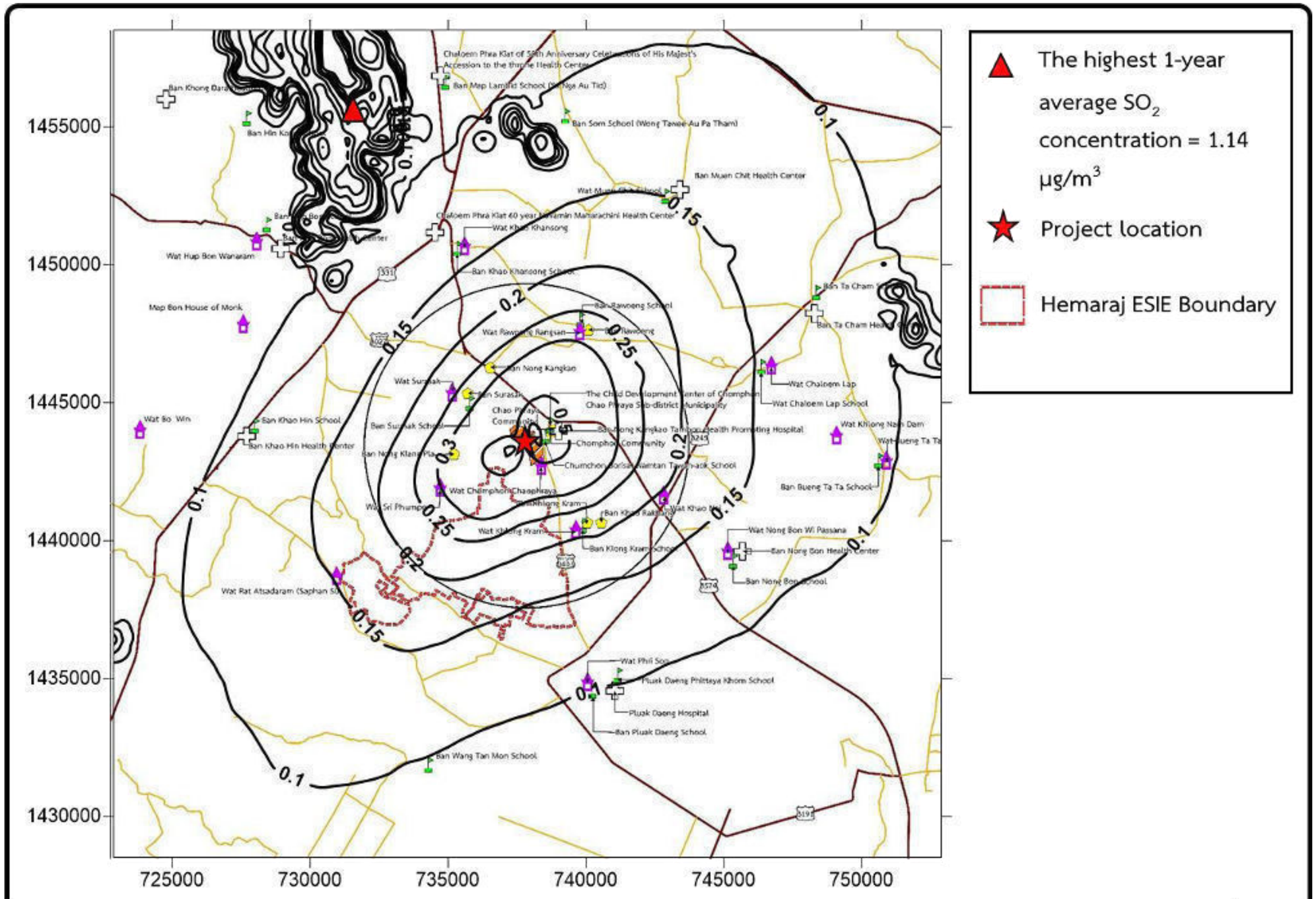


FIGURE 5.1.1.1-18 : CONTOUR MAP OF 1 YR AVERAGE SO_2 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

When combining the above with the highest value from the current measurement, the highest concentration of SO_2 1 yr average in the atmosphere was 16.86 µg/m^3 or 16.86 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 1.98-16.19 µg/m^3 or 1.98-16.19 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

- **24 hr average and 1 yr average TSP**

The operation of the project resulted in the general areas having the highest 24 hr average TSP concentration at 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 11.82 µg/m^3 or 3.58 % of the ambient air quality standard (24 hr average TSP must not exceed 330 µg/m^3). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 1.37-3.47 µg/m^3 or 0.42-1.05 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-19**.

The above value when combined with the existing data, the highest 24 hr average TSP concentration in the atmosphere was 182.68 µg/m^3 or 55.36 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 94.58-172.46 µg/m^3 or 28.66-52.26 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

The highest 1 yr average TSP concentration was found 12.34 km north-northwest (NNW) of the project area at coordinates: 732378E 1454511N where Chomphu Mountain is located. The value was 1.45 µg/m^3 or 1.45 % of the ambient air quality standard (1 yr average TSP must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the 1 yr average TSP concentration in the atmosphere was between 0.27-0.93 µg/m^3 or 0.27-0.93 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-20**.

When combining the above with the highest value from the current measurement, the highest 1 yr average TSP concentration in the atmosphere was 50.60 µg/m^3 or 50.60 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 28.92-49.75 µg/m^3 or 28.92-49.75 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

- **24 hr average and 1 yr average PM-10**

The operation of the project resulted in the general areas having the highest 24 hr average PM-10 concentration at 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 11.82 µg/m^3 or 9.85 % of the ambient air quality standard (24 hr average PM-10 must not exceed 120 µg/m^3). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 1.37-3.47 µg/m^3 or 1.14-2.90 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-21**.

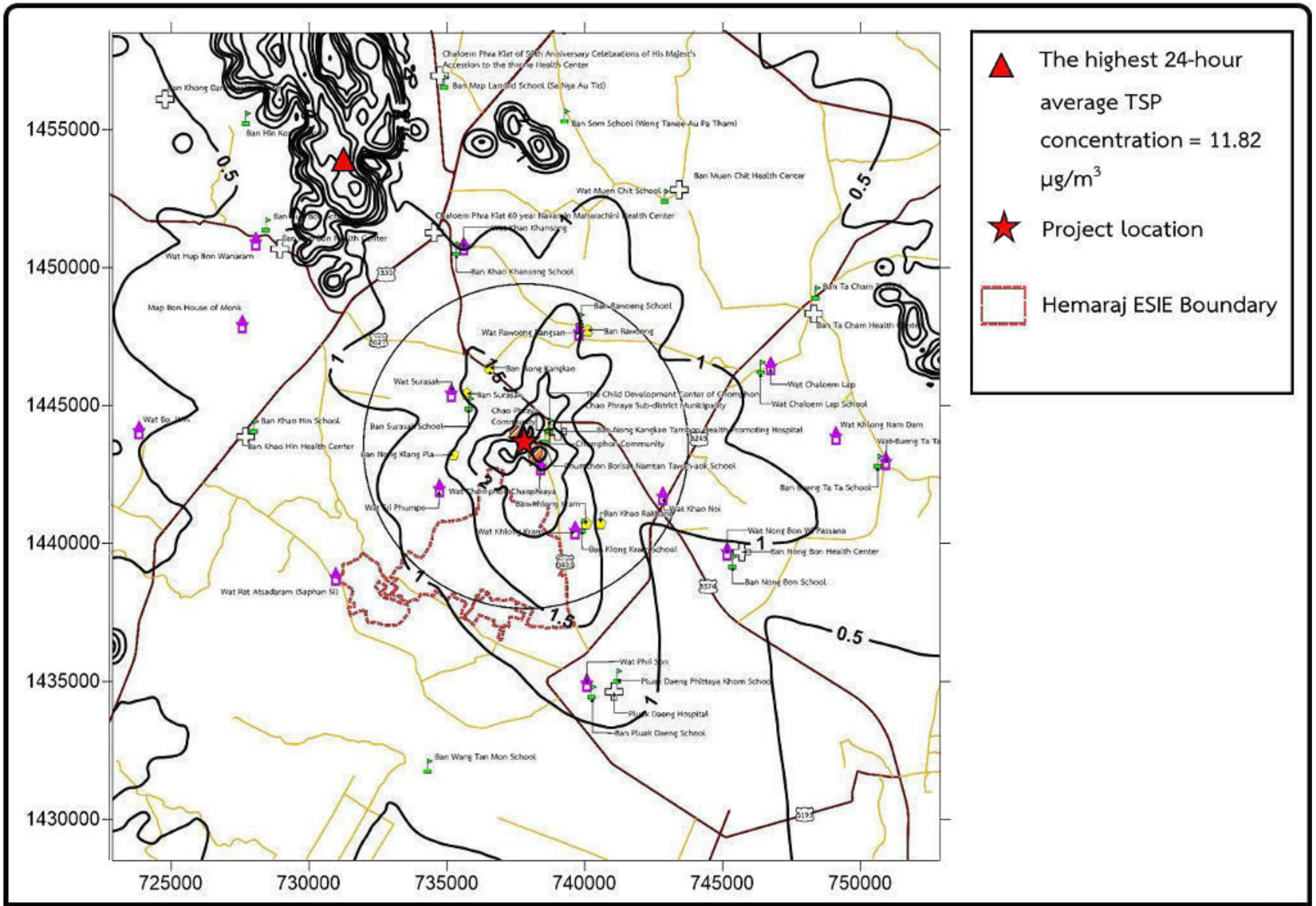


FIGURE 5.1.1.1-19 : CONTOUR MAP OF 24 HR AVERAGE TSP CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

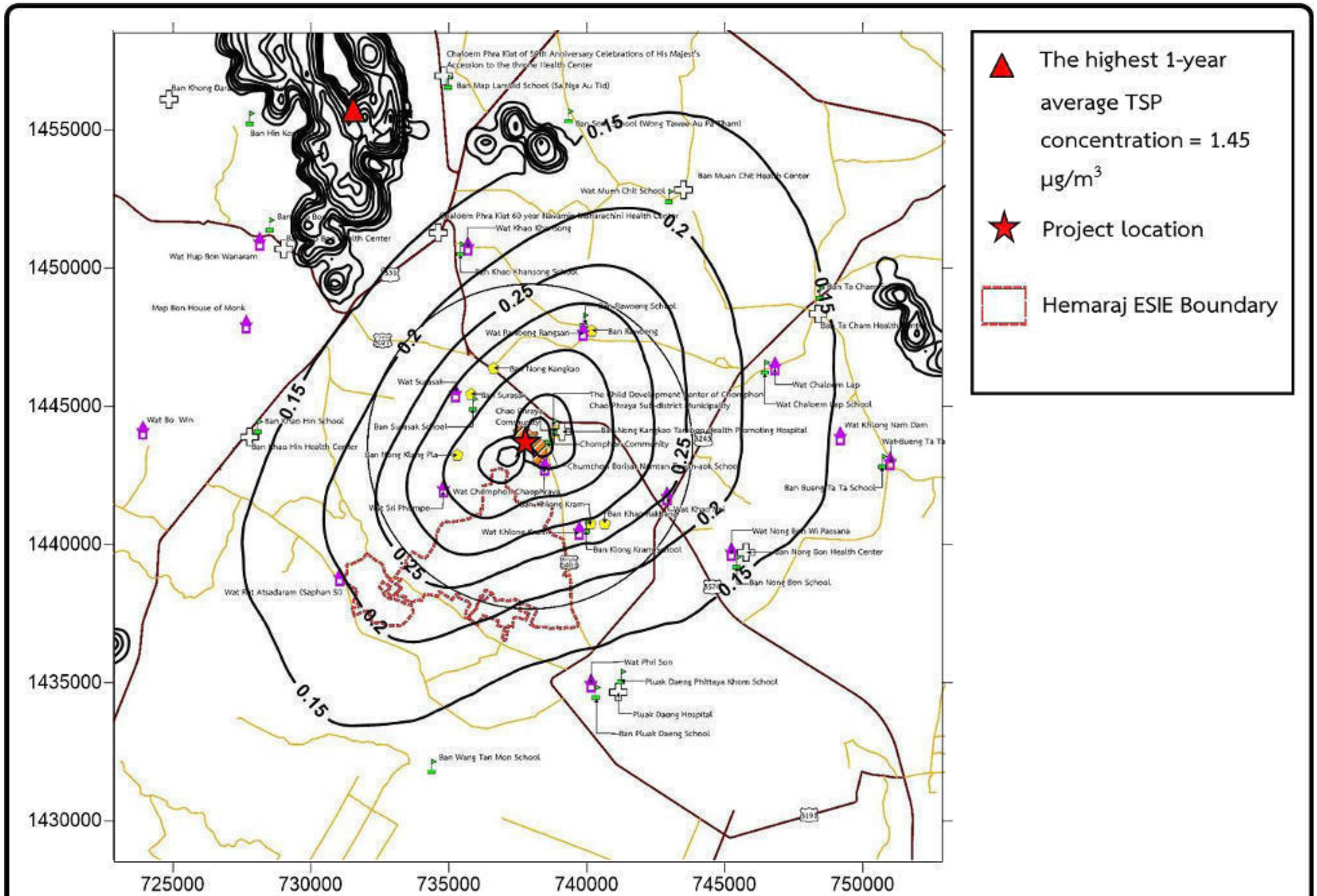


FIGURE 5.1.1.1-20 : CONTOUR MAP OF 1 YR AVERAGE TSP CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

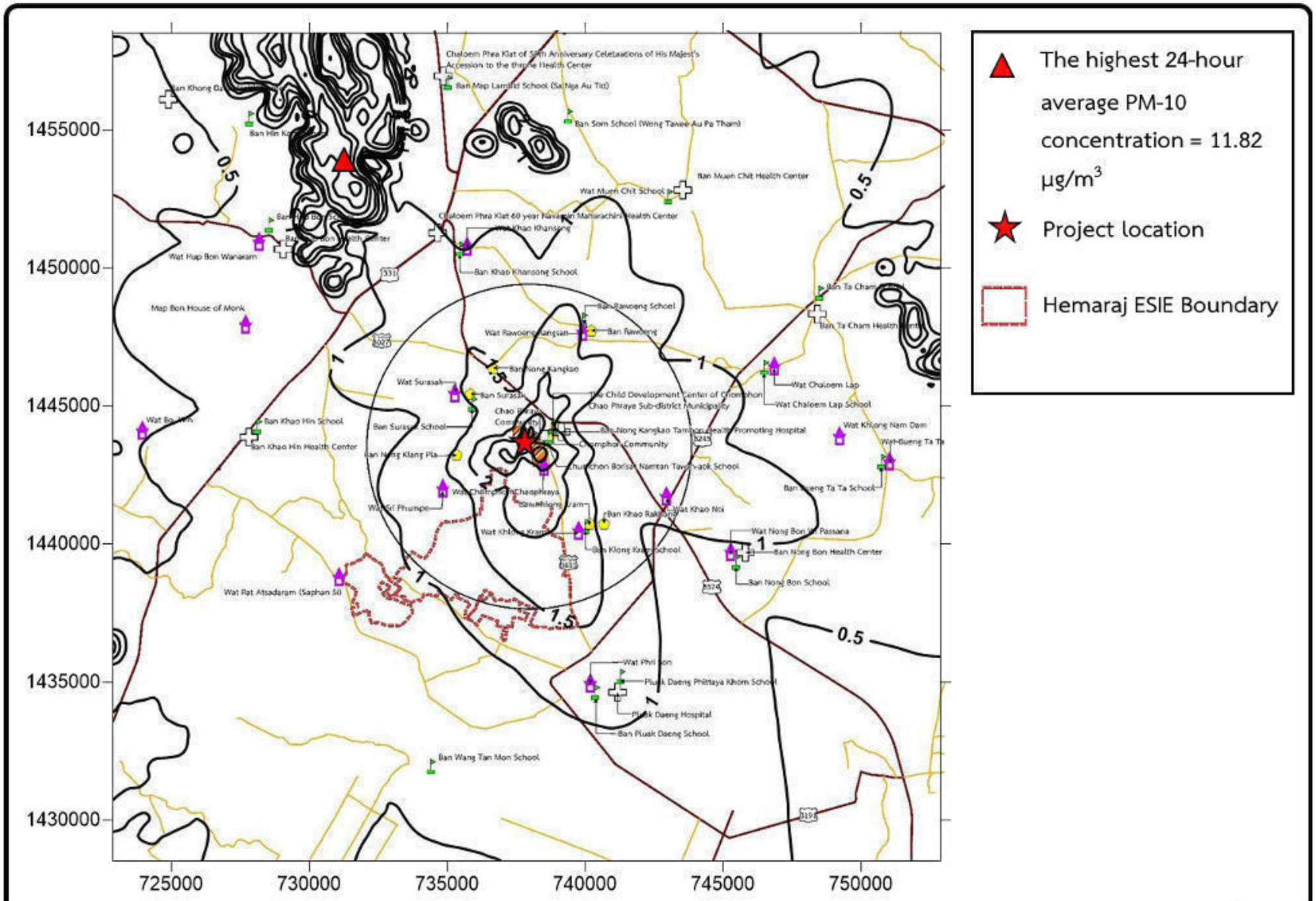


FIGURE 5.1.1.1-21 : CONTOUR MAP OF 24 HR AVERAGE PM-10 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

When combining the above with the highest value from the current measurement, the highest 24 hr average PM-10 concentration in the atmosphere was 113.82 µg/m^3 or 94.85 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 43.58-103.60 µg/m^3 or 36.32-86.33 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

The highest 1 yr average PM-10 concentration was found 12.34 km north-northwest (NNW) of the project area at coordinates: 732378E 1454511N where Chomphu Mountain is located. The value was 1.45 µg/m^3 or 2.90 % of the ambient air quality standard (1 yr average PM-10 must not exceed 50 µg/m^3). For 21 sensitive receptor areas, the 1 yr average PM-10 concentration in the atmosphere was between 0.27-0.93 µg/m^3 or 0.54-1.86 % of the ambient air quality standard as shown in **Table 5.1.1.1-11** and **Figure 5.1.1.1-22**.

When combining the above with the highest value from the current measurement, the highest concentration of PM-10 1 yr average in the atmosphere was 44.45 µg/m^3 or 88.90 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 13.25-43.60 µg/m^3 or 26.50-87.20 % of the ambient air quality standard as shown in **Table 5.1.1.1-11**.

(b) Scenario 2: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 60 % load.

- **1 hr average and 1 yr average NO_2**

NO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average NO_2 concentration at 10.34 km north-northwest (NNW) of the project at coordinates: 731878E 1452011N where Nam Jone Mountain is located. The value was 45.91 µg/m^3 or 14.35 % of the ambient air quality standard (1 hr average NO_2 must not exceed 320 µg/m^3). For 21 sensitive receptor areas, the 1 hr average NO_2 concentration in the atmosphere was between 7.49-14.60 µg/m^3 or 2.34-4.56 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-23**.

When combining the above with the highest value from the current measurement, the highest 1 hr average NO_2 concentration in the atmosphere was 148.54 µg/m^3 or 46.42 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 42.69-117.23 µg/m^3 or 13.34-36.63 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

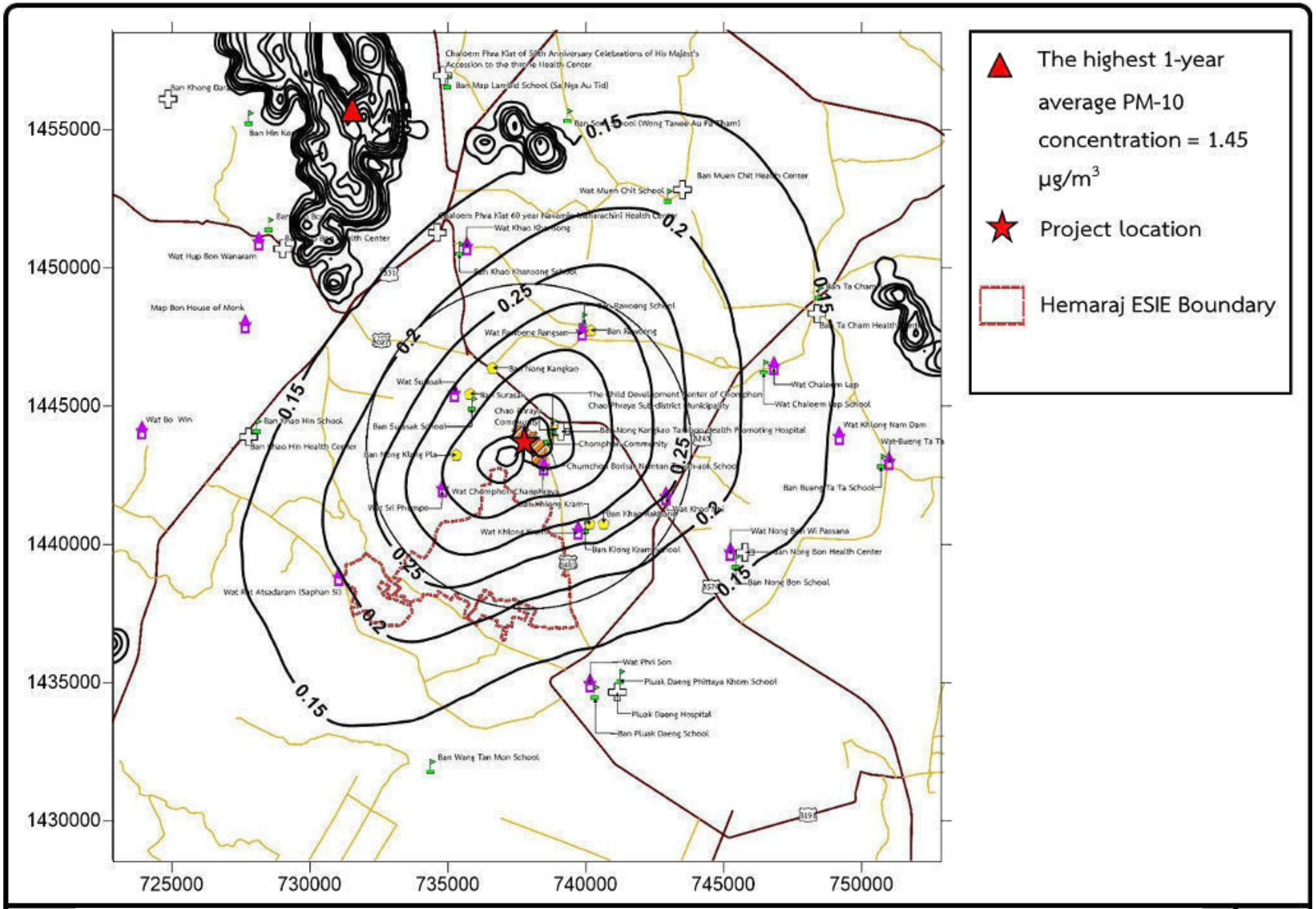


FIGURE 5.1.1.1-22 : CONTOUR MAP OF 1 YR AVERAGE PM-10 CONCENTRATION

SCENARIO 1 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD

TABLE 5.1.1.1-12

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 2: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60 % LOAD.

Unit : µg/m^3

Study Area	Highest concentration value from results of assessment, case 2																										
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
Highest concentration value	45.91	102.63[1/]	148.54	1.07	15.44[1/]	16.51	48.49	106.91[1/]	155.40	7.68	56.06[1/]	63.74	0.94	15.72[1/]	16.66	9.77	170.86[1/]	180.63	1.19	49.15[1/]	50.34	9.77	102[1/]	111.77	1.19	43[1/]	44.19
Coordinates	731878E, 1452011N			738278E, 1444211N			732378E, 1452511N			731878E, 1453011N			731878E, 1453011N			731878E, 1453011N			731878E, 1453011N			731878E, 1453011N			731878E, 1453011N		
Area	Nam Jone Mountain			vacant area within Hemaraj ESIE			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain		
Direction and distance	NNW (10.34 km)			NE (0.81 km)			NNW (10.53 km)			NNW (11.27 km)			NNW (11.27 km)			NNW (11.27 km)			NNW (11.27 km)			NNW (11.27 km)			NNW (11.27 km)		
Land utilization	Mountain			Industrial Estate			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain		
Sensitive Area																											
1. Ban Nong Kangkao Tambon Health Promoting Hospital	11.35	31.8	43.15	1	5.18	6.18	7.26	11.53	18.79	1.69	6.29	7.98	0.55	1.93	2.48	2.15	129	131.15	0.69	39.64	40.33	2.15	67	69.15	0.69	20.59	21.28
2. Ban Rawoeng School	12.39	38.01	50.40	0.48	6.19	6.67	6.16	9.43	15.59	0.95	5.76	6.71	0.19	1.77	1.96	1.2	93	94.20	0.24	28.58	28.82	1.2	42	43.20	0.24	12.91	13.15
3. Ban Surasak School	11.22	47.23	58.45	0.48	7.69	8.17	7.21	11.27	18.48	0.92	6.29	7.21	0.2	1.93	2.13	1.18	153	154.18	0.25	47.01	47.26	1.18	81	82.18	0.25	24.89	25.14
4. Chumchon Borisat Namtan Tawan-aok School	12.57	31.8	44.37	1.05	5.18	6.23	9.04	11.53	20.57	2.48	6.29	8.77	0.71	1.93	2.64	3.16	129	132.16	0.91	39.64	40.55	3.16	67	70.16	0.91	20.59	21.50
5. Ban Khlong Kram School	8.13	37.26	45.39	0.37	6.06	6.43	6.41	9.43	15.84	1.11	5.76	6.87	0.17	1.77	1.94	1.42	131	132.42	0.22	40.25	40.47	1.42	61	62.42	0.22	18.74	18.96
6. Wat Rawoeng Rangsan	12.81	38.01	50.82	0.5	6.19	6.69	6.37	9.43	15.80	0.96	5.76	6.72	0.2	1.77	1.97	1.22	93	94.22	0.25	28.58	28.83	1.22	42	43.22	0.25	12.91	13.16
7. Wat Surasak	11.78	47.23	59.01	0.41	15.44	15.85	6.53	12.84	19.37	0.86	7.34	8.20	0.16	15.72	15.88	1.1	118	119.10	0.21	49.15	49.36	1.1	45	46.10	0.21	43	43.21
8. Wat Chompon Chao Phraya	11.86	47.23	59.09	0.75	15.44	16.19	10.18	11.27	21.45	2.13	6.29	8.42	0.43	15.72	16.15	2.71	153	155.71	0.55	49.15	49.70	2.71	81	83.71	0.55	43	43.55
9. Wat Khlong Kram	8.03	37.26	45.29	0.36	6.06	6.42	6.59	9.43	16.02	1.13	5.76	6.89	0.17	1.77	1.94	1.44	131	132.44	0.22	40.25	40.47	1.44	61	62.44	0.22	18.74	18.96
10. Wat Khao Noi	7.5	37.26	44.76	0.37	6.06	6.43	4.86	9.43	14.29	0.91	5.76	6.67	0.15	1.77	1.92	1.15	131	132.15	0.19	40.25	40.44	1.15	61	62.15	0.19	18.74	18.93
11. Wat Sri Phumpo	8.44	34.25	42.69	0.5	5.57	6.07	7.95	12.84	20.79	0.83	7.34	8.17	0.21	2.26	2.47	1.06	118	119.06	0.27	36.26	36.53	1.06	45	46.06	0.27	13.83	14.10
12. Moo 7 Ban Rawoeng, Khao Khansong Sub-district	12.73	38.01	50.74	0.49	6.19	6.68	6.45	9.43	15.88	0.92	5.76	6.68	0.2	1.77	1.97	1.18	93	94.18	0.25	28.58	28.83	1.18	42	43.18	0.25	12.91	13.16
13. Moo 5 Ban Surasak, Khao Khansong Sub-district	12.03	47.23	59.26	0.45	7.69	8.14	7.14	11.27	18.41	0.93	6.29	7.22	0.18	1.93	2.11	1.18	153	154.18	0.23	47.01	47.24	1.18	81	82.18	0.23	24.89	25.12
14. Moo 7 Ban Nong Kang Pla, Bowin Sub-district	9.3	34.25	43.55	0.53	5.57	6.10	7.35	12.84	20.19	0.86	7.34	8.20	0.22	2.26	2.48	1.1	118	119.10	0.29	36.26	36.55	1.1	45	46.10	0.29	13.83	14.12
15. Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	14.6	102.63	117.23	0.45	15.44	15.89	7.7	106.91	114.61	0.96	56.06	57.02	0.18	11.26	11.44	1.22	170.86	172.08	0.23	49.15	49.38	1.22	102	103.22	0.23	33.92	34.15
16. Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	7.49	37.26	44.75	0.64	6.06	6.70	5.64	9.43	15.07	0.96	5.76	6.72	0.28	1.77	2.05	1.22	131	132.22	0.36	40.25	40.61	1.22	61	62.22	0.36	18.74	19.10
17. Moo 1 Ban Khlong Kram, Ta Sit Sub-district	7.97	37.26	45.23	0.37	6.06	6.43	5.97	9.43	15.40	1.07	5.76	6.83	0.17	1.77	1.94	1.36	131	132.36	0.22	40.25	40.47	1.36	61	62.36	0.22	18.74	18.96
18. Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	11.91	31.8	43.71	1.06	5.18	6.24	7.46	11.53	18.99	2.26	6.29	8.55	0.62	1.93	2.55	2.88	129	131.88	0.79	39.64	40.43	2.88	67	69.88	0.79	20.59	21.38

TABLE 5.1.1.1-12

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 2: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60 % LOAD. (Cont'd)

Study Area	Highest concentration value from results of assessment, case 2																									
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
19. Chompon Community, Chompon Chao Phraya Sub-district Municipality	11.62	31.8	43.42	1.04	5.18	6.22	7.13	11.53	18.66	2.09	6.29	8.38	0.58	1.93	2.51	2.66	129	131.66	0.74	39.64	40.38	2.66	67	69.66	0.74	20.59	21.33
20. The Praow Village	10.93	47.23	58.16	0.7	7.69	8.39	9.29	11.27	20.56	1.52	6.29	7.81	0.42	1.93	2.35	1.93	153	154.93	0.54	47.01	47.55	1.93	81	82.93	0.54	24.89	25.43
21. The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	12.34	31.8	44.14	1.06	5.18	6.24	7.23	11.53	18.76	2.3	6.29	8.59	0.6	1.93	2.53	2.93	129	131.93	0.76	39.64	40.40	2.93	67	69.93	0.76	20.59	21.35
Standard[2/]	320			57			780			300			100			330			100			120			50		

Remark : [1/] Reference **Table 5.1.1.1-3** Highest values from ambient air quality monitoring near the project area.

[2/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.

[3/] Standard reference:

- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 24 B.E.2547 (2004)
- Ambient nitrogen dioxide standard in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)
- Ambient sulfur dioxide 1 hour standard in accordance with the notification of National Environmental Committee Vol. 12 B.E.2538 (1995)
- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 10 B.E.2538 (1995)

Source : Team Consulting Engineering and Management Co., Ltd., 2015

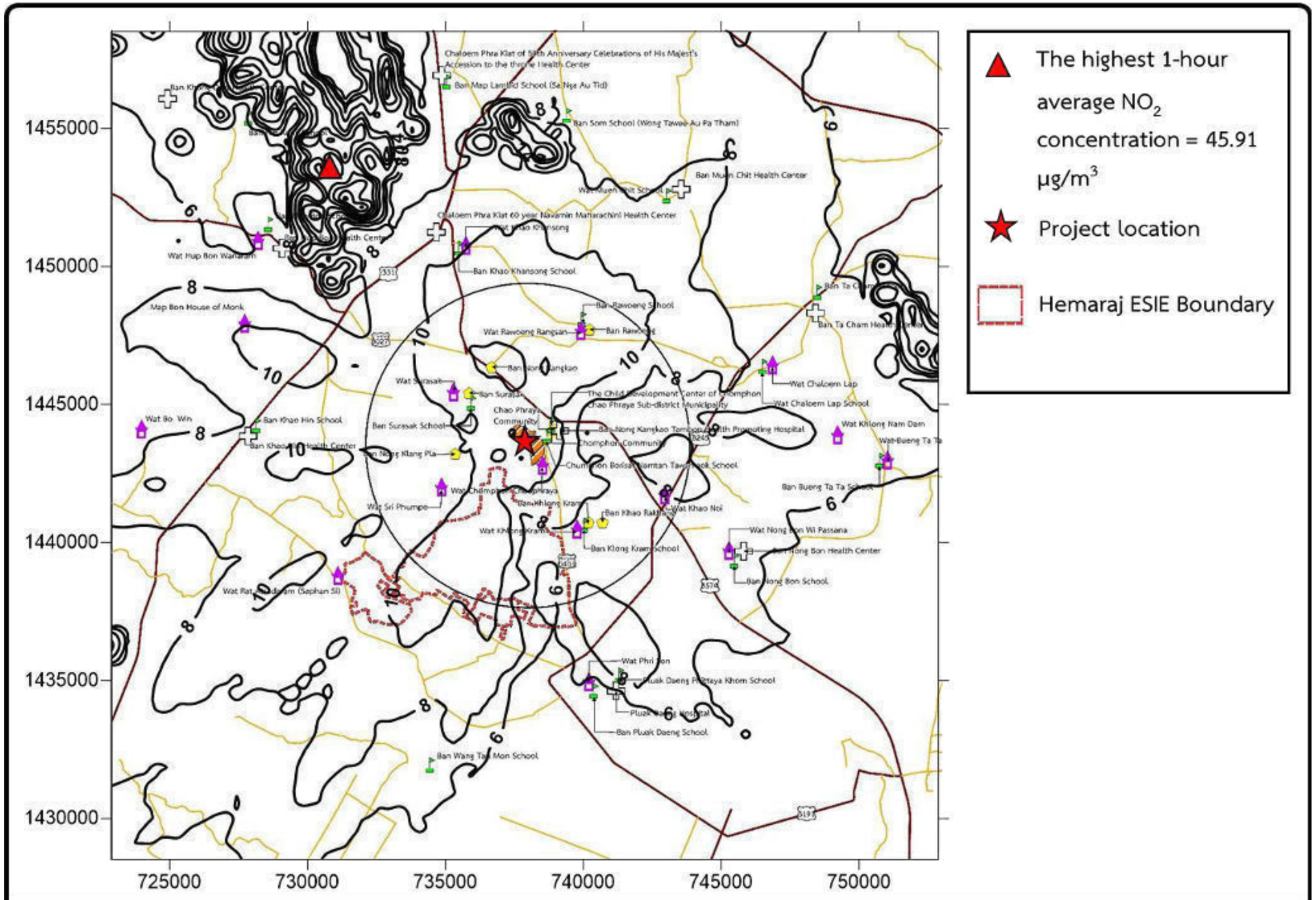


FIGURE 5.1.1.1-23 : CONTOUR MAP OF 1 HR AVERAGE NO_2 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

The highest 1 yr average NO_2 concentration was found 0.81 km northeast (NE) of the project area at coordinates: 738278E 1444211N where it is a vacant area within Hemaraj ESIE. The value was 1.07 µg/m^3 or 1.88 % of the ambient air quality standard (NO_2 1 yr average must not exceed 57 µg/m^3). For 21 sensitive receptor areas, the 1 yr average NO_2 concentration in the atmosphere was between 0.36-1.06 µg/m^3 or 0.63-1.86 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-24.**

When combining the above with the highest value from the current measurement, the highest 1 yr average NO_2 concentration in the atmosphere was 16.51 µg/m^3 or 28.96 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 6.07-16.19µg/m^3 or 10.65-28.40 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

- **1 hr average, 24 hr average and 1 yr average SO_2**

SO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average SO_2 concentration at 10.53 km north-northwest (NNW) of the project area at coordinates: 732378 E 1452511N where Nam Jone Mountain is located. The value was 48.49 µg/m^3 or 6.22 % of the ambient air quality standard (SO_2 1 hr average must not exceed 780 µg/m^3). For 21 sensitive receptor areas, the 1 hr average SO_2 concentration in the atmosphere was between 4.86-10.18 µg/m^3 or 0.62-1.31 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-25**.

When combining the above with the highest value from the current measurement, the highest SO_2 1 hr average concentration in the atmosphere was 155.40 µg/m^3 or 19.92 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 14.29-114.61 µg/m^3 or 1.83-14.69 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

The highest SO_2 24 hr average concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 7.68 µg/m^3 or 2.56 % of the ambient air quality standard (SO_2 24 hr average must not exceed 300 µg/m^3). For 21 sensitive receptor areas, the 24 hr average SO_2 concentration in the atmosphere was between 0.83-2.48 µg/m^3 or 0.28-0.83 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-26**.

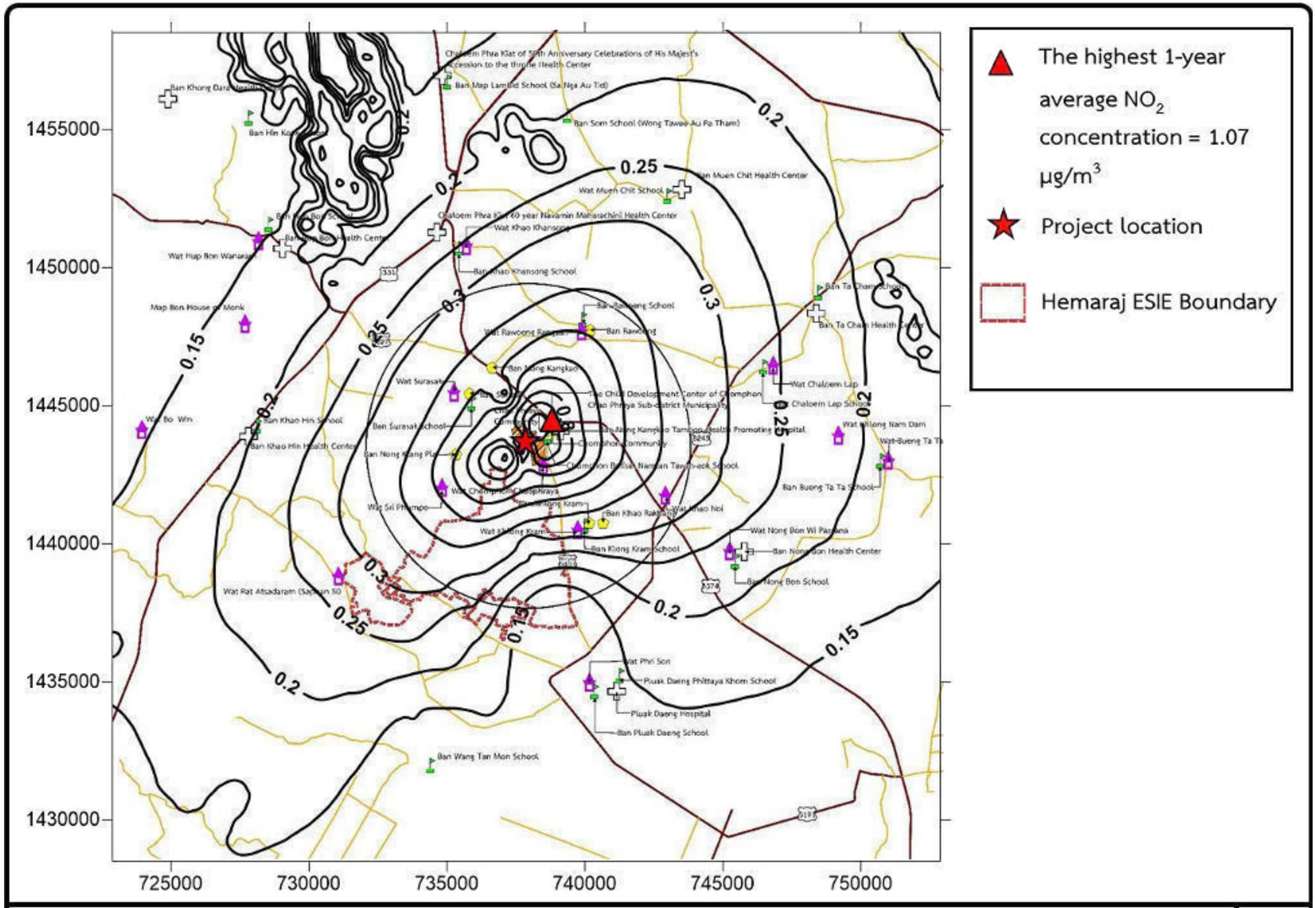


FIGURE 5.1.1.1-24 : CONTOUR MAP OF 1 YR AVERAGE NO_2 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

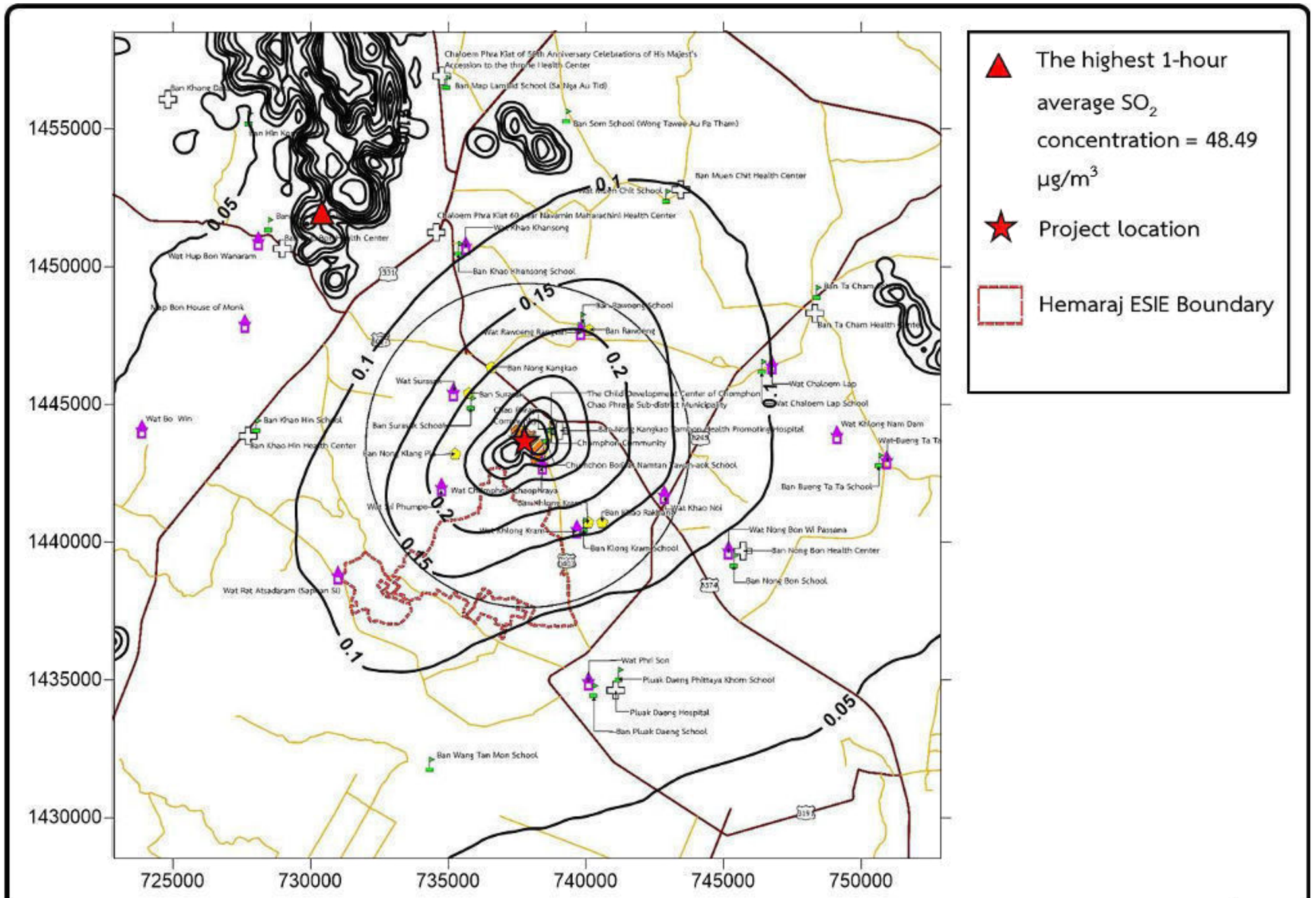


FIGURE 5.1.1.1-25 : CONTOUR MAP OF 1 HR AVERAGE SO_2 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

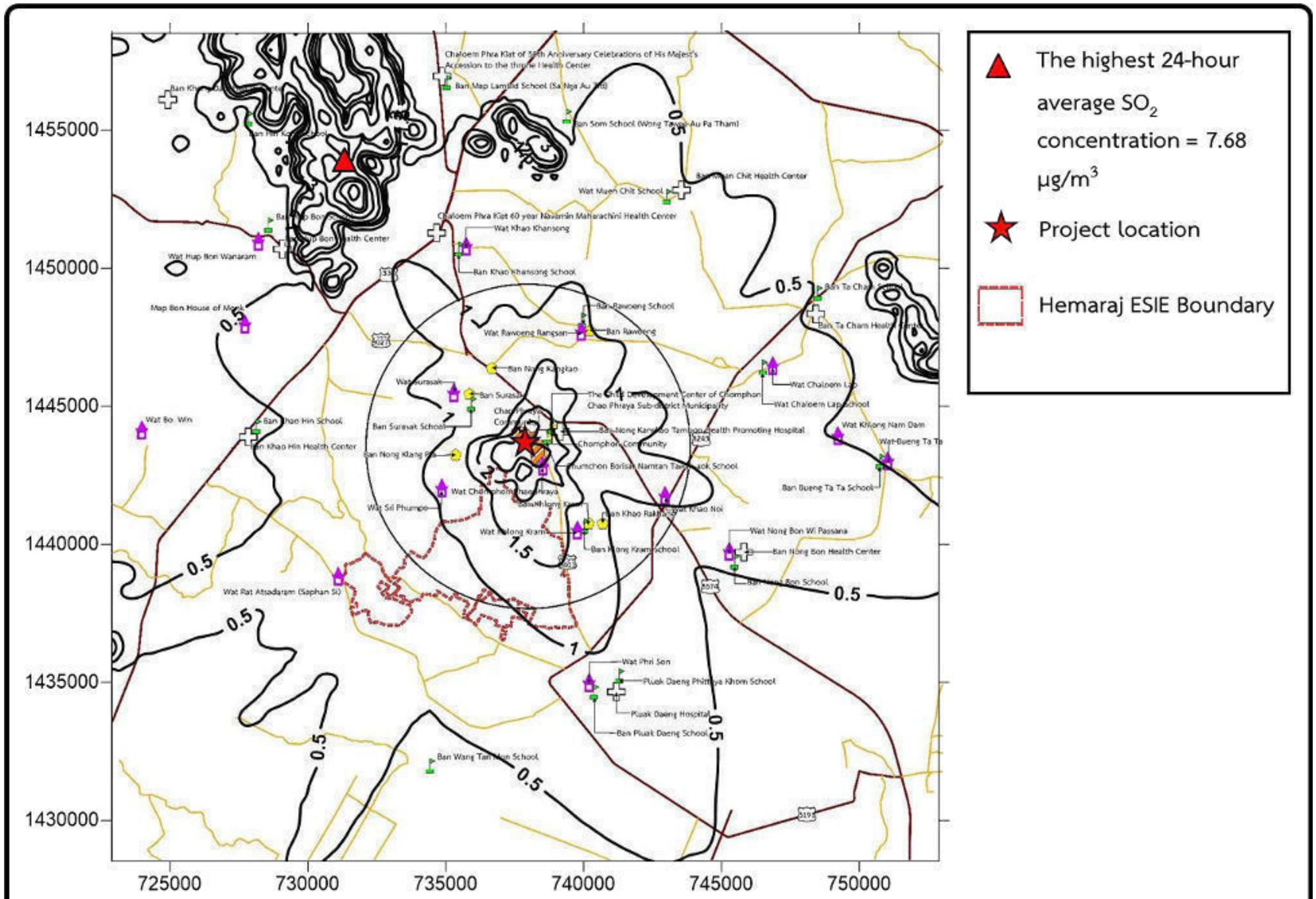


FIGURE 5.1.1.1-26 : CONTOUR MAP OF 24 HR AVERAGE SO_2 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

When combining the above with the highest value from the current measurement, the highest 24 hr average SO_2 concentration in the atmosphere was 63.74 µg/m^3 or 21.25 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 6.67-57.02 µg/m^3 or 2.22-19.01 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

The highest SO_2 1 yr average concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 0.94 µg/m^3 or 0.94 % of the ambient air quality standard (SO_2 1 yr average must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the SO_2 1 yr average concentration in the atmosphere was between 0.15-0.71 µg/m^3 or 0.15-0.71 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-27**.

When combining the above with the highest value from the current measurement, the highest concentration of SO_2 1 yr average in the atmosphere was 16.66 µg/m^3 or 16.66 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 1.92-16.15 µg/m^3 or 1.92-16.15 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

- **24 hr average and 1 yr average TSP**

The operation of the project resulted in the general areas having the highest 24 hr average TSP concentration at 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 9.77µg/m^3 or 2.96 % of the ambient air quality standard (24 hr average TSP must not exceed 330 µg/m^3). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 1.06-3.16 µg/m^3 or 0.32-0.96 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-28**.

The above value when combined with the existing data, the highest 24 hr average TSP concentration in the atmosphere was 180.63 µg/m^3 or 54.74 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 94.18-172.08 µg/m^3 or 28.54-52.15 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

The highest 1 yr average TSP concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 1.19 µg/m^3 or 1.19 % of the ambient air quality standard (1 yr average TSP must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the 1 yr average TSP concentration in the atmosphere was between 0.19-0.91 µg/m^3 or 0.19-0.91 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-29**.

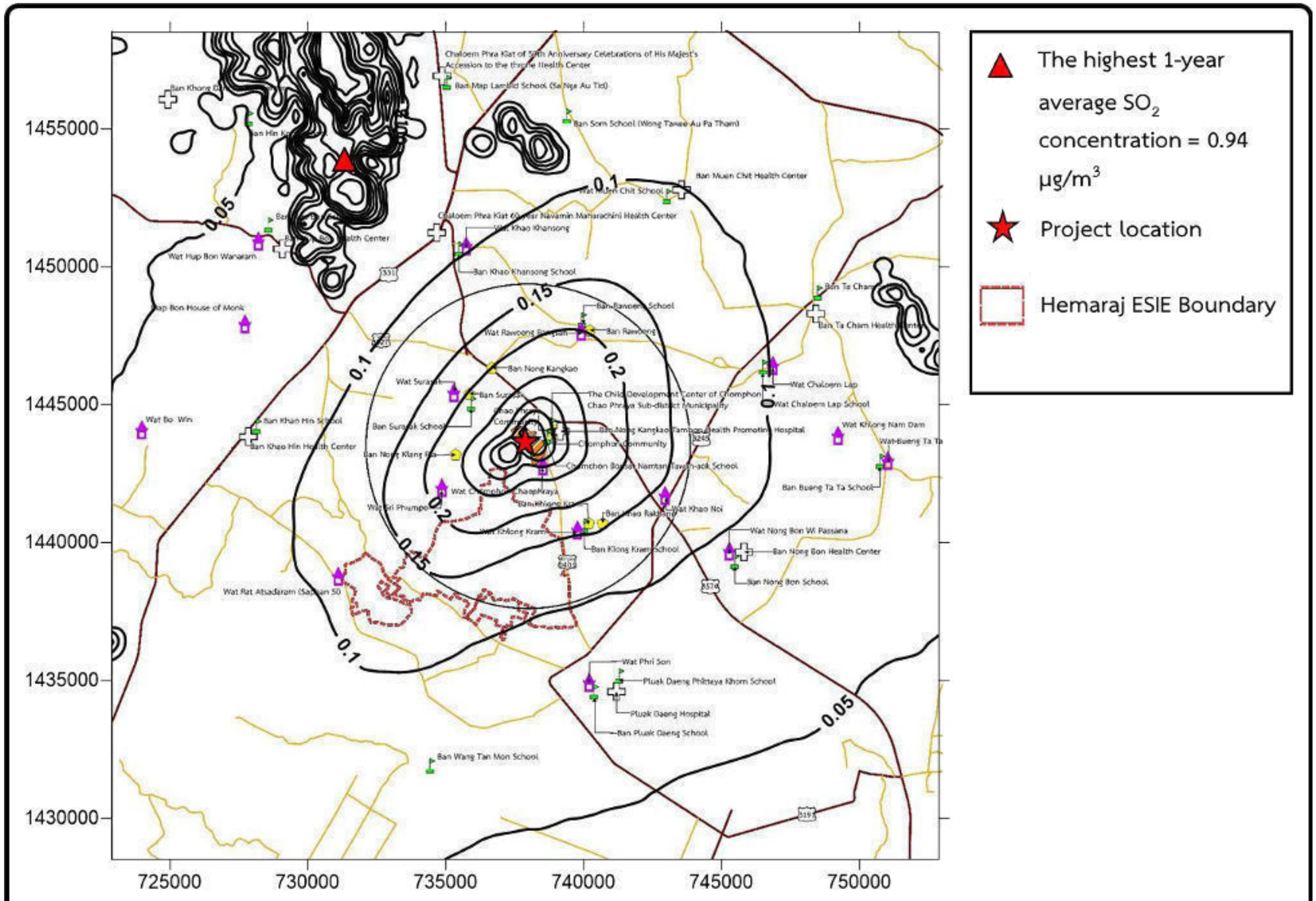


FIGURE 5.1.1.1-27 : CONTOUR MAP OF 1 YR AVERAGE SO_2 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

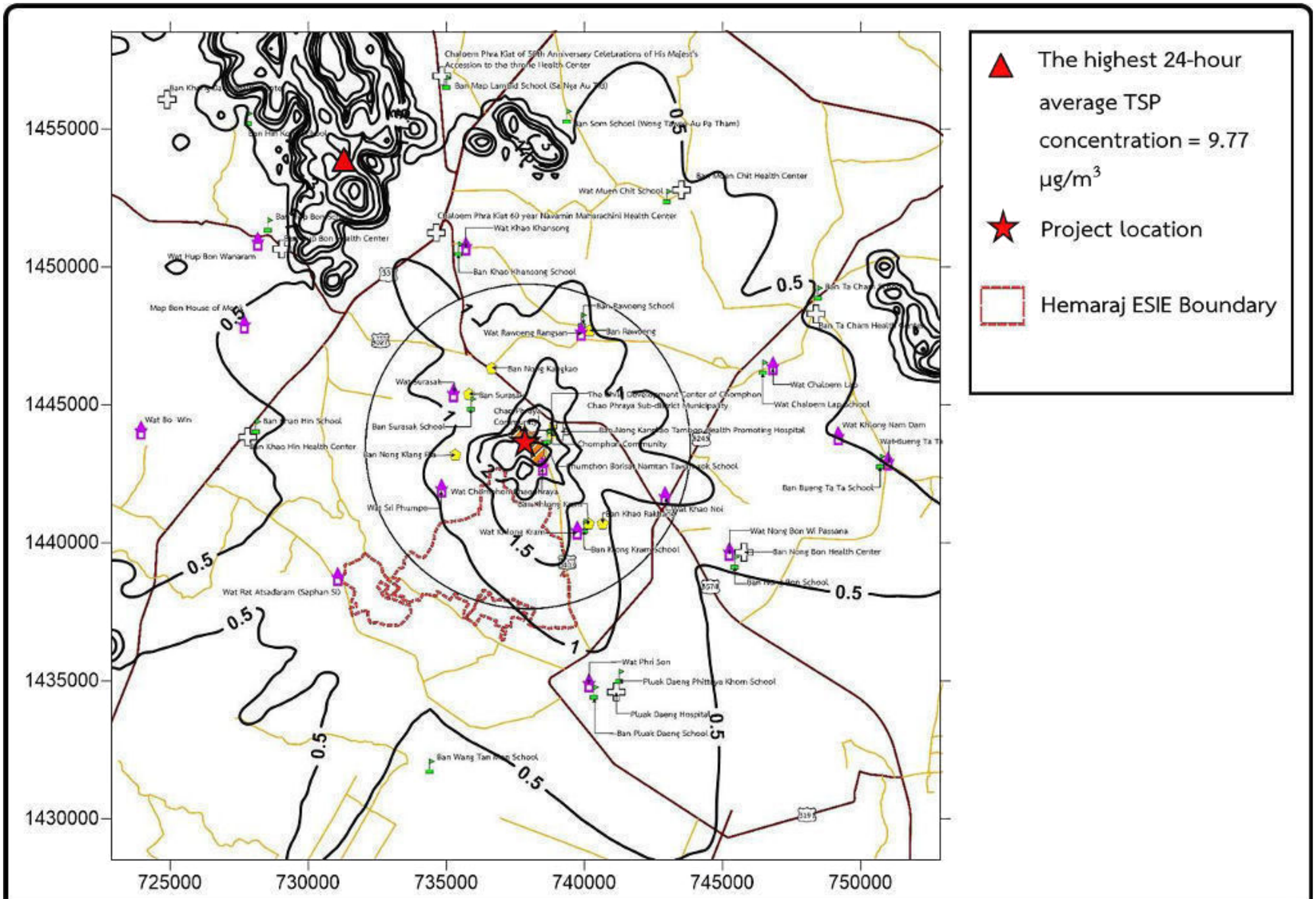


FIGURE 5.1.1.1-28 : CONTOUR MAP OF 24 HR AVERAGE TSP CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

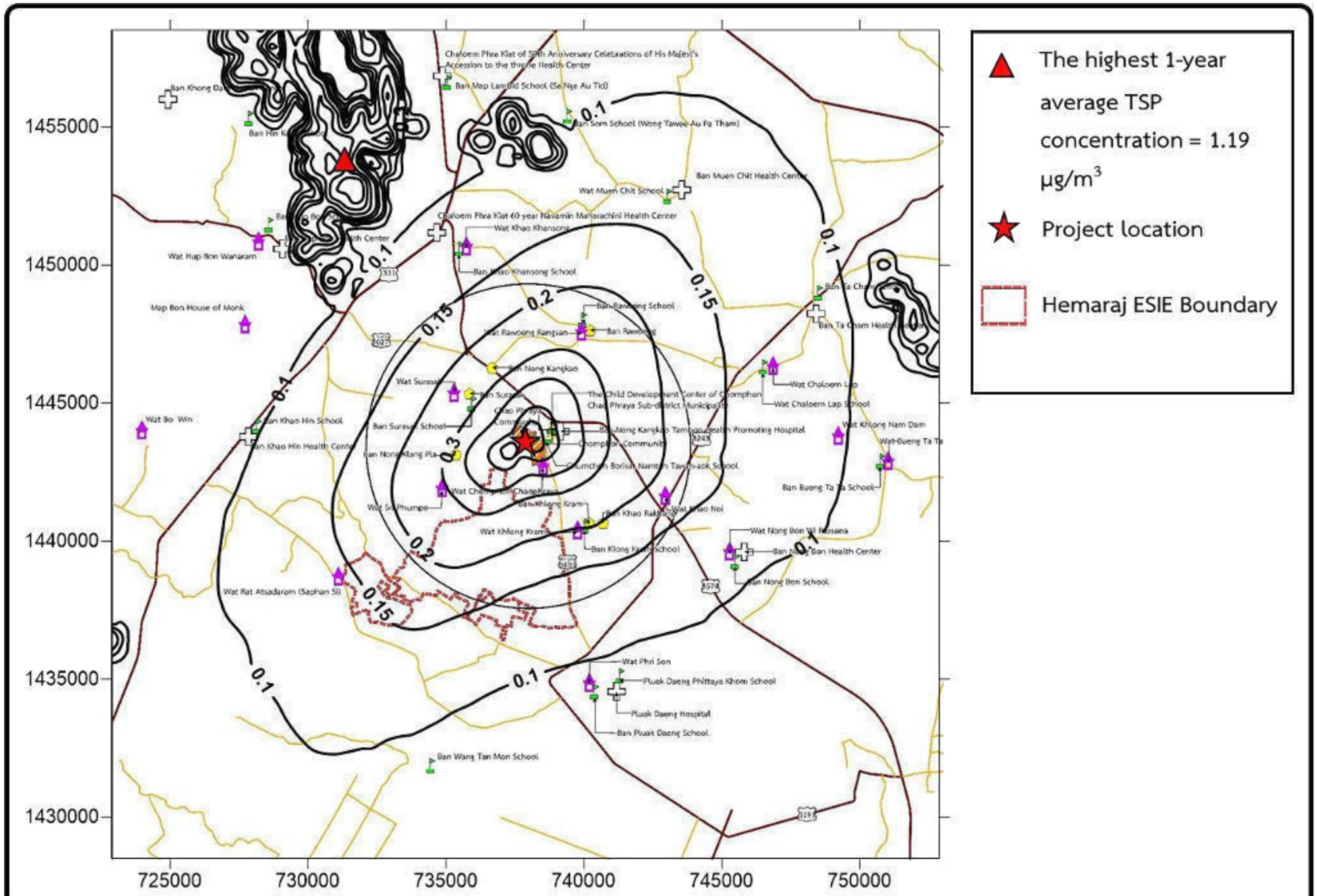


FIGURE 5.1.1.1-29 : CONTOUR MAP OF 1 YR AVERAGE TSP CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

When combining the above with the highest value from the current measurement, the highest 1 yr average TSP concentration in the atmosphere was 50.34 µg/m^3 or 50.34 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 28.82-49.70 µg/m^3 or 28.82-49.70 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

- **24 hr average and 1 yr average PM-10**

The operation of the project resulted in the general areas having the highest 24 hr average PM-10 concentration at 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 9.77 µg/m^3 or 8.14 % of the ambient air quality standard (24 hr average PM-10 must not exceed 120 µg/m^3). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 1.06-3.16 µg/m^3 or 0.88-2.63 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-30**.

When combining the above with the highest value from the current measurement, the highest 24 hr average PM-10 concentration in the atmosphere was 111.77 µg/m^3 or 93.14 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 43.18-103.22 µg/m^3 or 35.98-86.02 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

The highest 1 yr average PM-10 concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011 N where Nam Jone Mountain is located. The value was 1.19 µg/m^3 or 2.38 % of the ambient air quality standard (1 yr average PM-10 must not exceed 50 µg/m^3). For 21 sensitive receptor areas, the 1 yr average PM-10 concentration in the atmosphere was between 0.19-0.91 µg/m^3 or 0.38-1.82 % of the ambient air quality standard as shown in **Table 5.1.1.1-12** and **Figure 5.1.1.1-31**.

When combining the above with the highest value from the current measurement, the highest concentration of PM-10 1 yr average in the atmosphere was 44.19 µg/m^3 or 88.90 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 13.15-43.55 µg/m^3 or 26.30-87.10 % of the ambient air quality standard as shown in **Table 5.1.1.1-12**.

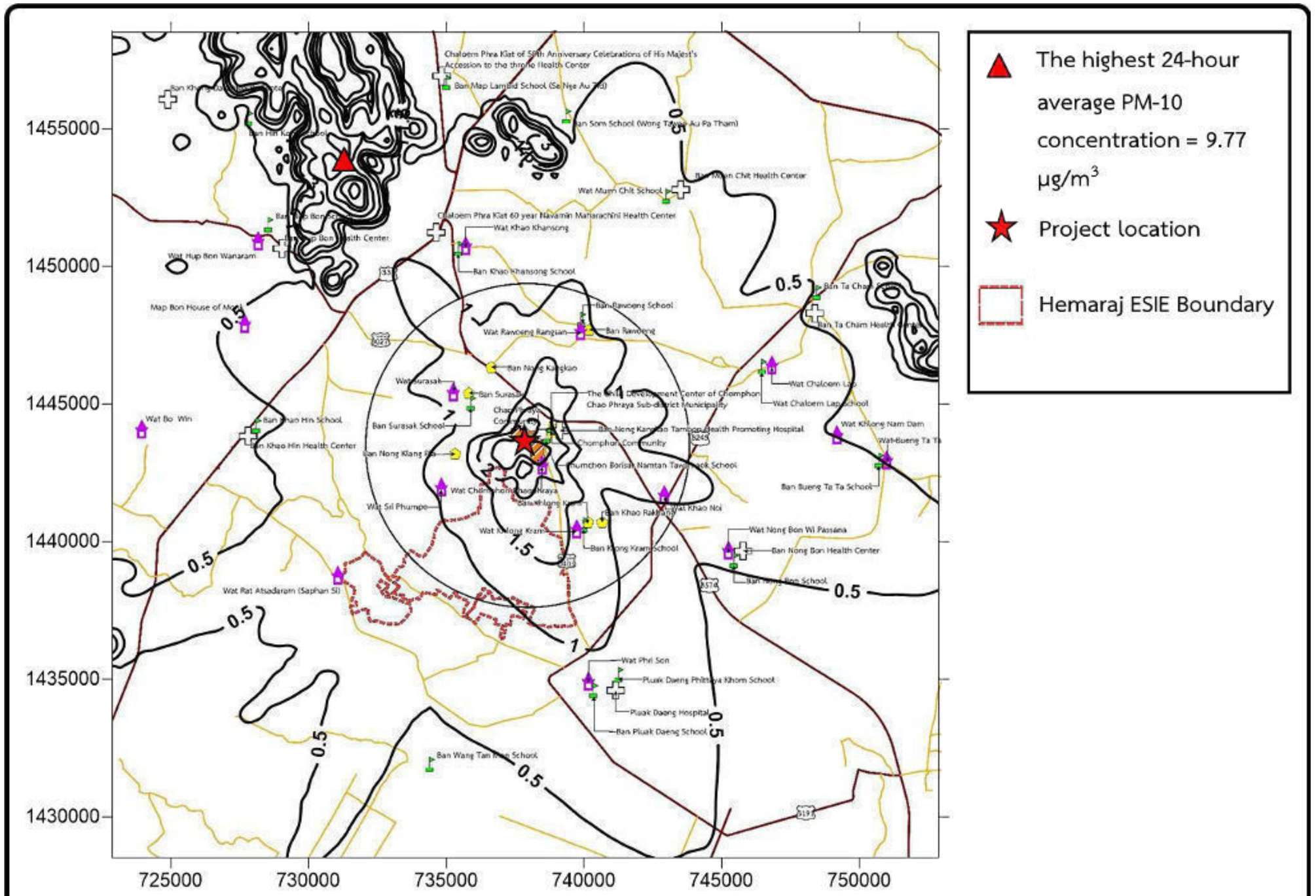


FIGURE 5.1.1.1-30 : CONTOUR MAP OF 24 HR AVERAGE PM-10 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

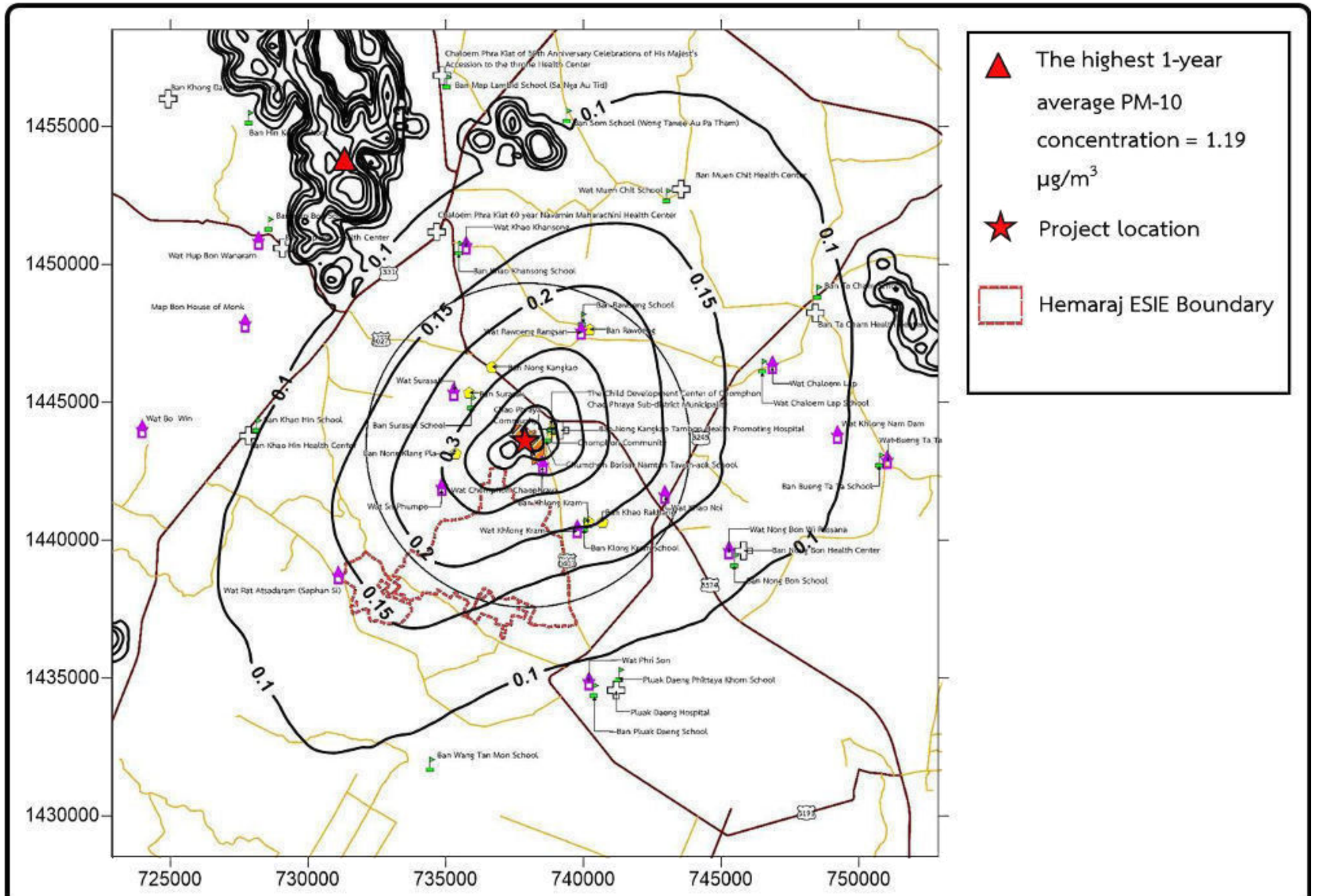


FIGURE 5.1.1.1-31 : CONTOUR MAP OF 1 YR AVERAGE PM-10 CONCENTRATION

SCENARIO 2 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 60% LOAD

(c) Scenario 3: Impact from Sriracha Power Plant when natural gas is used as fuel and operated at 100 % load, combined with current impact from other industrial factories that have been approved in the environmental impact assessment report but have not yet released any air substance, and from the power plants in the development plan by Gulf Group Company that are located within the radius of 15 km from the project location.

- **1 hr average and 1 yr average NO_2**

NO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average NO_2 concentration at 12.06 km north-northwest (NNW) of the project at coordinates: 736878 E 1455511 N where Mai Rai Mountain is located. The value was 187.30 µg/m^3 or 58.53 % of the ambient air quality standard (1 hr average NO_2 must not exceed 320 µg/m^3). For 21 sensitive receptor areas, the 1 hr average NO_2 concentration in the atmosphere was between 53.78-80.98 µg/m^3 or 16.81-25.30 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-32**.

When combining the above with the highest value from the current measurement, the highest 1 hr average NO_2 concentration in the atmosphere was 289.93 µg/m^3 or 90.60 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 87.66-183.58 µg/m^3 or 27.40-57.37 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

The highest 1 yr average NO_2 concentration was found 3.00 km south (S) of the project area at coordinates: 738378 E 1440511N where it is an Industrial area within Hemaraj ESIE. The value was 6.16 µg/m^3 or 10.81 % of the ambient air quality standard (NO_2 1 yr average must not exceed 57 µg/m^3). For 21 sensitive receptor areas, the 1 yr average NO_2 concentration in the atmosphere was between 3.45-5.17 µg/m^3 or 6.05-9.07 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-33**.

When combining the above with the highest value from the current measurement, the highest 1 yr average NO_2 concentration in the atmosphere was 21.60 µg/m^3 or 37.89 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 9.56-20.29 µg/m^3 or 16.77-35.60 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

TABLE 5.1.1.1-13

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 3: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100 % LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASED ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION.

Unit : $\mu g/m^3$

Study Area	Highest concentration value from results of assessment, case 3																										
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
Highest concentration value	187.3	102.63[1/]	289.93	6.16	15.44[1/]	21.60	84.35	106.91[1/]	191.26	12.58	56.06[1/]	68.64	2.66	15.72[1/]	18.38	15.42	170.86[1/]	186.28	2.81	49.15[1/]	51.96	15.42	102[1/]	117.42	2.81	43[1/]	45.81
Coordinates	736878E, 1455511N			738378E, 1440511N			731878E, 1452011N			731878E, 1453011N			731878E, 1453011N			732378E, 1452011N			732378E, 1452011N			732378E, 1452011N			732378E, 1452011N		
Area	Mai Rai Mountain			Industrial			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain			Nam Jone Mountain		
Direction and distance	N (12.06 km)			S (3.00 km)			NNW (10.34 km)			NNW (11.27 km)			NNW (11.27 km)			NNW (10.15 km)			NNW (10.15 km)			NNW (10.15 km)			NNW (10.15 km)		
Land utilization	Mountain			Industrial Estate			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain		
Sensitive Area																											
1. Ban Nong Kangkao Tambon Health Promoting Hospital	58.3	31.8	90.10	5.13	5.18	10.31	16.92	11.53	28.45	2.93	6.29	9.22	1.18	1.93	3.11	3.42	129	132.42	1.43	39.64	41.07	3.42	67	70.42	1.43	20.59	22.02
2. Ban Rawoeng School	76.34	38.01	114.35	3.53	6.19	9.72	18.6	9.43	28.03	3.16	5.76	8.92	0.69	1.77	2.46	3.62	93	96.62	0.81	28.58	29.39	3.62	42	45.62	0.81	12.91	13.72
3. Ban Surasak School	56.85	47.23	104.08	3.98	7.69	11.67	14.89	11.27	26.16	2.52	6.29	8.81	0.79	1.93	2.72	2.94	153	155.94	0.95	47.01	47.96	2.94	81	83.94	0.95	24.89	25.84
4. Chumchon Borisat Namtan Tawan-aok School	57.63	31.8	89.43	5.05	5.18	10.23	15.83	11.53	27.36	3.49	6.29	9.78	1.29	1.93	3.22	4.26	129	133.26	1.56	39.64	41.20	4.26	67	71.26	1.56	20.59	22.15
5. Ban Khlong Kram School	61.42	37.26	98.68	5.01	6.06	11.07	17.85	9.43	27.28	3.16	5.76	8.92	0.9	1.77	2.67	3.96	131	134.96	1.04	40.25	41.29	3.96	61	64.96	1.04	18.74	19.78
6. Wat Rawoeng Rangsan	76.02	38.01	114.03	3.59	6.19	9.78	18.64	9.43	28.07	3.17	5.76	8.93	0.7	1.77	2.47	3.62	93	96.62	0.83	28.58	29.41	3.62	42	45.62	0.83	12.91	13.74
7. Wat Surasak	56.97	47.23	104.20	3.45	15.44	18.89	15.87	12.84	28.71	2.39	7.34	9.73	0.68	15.72	16.40	3.02	118	121.02	0.79	49.15	49.94	3.02	45	48.02	0.79	43	43.79
8. Wat Chompon Chao Phraya	56.93	47.23	104.16	4.85	15.44	20.29	17.2	11.27	28.47	3.31	6.29	9.60	1.05	15.72	16.77	4.31	153	157.31	1.24	49.15	50.39	4.31	81	85.31	1.24	43	44.24
9. Wat Khlong Kram	61.22	37.26	98.48	5.02	6.06	11.08	17.87	9.43	27.30	3.18	5.76	8.94	0.9	1.77	2.67	3.98	131	134.98	1.05	40.25	41.30	3.98	61	64.98	1.05	18.74	19.79
10. Wat Khao Noi	61.52	37.26	98.78	4.09	6.06	10.15	16.77	9.43	26.20	1.91	5.76	7.67	0.68	1.77	2.45	2.16	131	133.16	0.75	40.25	41.00	2.16	61	63.16	0.75	18.74	19.49
11. Wat Sri Phumpo	55.79	34.25	90.04	3.99	5.57	9.56	19.33	12.84	32.17	2.39	7.34	9.73	0.83	2.26	3.09	2.91	118	120.91	0.94	36.26	37.20	2.91	45	47.91	0.94	13.83	14.77
12. Moo 7 Ban Rawoeng, Khao Khansong Sub-district	75.12	38.01	113.13	3.56	6.19	9.75	18.74	9.43	28.17	3.09	5.76	8.85	0.69	1.77	2.46	3.52	93	96.52	0.82	28.58	29.40	3.52	42	45.52	0.82	12.91	13.73
13. Moo 5 Ban Surasak, Khao Khansong Sub-district	58.75	47.23	105.98	3.72	7.69	11.41	14.64	11.27	25.91	2.49	6.29	8.78	0.73	1.93	2.66	3.06	153	156.06	0.87	47.01	47.88	3.06	81	84.06	0.87	24.89	25.76
14. Moo 7 Ban Nong Kang Pla, Bowin Sub-district	54.8	34.25	89.05	3.99	5.57	9.56	16.92	12.84	29.76	2.41	7.34	9.75	0.82	2.26	3.08	2.95	118	120.95	0.95	36.26	37.21	2.95	45	47.95	0.95	13.83	14.78
15. Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	80.95	102.63	183.58	3.67	15.44	19.11	14.36	106.91	121.27	2.61	56.06	58.67	0.72	11.26	11.98	3.45	170.86	174.31	0.86	49.15	50.01	3.45	102	105.45	0.86	33.92	34.78
16. Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	65.17	37.26	102.43	4.54	6.06	10.60	18.49	9.43	27.92	2.39	5.76	8.15	0.88	1.77	2.65	2.69	131	133.69	1.04	40.25	41.29	2.69	61	63.69	1.04	18.74	19.78
17. Moo 1 Ban Khlong Kram, Ta Sit Sub-district	59.07	37.26	96.33	4.95	6.06	11.01	17.9	9.43	27.33	3.08	5.76	8.84	0.88	1.77	2.65	3.84	131	134.84	1.02	40.25	41.27	3.84	61	64.84	1.02	18.74	19.76
18. Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	55.86	31.8	87.66	5.15	5.18	10.33	16.04	11.53	27.57	3.49	6.29	9.78	1.24	1.93	3.17	4.04	129	133.04	1.51	39.64	41.15	4.04	67	71.04	1.51	20.59	22.10

TABLE 5.1.1.1-13 (Cont'd)

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 3: IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100 % LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASED ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION.

Unit : $\mu g/m^3$

ที่ Study Area	Highest concentration value from results of assessment, case 3																									
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total
19. Chompon Community, Chompon Chao Phraya Sub-district Municipality	57.38	31.8	89.18	5.15	5.18	10.33	16.26	11.53	27.79	3.4	6.29	9.69	1.21	1.93	3.14	3.94	129	132.94	1.48	39.64	41.12	3.94	67	70.94	1.48	20.59	22.07
20. The Praow Village	53.78	47.23	101.01	4.7	7.69	12.39	16.71	11.27	27.98	2.96	6.29	9.25	1.02	1.93	2.95	3.86	153	156.86	1.19	47.01	48.20	3.86	81	84.86	1.19	24.89	26.08
21. The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	58.3	31.8	90.10	5.17	5.18	10.35	15.75	11.53	27.28	3.51	6.29	9.80	1.24	1.93	3.17	4.29	129	133.29	1.52	39.64	41.16	4.29	67	71.29	1.52	20.59	22.11
Standard[2/]	320			57			780			300			100			330			100			120			50		

Remark : [1/] Reference **Table 5.1.1.1-3** Highest values from ambient air quality monitoring near the project area.

[2/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.

[3/] Standard reference:

- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 24 B.E.2547 (2004)
- Ambient nitrogen dioxide standard in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)
- Ambient sulfur dioxide 1 hour standard in accordance with the notification of National Environmental Committee Vol. 12 B.E.2538 (1995)
- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 10 B.E.2538 (1995)

Source : Team Consulting Engineering and Management Co., Ltd., 2015

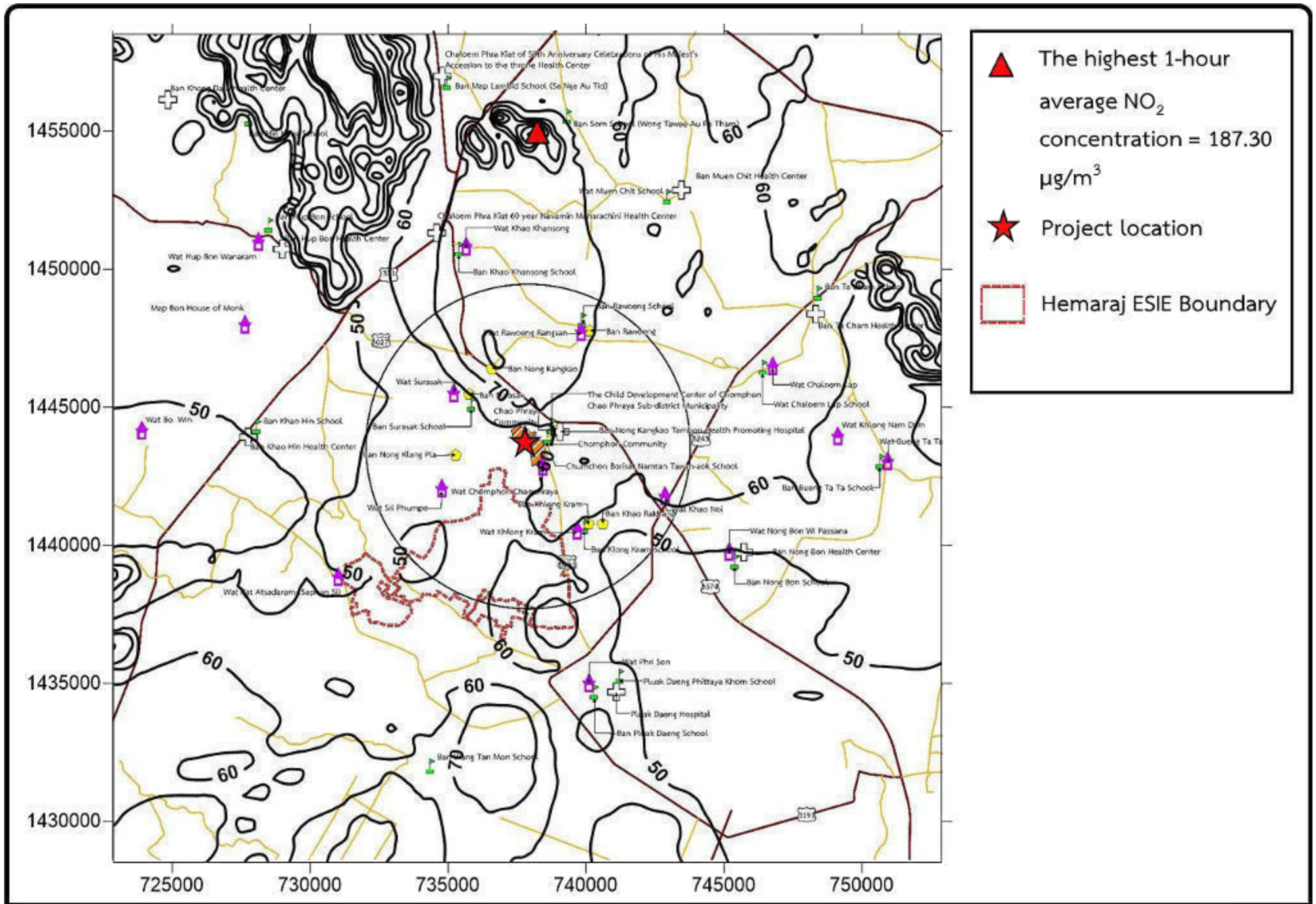


FIGURE 5.1.1.1-32 : CONTOUR MAP OF 1 HR AVERAGE NO_2 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

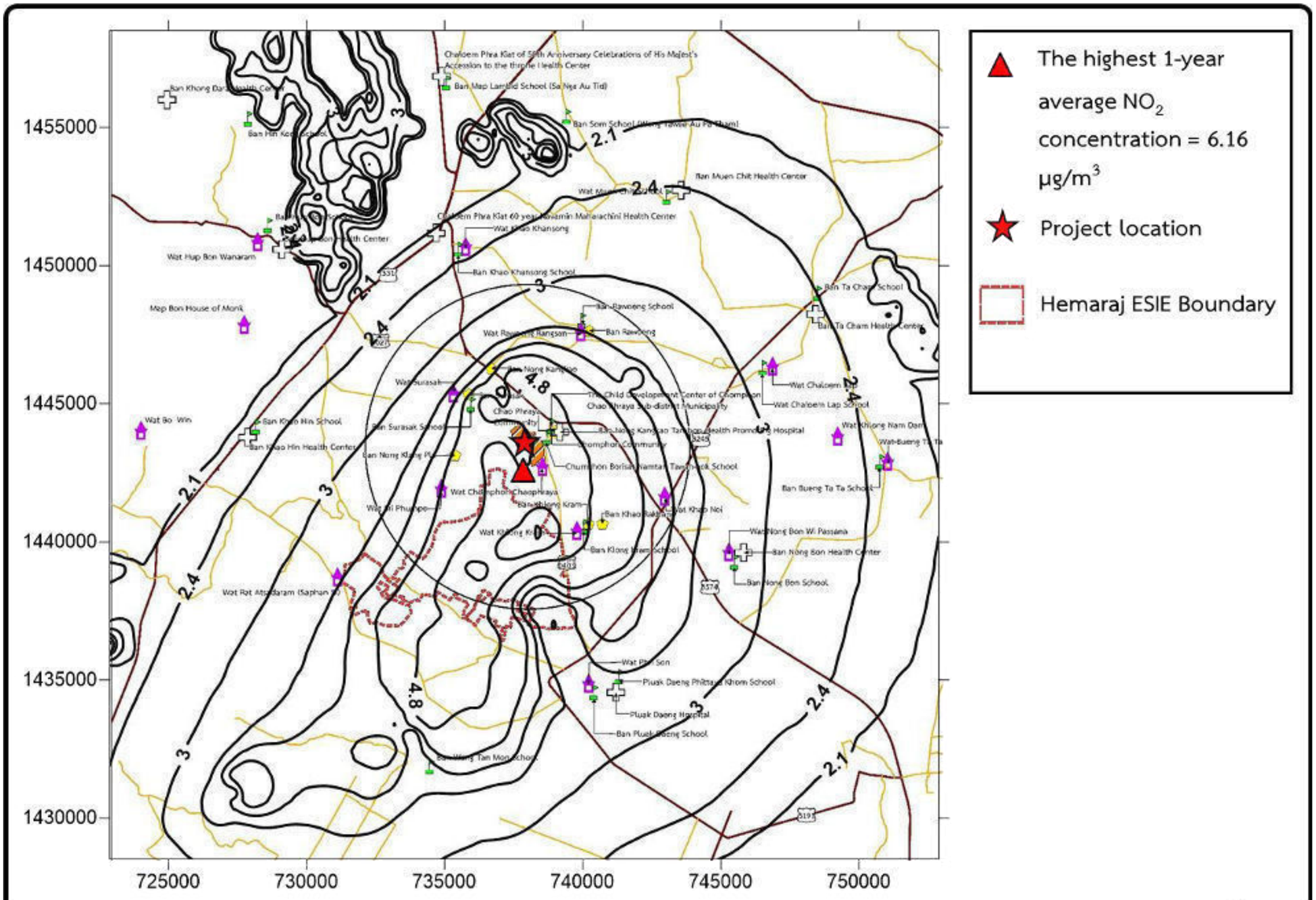


FIGURE 5.1.1.1-33 : CONTOUR MAP OF 1 YR AVERAGE NO_2 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

- **1 hr average, 24 hr average and 1 yr average SO_2**

SO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average SO_2 concentration at 10.34 km north-northwest (NNW) of the project area at coordinates: 731878E 1452011N where Nam Jone Mountain is located. The value was 84.35 µg/m^3 or 10.81 % of the ambient air quality standard (SO_2 1 hr average must not exceed 780 µg/m^3). For 21 sensitive receptor areas, the 1 hr average SO_2 concentration in the atmosphere was between 14.36-19.33µg/m^3 or 1.84-2.48 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-34**.

When combining the above with the highest value from the current measurement, the highest SO_2 1 hr average concentration in the atmosphere was 191.26 µg/m^3 or 24.52 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 25.91-121.27 µg/m^3 or 3.32-15.55 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

The highest SO_2 24 hr average concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878E 1453011N where Nam Jone Mountain is located. The value was 12.58 µg/m^3 or 4.19 % of the ambient air quality standard (SO_2 24 hr average must not exceed 300 µg/m^3). For 21 sensitive receptor areas, the 24 hr average SO_2 concentration in the atmosphere was between 1.91-3.51 µg/m^3 or 0.64-1.17 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-35**.

When combining the above with the highest value from the current measurement, the highest 24 hr average SO_2 concentration in the atmosphere was 68.64 µg/m^3 or 22.88 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 7.67-58.67 µg/m^3 or 2.56-19.56 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

The highest SO_2 1 yr average concentration was found 11.27 km north-northwest (NNW) of the project area at coordinates: 731878 E 1453011 N where Nam Jone Mountain is located. The value was 2.66 µg/m^3 or 2.66 % of the ambient air quality standard (SO_2 1 yr average must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the SO_2 1 yr average concentration in the atmosphere was between 0.68-1.29 µg/m^3 or 0.68-1.29 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-36**.

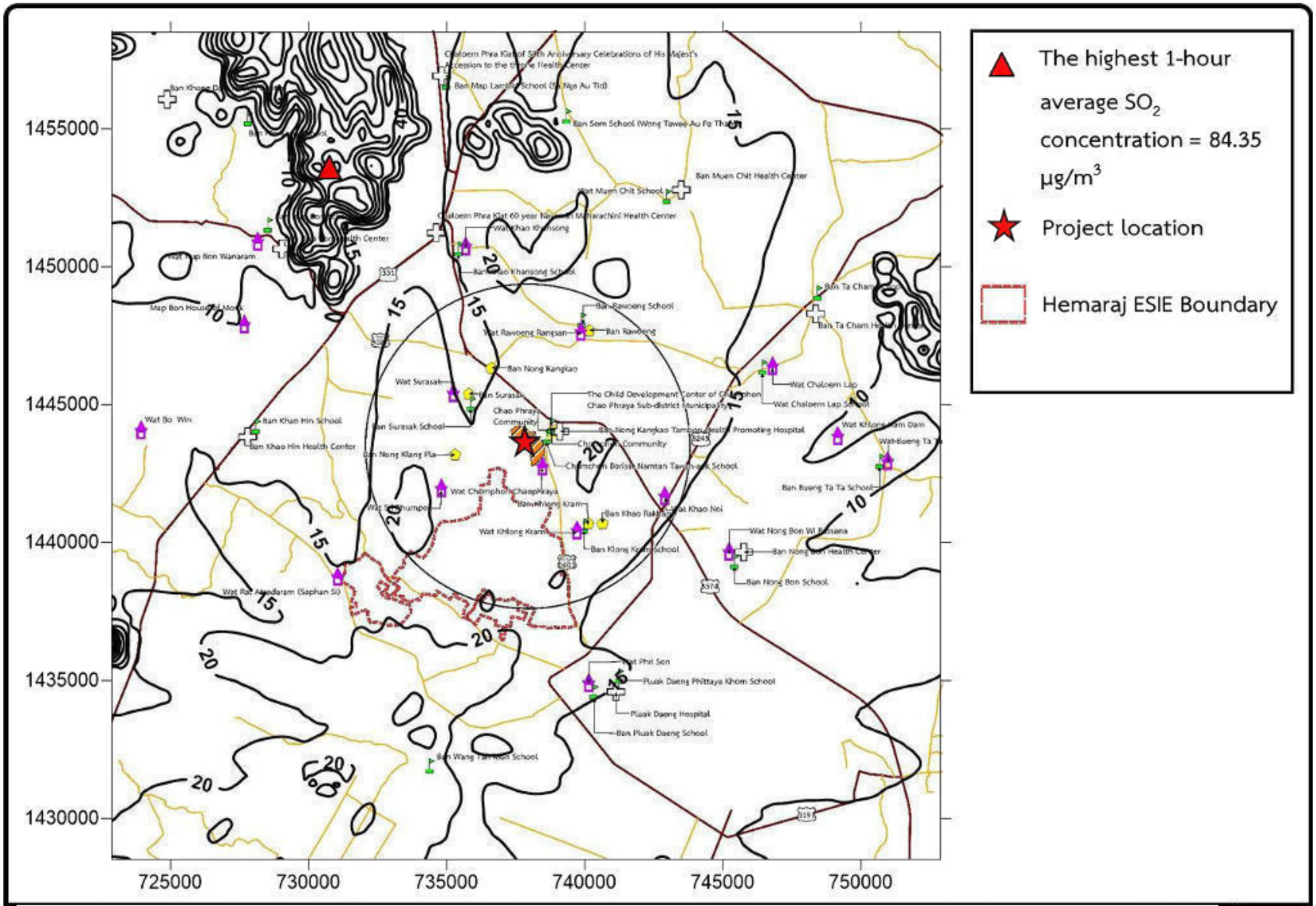


FIGURE 5.1.1.1-34 : CONTOUR MAP OF 1 HR AVERAGE SO_2 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

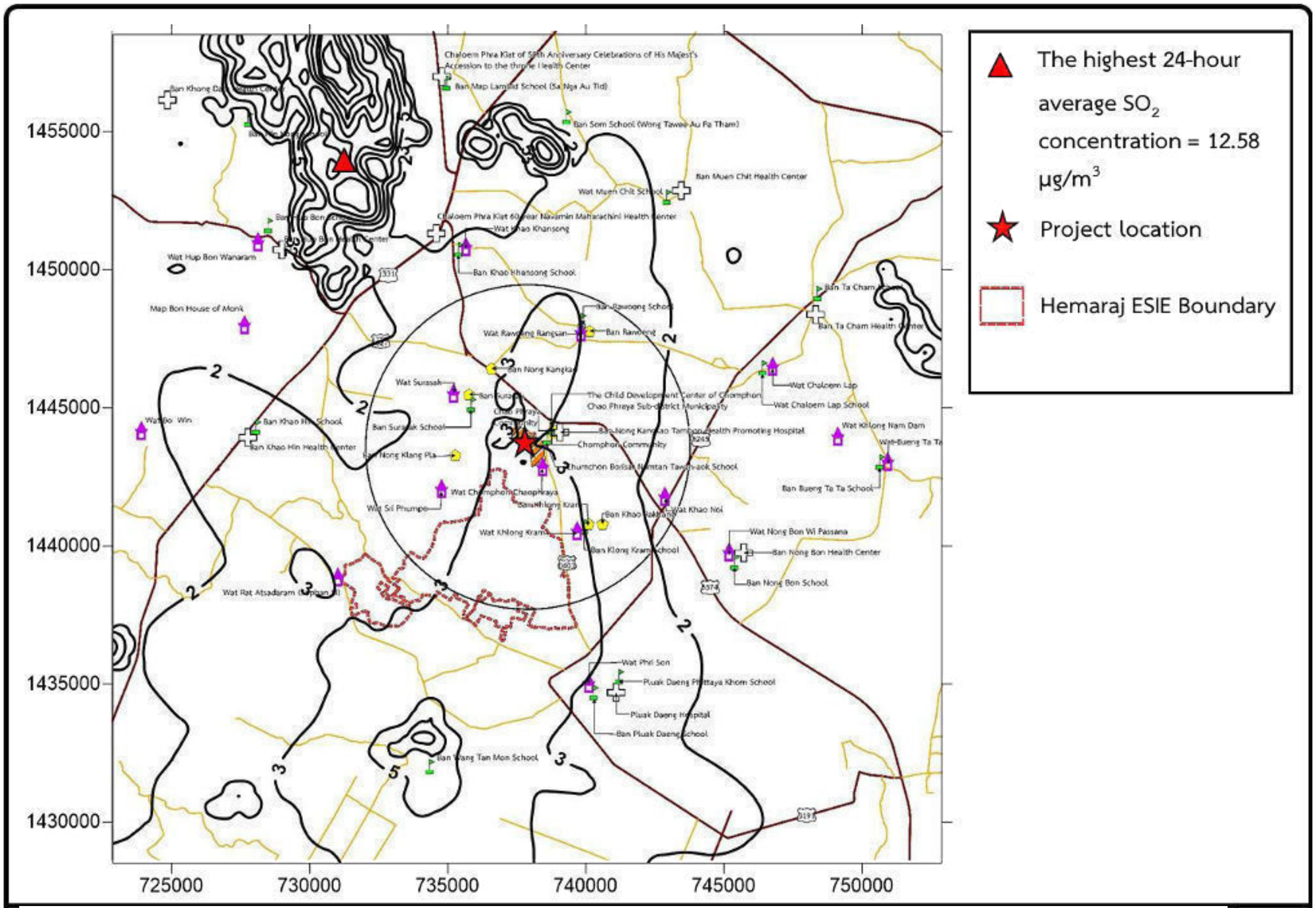


FIGURE 5.1.1.1-35 : CONTOUR MAP OF 24 HR AVERAGE NO_2 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

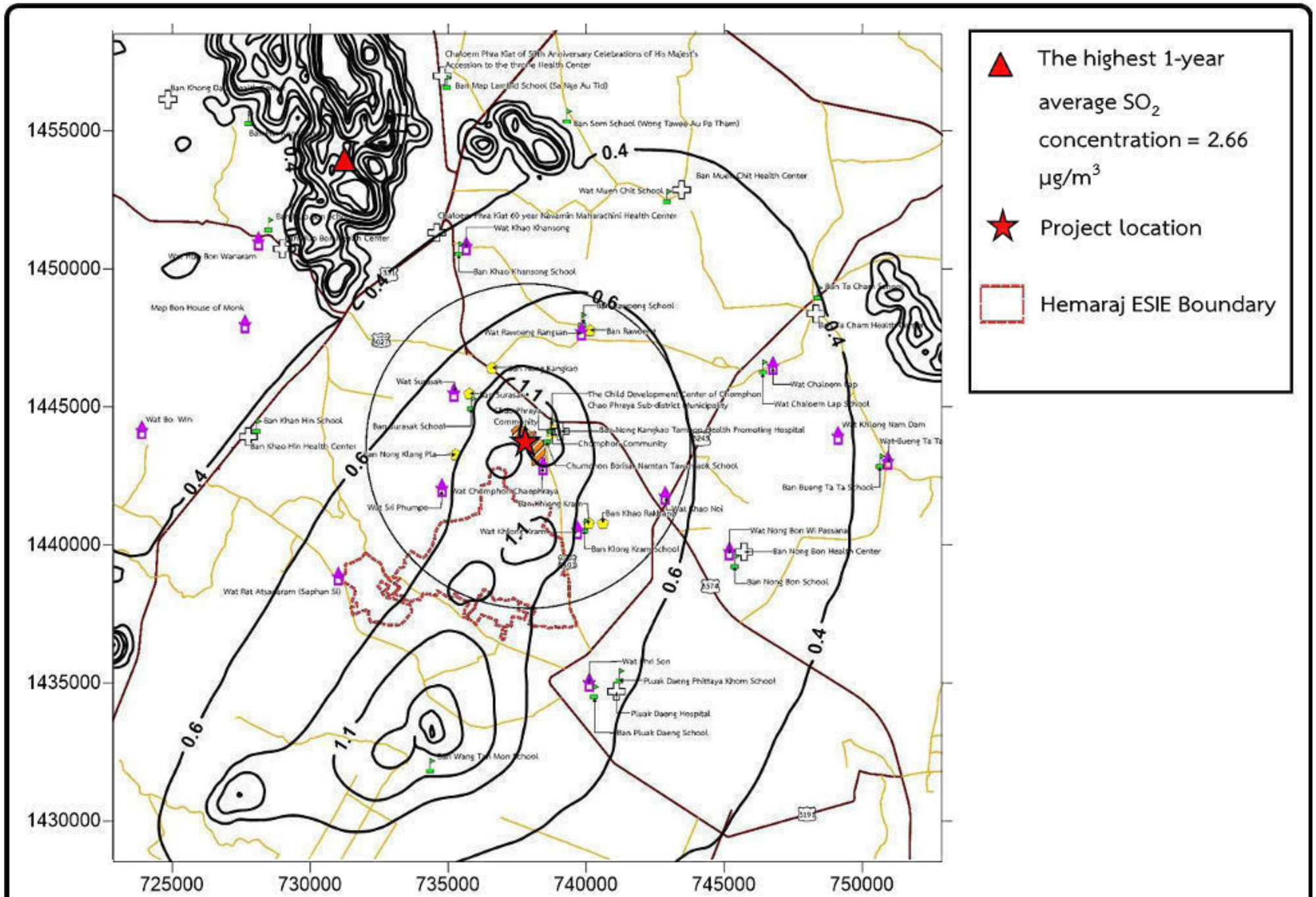


FIGURE 5.1.1.1-36 : CONTOUR MAP OF 1 YR AVERAGE SO_2 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

When combining the above with the highest value from the current measurement, the highest concentration of SO_2 1 yr average in the atmosphere was 18.38 µg/m^3 or 18.38 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 2.45-16.77 µg/m^3 or 2.45-16.77 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

- **24 hr average and 1 yr average TSP**

The operation of the project resulted in the general areas having the highest 24 hr average TSP concentration at 10.15 km north-northwest (NNW) of the project area at coordinates: 732378 E 1452011 N where Nam Jone Mountain is located. The value was 15.42 µg/m^3 or 4.67 % of the ambient air quality standard (24 hr average TSP must not exceed 330 µg/m^3). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 2.16-4.31 µg/m^3 or 0.65-1.31 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-37**.

The above value when combined with the existing data, the highest 24 hr average TSP concentration in the atmosphere was 186.28 µg/m^3 or 56.45 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 96.52-174.31 µg/m^3 or 29.25-52.82 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

The highest 1 yr average TSP concentration was found 10.15 km north-northwest (NNW) of the project area at coordinates: 732378 E 1452011 N where Nam Jone Mountain is located. The value was 2.81 µg/m^3 or 2.81 % of the ambient air quality standard (1 yr average TSP must not exceed 100 µg/m^3). For 21 sensitive receptor areas, the 1 yr average TSP concentration in the atmosphere was between 0.75-1.56 µg/m^3 or 0.75-1.56 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-38**.

When combining the above with the highest value from the current measurement, the highest 1 yr average TSP concentration in the atmosphere was 51.96 µg/m^3 or 51.96 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 29.39-50.39 µg/m^3 or 29.39-50.39 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

- **24 hr average and 1 yr average PM-10**

The operation of the project resulted in the general areas having the highest 24 hr average PM-10 concentration at 10.15 km north-northwest (NNW) of the project area at coordinates: 732378 E 1452011 N where Nam Jone Mountain is located. The value was 15.42 $\mu g/m^3$ or 12.85 % of the ambient air quality standard (24 hr average PM-10 must not exceed 120 $\mu g/m^3$). For 21 sensitive receptor areas, the 24 hr average TSP concentration in the atmosphere was between 2.16-4.31 $\mu g/m^3$ or 1.80-3.59 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-39**.

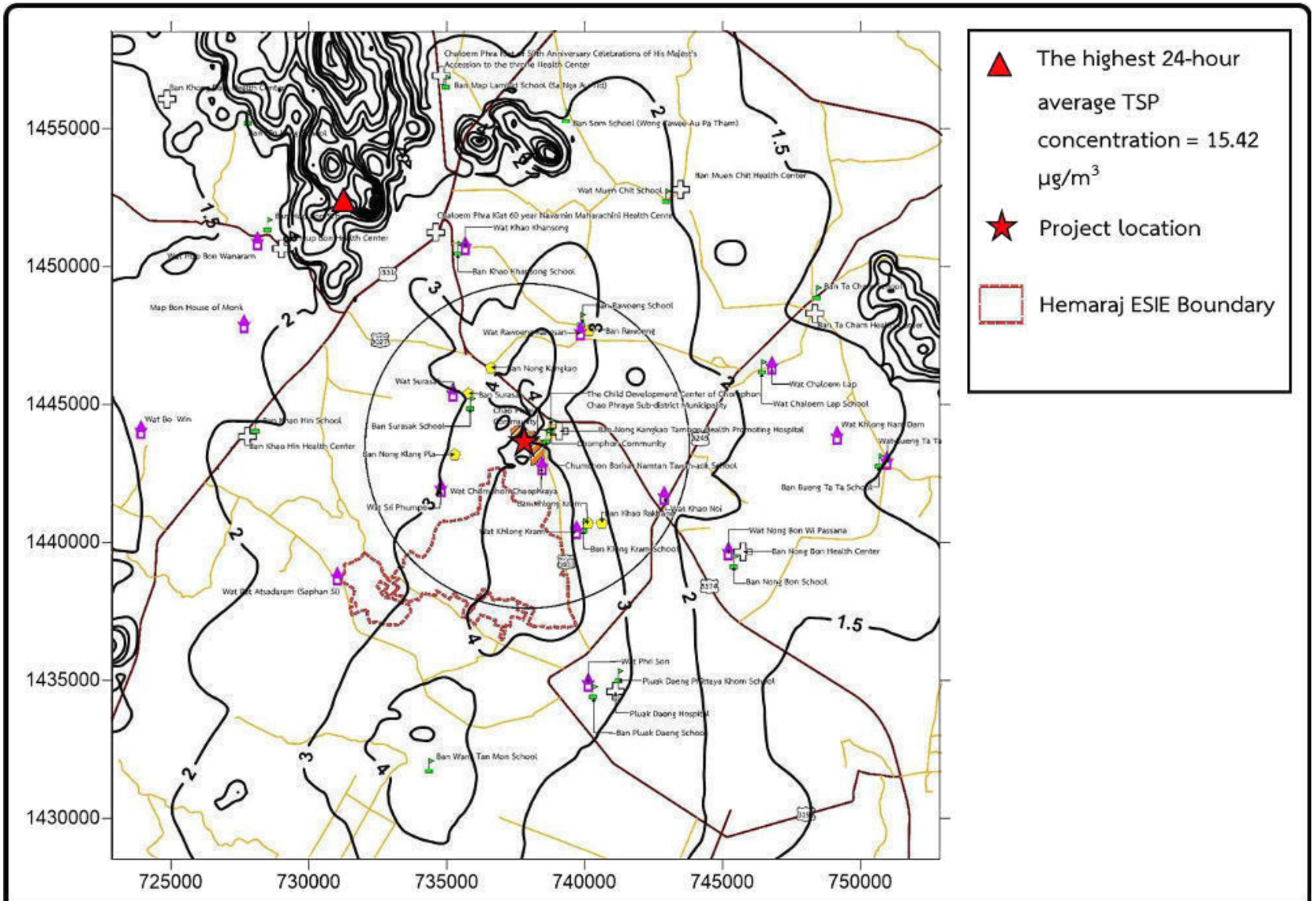


FIGURE 5.1.1.1-37 : CONTOUR MAP OF 24 HR AVERAGE TSP CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

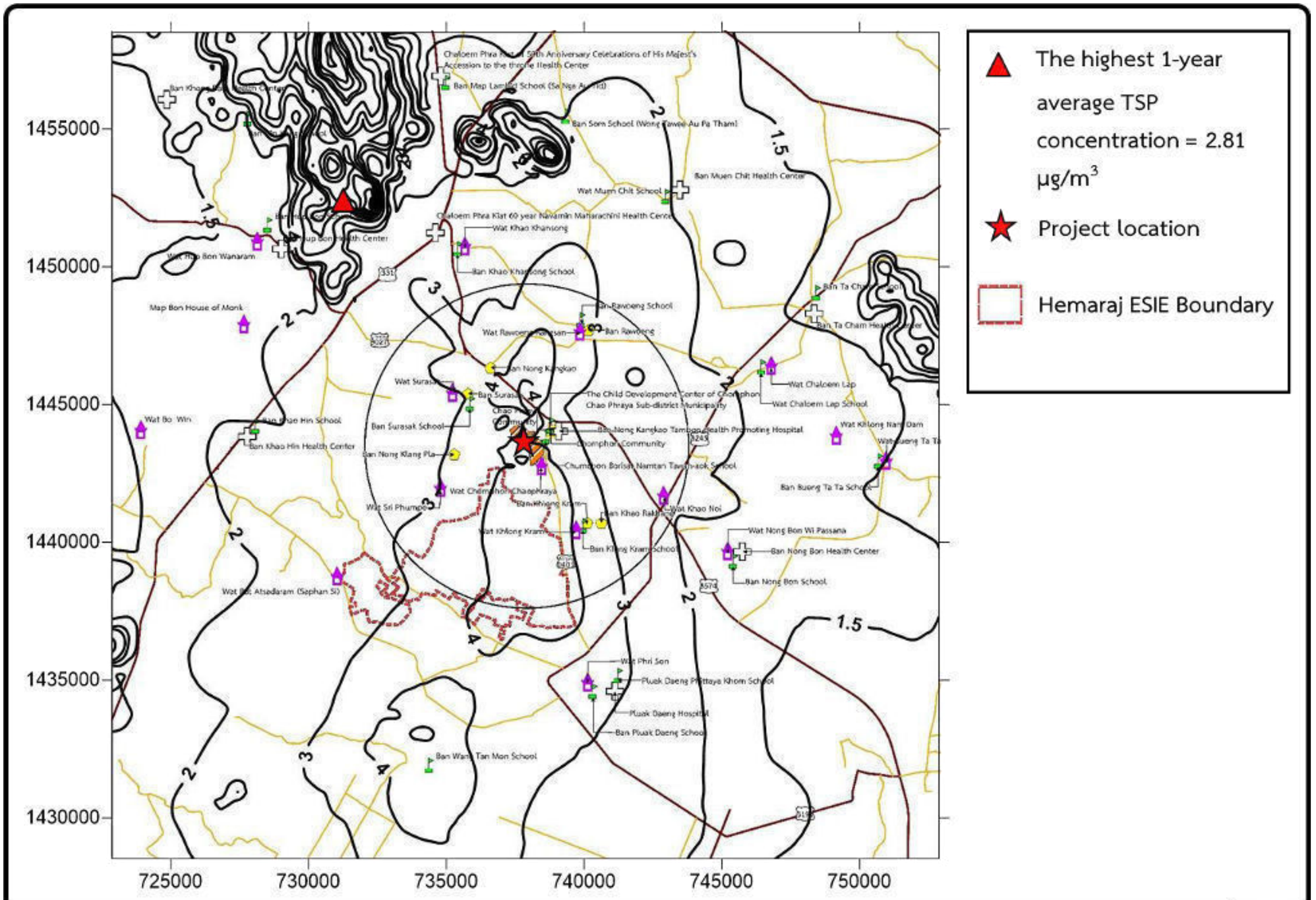


FIGURE 5.1.1.1-38 : CONTOUR MAP OF 1 YR AVERAGE TSP CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

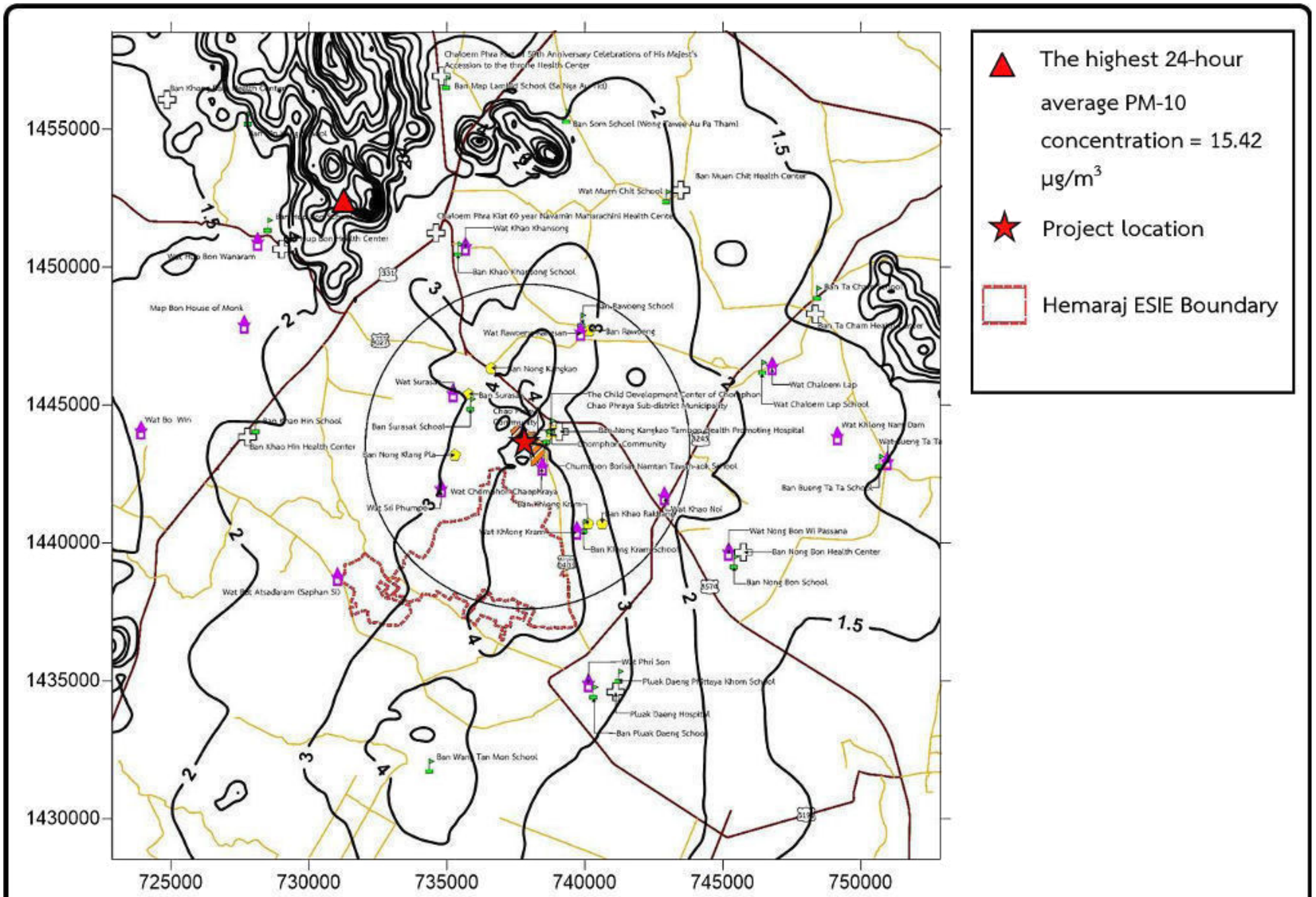


FIGURE 5.1.1.1-39 : CONTOUR MAP OF 24 HR AVERAGE PM-10 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

When combining the above with the highest value from the current measurement, the highest 24 hr average PM-10 concentration in the atmosphere was 117.42 µg/m^3 or 97.85 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 45.52-105.45 µg/m^3 or 37.93-87.88 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

The highest 1 yr average PM-10 concentration was found 10.15 km north-northwest (NNW) of the project area at coordinates: 732378 E 1452011 N where Nam Jone Mountain is located. The value was 2.81 µg/m^3 or 5.62 % of the ambient air quality standard (1 yr average PM-10 must not exceed 50 µg/m^3). For 21 sensitive receptor areas, the 1 yr average PM-10 concentration in the atmosphere was between 0.75-1.56 µg/m^3 or 1.50-3.12 % of the ambient air quality standard as shown in **Table 5.1.1.1-13** and **Figure 5.1.1.1-40**.

When combining the above with the highest value from the current measurement, the highest concentration of PM-10 1 yr average in the atmosphere was 45.81 µg/m^3 or 91.62 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 13.72-44.2 µg/m^3 or 27.44-88.48 % of the ambient air quality standard as shown in **Table 5.1.1.1-13**.

(d) Scenario 4: Impact from Sriracha Power Plant when diesel is used as fuel and operated at 100 % load.

- **1 hr average and 1 yr average NO_2**

NO_2 is one of the major air substances which has been released to the atmosphere during the project operation and which resulted in the general areas having the highest 1 hr average NO_2 concentration at 13.48 km north-northwest (NNW) of the project at coordinates: 730878 E 1455011 N where Chomphu Mountain is located. The value was 44.09 µg/m^3 or 13.78 % of the ambient air quality standard (1 hr average NO_2 must not exceed 320 µg/m^3). For 21 sensitive receptor areas, the 1 hr average NO_2 concentration in the atmosphere was between 8.35-13.45 µg/m^3 or 2.61-4.20 % of the ambient air quality standard as shown in **Table 5.1.1.1-14** and **Figure 5.1.1.1-41.**

When combining the above with the highest value from the current measurement, the highest 1 hr average NO_2 concentration in the atmosphere was 146.72 µg/m^3 or 45.85 % of the ambient air quality standard. For 21 sensitive receptor areas, the value was between 43.40-115.76 µg/m^3 or 13.56-36.18 % of the ambient air quality standard as shown in **Table 5.1.1.1-14**.

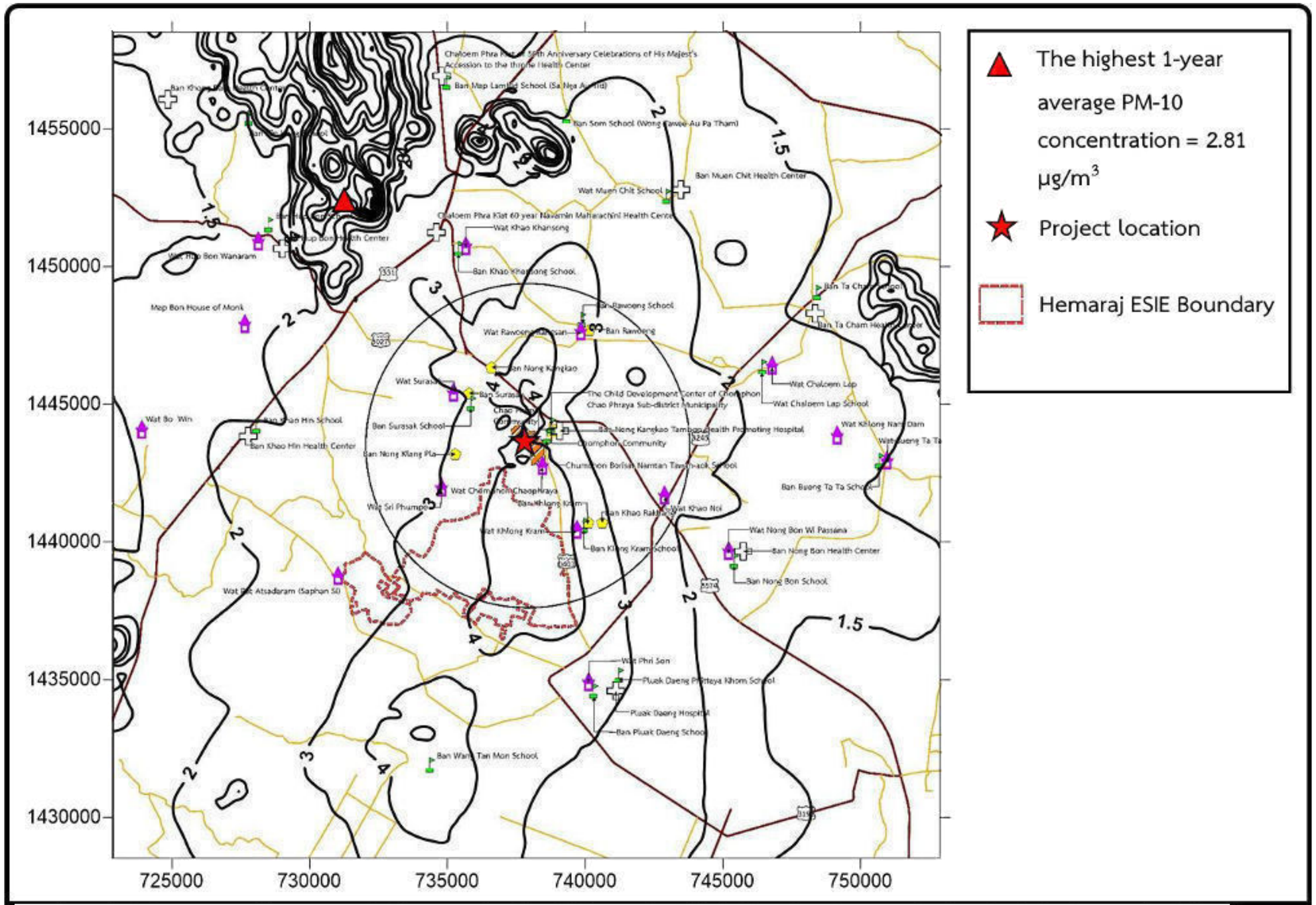


FIGURE 5.1.1.1-40 : CONTOUR MAP OF 1 YR AVERAGE PM-10 CONCENTRATION SCENARIO 3 : IMPACT FROM SRIRACHA POWER PLANT WHEN NATURAL GAS IS USED AS FUEL AND OPERATED AT 100% LOAD, COMBINED WITH CURRENT IMPACT FROM OTHER INDUSTRIAL FACTORIES THAT HAVE BEEN APPROVED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT BUT HAVE NOT YET RELEASE ANY AIR SUBSTANCE, AND FROM THE POWER PLANTS IN THE DEVELOPMENT PLAN BY GULF GROUP COMPANY THAT ARE LOCATED WITHIN THE RADIUS OF 15 KM FROM THE PROJECT LOCATION

TABLE 5.1.1.1-14

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 4: IMPACT FROM SRIRACHA POWER PLANT WHEN DIESEL IS USED AS FUEL AND OPERATED AT 100 % LOAD.

Unit : $\mu g/m^3$

Study Area	Highest concentration value from results of assessment, case 4																								
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	Total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	Total	model	monitor[2/]	total	model	monitor[2/]	total
Highest concentration value	44.09	102.63[1/]	146.72	0.98	15.44[1/]	16.42	116.38	106.91[1/]	223.29	19.29	56.06[1/]	75.35	2.58	15.72[1/]	18.30	11.74	170.86[1/]	182.60	1.58	49.15[1/]	50.73	11.74	102[1/]	113.74	1.58	43[1/]	44.58
Coordinates	730878E, 1455011N			738378E, 1444711N			731878E, 1453011N			730378E, 1454511N			732378E, 1455011N			730378E, 1454511N			732378E, 1455011N			730378E, 1454511N			732378E, 1455011N		
Area	Chomphu Mountain			Industrial			731878E, 1452011N			Chomphu Mountain			Chomphu Mountain			Chomphu Mountain			Chomphu Mountain			Chomphu Mountain			Chomphu Mountain		
Direction and distance Land utilization	NNW (13.48 km)			NNE (1.32 km)			NNW (11.27 km)			NNW (12.34 km)			NW (13.34 km)			NNW (12.34 km)			NW (13.34 km)			NNW (12.34 km)			NW (13.34 km)		
Sensitive Area	Mountain			Industrial Estate			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain			Mountain		
1. Ban Nong Kangkao Tambon Health Promoting Hospital																											
2. Ban Rawoeng School	12.67	31.8	44.47	0.93	5.18	6.11	14.89	11.53	26.42	3.43	6.29	9.72	1.1	1.93	3.03	2.10	129	131.10	0.68	39.64	40.32	2.10	67	69.10	0.68	20.59	21.27
3. Ban Surasak School	13.40	38.01	51.41	0.6	6.19	6.79	14.52	9.43	23.95	2.80	5.76	8.56	0.65	1.77	2.42	1.71	93	94.71	0.40	28.58	28.98	1.71	42	43.71	0.40	12.91	13.31
4. Chumchon Borisat Namtan Tawan-aok School	11.48	47.23	58.71	0.58	7.69	8.27	15.43	11.27	26.70	2.49	6.29	8.78	0.63	1.93	2.56	1.52	153	154.52	0.39	47.01	47.40	1.52	81	82.52	0.39	24.89	25.28
5. Ban Khlong Kram School	11.60	31.8	43.40	0.82	5.18	6.00	18.40	11.53	29.93	4.67	6.29	10.96	1.11	1.93	3.04	2.85	129	131.85	0.68	39.64	40.32	2.85	67	69.85	0.68	20.59	21.27
6. Wat Rawoeng Rangsan	9.06	37.26	46.32	0.46	6.06	6.52	13.09	9.43	22.52	3.20	5.76	8.96	0.57	1.77	2.34	1.95	131	132.95	0.35	40.25	40.60	1.95	61	62.95	0.35	18.74	19.09
7. Wat Surasak	13.45	38.01	51.46	0.62	6.19	6.81	14.43	9.43	23.86	2.81	5.76	8.57	0.67	1.77	2.44	1.71	93	94.71	0.41	28.58	28.99	1.71	42	43.71	0.41	12.91	13.32
8. Wat Chompon Chao Phraya	12.76	47.23	59.99	0.52	15.44	15.96	14.93	12.84	27.77	2.12	7.34	9.46	0.56	15.72	16.28	1.29	118	119.29	0.34	49.15	49.49	1.29	45	46.29	0.34	43	43.34
9. Wat Khlong Kram	12.24	47.23	59.47	0.65	15.44	16.09	23.61	11.27	34.88	4.53	6.29	10.82	0.79	15.72	16.51	2.75	153	155.75	0.48	49.15	49.63	2.75	81	83.75	0.48	43	43.48
10. Wat Khao Noi	8.68	37.26	45.94	0.45	6.06	6.51	13.33	9.43	22.76	3.19	5.76	8.95	0.56	1.77	2.33	1.95	131	132.95	0.34	40.25	40.59	1.95	61	62.95	0.34	18.74	19.08
11. Wat Sri Phumpo	8.36	37.26	45.62	0.47	6.06	6.53	11.6	9.43	21.03	2.36	5.76	8.12	0.52	1.77	2.29	1.44	131	132.44	0.32	40.25	40.57	1.44	61	62.44	0.32	18.74	19.06
12. Moo 7 Ban Rawoeng, Khao Khansong Sub-district	9.55	34.25	43.80	0.62	5.57	6.19	13.25	12.84	26.09	2.48	7.34	9.82	0.70	2.26	2.96	1.51	118	119.51	0.43	36.26	36.69	1.51	45	46.51	0.43	13.83	14.26
13. Moo 5 Ban Surasak, Khao Khansong Sub-district	13.42	38.01	51.43	0.61	6.19	6.80	14.57	9.43	24.00	2.75	5.76	8.51	0.66	1.77	2.43	1.68	93	94.68	0.41	28.58	28.99	1.68	42	43.68	0.41	12.91	13.32
14. Moo 7 Ban Nong Kang Pla, Bowin Sub-district	12.61	47.23	59.84	0.55	7.69	8.24	16.12	11.27	27.39	2.32	6.29	8.61	0.6	1.93	2.53	1.42	153	154.42	0.37	47.01	47.38	1.42	81	82.42	0.37	24.89	25.26
15. Moo 3 Ban Nong Kangkao, Ta Sit Sub-district	9.32	34.25	43.57	0.64	5.57	6.21	15.70	12.84	28.54	2.71	7.34	10.05	0.72	2.26	2.98	1.65	118	119.65	0.44	36.26	36.70	1.65	45	46.65	0.44	13.83	14.27
16. Moo 2 Ban Khao Rakhang, Ta Sit Sub-district	13.13	102.63	115.76	0.55	15.44	15.99	14.87	106.91	121.78	2.76	56.06	58.82	0.6	11.26	11.86	1.69	170.86	172.55	0.37	49.15	49.52	1.69	102	103.69	0.37	33.92	34.29
17. Moo 1 Ban Khlong Kram, Ta Sit Sub-district	8.35	37.26	45.61	0.74	6.06	6.80	12.85	9.43	22.28	2.54	5.76	8.30	0.83	1.77	2.60	1.55	131	132.55	0.51	40.25	40.76	1.55	61	62.55	0.51	18.74	19.25
18. Chao Phraya Community, Chompon Chao Phraya Sub-district Municipality	9.08	37.26	46.34	0.47	6.06	6.53	12.69	9.43	22.12	3.14	5.76	8.90	0.57	1.77	2.34	1.92	131	132.92	0.35	40.25	40.60	1.92	61	62.92	0.35	18.74	19.09

TABLE 5.1.1.1-14

RESULTS FROM THE ASSESSMENT ON AMBIENT AIR QUALITY USING MATHEMATICAL MODEL AERMOD COMBINED WITH THE HIGHEST VALUE FROM THE CURRENT MEASUREMENT IN NORMAL CIRCUMSTANCE (WITH NO INFLUENCE OF DOWNWASH)

SCENARIO 4: IMPACT FROM SRIRACHA POWER PLANT WHEN DIESEL IS USED AS FUEL AND OPERATED AT 100 % LOAD (Cont'd)

Unit : µg/m^3

Study Area	Highest concentration value from results of assessment, case 4																								
	NO_2 average 1 hr			NO_2 average 1 yr			SO_2 average 1 hr			SO_2 average 24 hr			SO_2 average 24 yr			TSP average 24 hr			TSP average 1 yr			PM-10 average 24 hr			PM-10 average 1 yr		
	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	total	model	monitor[2/]	Total	model	monitor[2/]	total	model	monitor[2/]	total
19. Chompon Community, Chompon Chao Phraya Sub-district Municipality	12.59	31.8	44.39	0.92	5.18	6.10	17.10	11.53	28.63	4.45	6.29	10.74	1.14	1.93	3.07	2.72	129	131.72	0.70	39.64	40.34	2.72	67	69.72	0.70	20.59	21.29
20. The Praow Village	12.62	31.8	44.42	0.94	5.18	6.12	16.05	11.53	27.58	4.15	6.29	10.44	1.13	1.93	3.06	2.54	129	131.54	0.69	39.64	40.33	2.54	67	69.54	0.69	20.59	21.28
21. The Child Development Center of Chomphon Chao Phraya Sub-district Municipality	10.69	47.23	57.92	0.55	7.69	8.24	18.41	11.27	29.68	3.18	6.29	9.47	0.68	1.93	2.61	1.95	153	154.95	0.42	47.01	47.43	1.95	81	82.95	0.42	24.89	25.31
22. 21. ศูนย์พัฒนาเด็กเล็ก ทต.จอมพลเจ้าพระยา	12.26	31.8	44.06	0.95	5.18	6.13	15.89	11.53	27.42	4.79	6.29	11.08	1.16	1.93	3.09	2.93	129	131.93	0.71	39.64	40.35	2.93	67	69.93	0.71	20.59	21.30
Standard[2/]	320			57			780			300			100			330			100			120			50		

Remark : [1/] Reference **Table 5.1.1.1-3** Highest values from ambient air quality monitoring near the project area.

[2/] Reference **Table 5.1.1.1-4** Highest value of the current air quality monitoring used as representative at sensitive receptors.

[3/] Standard reference:

- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 24 B.E.2547 (2004)
- Ambient nitrogen dioxide standard in accordance with the notification of National Environmental Committee Vol. 33 B.E.2552 (2009)
- Ambient sulfur dioxide 1 hour standard in accordance with the notification of National Environmental Committee Vol. 12 B.E.2538 (1995)
- Ambient air quality standard in accordance with the notification of National Environmental Committee Vol. 10 B.E.2538 (1995)

Source : Team Consulting Engineering and Management Co., Ltd., 2015