May 26th, 2020
Birzeit

Environment and Health Assessment Study for the Hot Blend Asphalt Plant (HBAP) in Birzeit Town[1]

Prepared by Birzeit University

An academic committee formed by Birzeit University's President and approved by Birzeit Municipality prepared this analytical study. The objective of this study was to assess the health and environmental impacts of the establishment of the Hot Blend Asphalt Plant (HBAP) in the industrial area of Birzeit Town. The study included: a critical review and analysis of the Environmental Impact Assessment (EIA) study provided by the owner (Appendix 1), the compilation of information and evidence from the academic literature, an evaluation of local, regional and international experience on the subject, and the application of a computer model for air pollution dispersion. In addition, the committee conducted a field visit to the area where the HBAP is under construction.

The main findings of the committee are summarized as follows:

1. **Location of the (HBAP):**
   - Hot blend asphalt plants are classified as heavy industries, and should not be built in areas allocated for light industries and handicrafts. Heavy industries such as the asphalt industry are known to have more serious hazards and risks to the environment and the health of the community compared to light industries (1).
   - **Therefore, regardless of the current classification of the area as allocated for light industrial purposes, the construction of the asphalt plant in this location poses serious environmental and health hazards.**
   - According to International guidelines (2), there must be an adequate buffer zone between the industrial and residential areas, known as "minimum acceptable distance". The exact measure of this distance depends on the type of industrial plant depending on the type of hazardous emissions (liquids, solids and gases), in addition to the speed and range of air pollutant transmissions. The buffer zone can range between 3 and 3.5 km (3).
   - The results obtained from the application of a software program (US EPA SCREEN3 v.4 (10)) to model the dispersion of air emissions from the hot blend asphalt plant (HBAP) revealed a secure distance ranging between 2.0 and 3.6 km between the HBAP site and the surrounding residential areas (Appendix 2).
   - The HBAP is hardly 150 meters away from the nearest residential area in Birzeit town and the nearby village of Jiffna. The factory is located at about 1.5 kms away from the Birzeit Municipality and almost 2.5 kms from the Birzeit University campus.
   - The accumulation of air pollutants in this area will be exacerbated by establishing the HBAP due to already existing pollution loads emitted by nearby located factories. These include the poultry slaughterhouse, the stone cutting factory, the brick factory, and the ready-made cement factory. The geographical dimensions (aerial distance) between these industries are no more than 150 meters apart (Appendix 3).

2. **Review of the EIA study (Appendix 1) submitted by the owner of the HBAP, revealed the following serious shortcomings:**
   - It is clear that the EIA study did not cover or provide sufficient explanations related to the environmental and health consequences of this heavy industrial project being built in an area close to residential areas.
   - When conducting an EIA study, it is good practice to comply with the terms of reference (ToR), which the EIA under review did not comply with. An initial screening stage is followed by scoping. Scoping includes identifying site and technology alternatives, close consultation and effective community participation of affected target groups and stakeholders, and most importantly, detailing the process of impacts identification, analyzes and mitigation (the process of risk assessment). This process should be done in four key phases: The first entails identifying potential risks/hazards. In this case, this would include chemical hazards (toxic and carcinogenic chemicals that have been proven to cause health problems in human beings (4) and physical hazards (noise, vibration, changes in cultural and aesthetic landscape of the scene). The physical hazards may also include those related to storage, loading, and transport of manufactured

---

1. This is the English translation of the original and official Arabic version of the Birzeit University Study.

materials to their location of use. The second phase includes the quantification of theses hazardous emissions into the receiving environment, and determining if they comply with international environmental standards (Permissible Exposure Limits). The third phase involves forming an integrated environmental management plan (IEMP) set for dealing with these hazards and reducing their negative effects as much as possible. In the fourth and final phase, a continuous follow-up, monitoring, and evaluation of this plan must be performed (in a consistent dynamic process). This follow-up must include taking periodical ambient air samples in the factory to measure the emission concentrations of the hazardous chemicals, fumes and dust (5). Here we ask a crucial question. What is the investor's plan for managing and evaluating the likely associated health and environmental risks from this heavy industry?

- The Environmental Impact Assessment did not discuss the mitigation of other types of hazards: traffic and noise pollution from the work of machines and materials transport. For instance, how could an estimated 30 trucks carrying heavy materials pass through Birzeit? This is a serious addition to the traffic congestion, which already exists in Birzeit town.
- The environmental management plan for the project proposal is deficient and lacks serious consideration for adequate mitigation measures to reduce environmental and health impacts during construction and operation of the HBAP in the proposed location in Birzeit. For example, building a two-meter high wall or planting some trees around the site will not have even minimal effects in mitigating the negative environmental and health impacts during plant operation. Based on our field visits and photos taken on site (Appendix 3), it is estimated that about 30-50 olive trees were uprooted during site preparation for the plant's construction, of which some are ancient olive trees. This finding contradicts the EIA report, which claimed that the site was empty from fruit trees when the construction works began.
- The EIA study did not respect the terms of reference set by the Environmental Quality Assurance (EQA), by neglecting a discussion of site alternatives including the "no project" option. In addition, the approved EIA report presented poor baseline data on the existing environmental situation in the project area. Moreover, the study did not provide a relevant discussion of the role of the community or its participation in discussing expected fears or potential conflicts. We firmly believe that protecting community health and the environment from pollution and degradation is less costly, easier to implement, and more beneficial than removing the damage once it occurs.
- We argue that the final draft report of the EIA study was not publicly discussed or presented for a hearing with the affected community groups neither in Birzeit nor in Jifna before its final review by the inter-ministerial EIA committee.
- The study did not present criteria or define its methods for measuring the potential negative impact on humans and the environment, nor did it address the cumulative or transitory effects of the proposed location for the establishment of the asphalt plant.
- The Birzeit area contains archeological, recreational, and touristic sites which are rich in beauty and biological diversity. Jifna village is considered a touristic and leisure area, with plenty of apricot trees, medicinal herbs, and rare flora and fauna. This has prompted the Ministry of Tourism and Antiquities to prohibit industrial activities in these sites.
- The EIA study did not take into account the potential economic and societal impacts beyond the borders of the construction site with regard to environmental effects and management, or the introduction of the principle of public benefit as more important than any other considerations.

3. Evidence from the literature and scientific studies:

Several international studies (6-8) have addressed the health effects on people living near industrial areas, including asphalt plants.

- At the international level: several studies have investigated the health and environmental impacts associated with asphalt industries located in close proximity to residential communities. The main health problems found were respiratory effects, cancer, and heart disease among others. Examples of these industries include the petrochemical industries (which include asphalt) (7,8).

- When heated to about 172°C, solidified hazardous chemicals are divided into smaller particles that may remain suspended in the air for at least 18 hours. In this form, the particles may be easily inhaled by people nearby with no suitable protection (Ref. 4, p.139 on chemicals and their health effects).
- There are two main points revealed by research about health effects on people living near asphalt plants:

1. Although most studies focus on occupational exposure and its health effects (9), we can argue that people who live close to the plant will have similar exposure to the hazards as the workers. This is clear from recently completed research by the Institute of Community and Public Health, Birzeit University, investigating the health effects on the Birzeit population living close to the quarries. The study found adverse health effects and impaired lung function among those who live close to the quarry sites (within 500 meters), including allergies, eye, and nose problems and suffering from dusty houses and plants around houses (paper submitted for publication).
2. There are several case studies that have examined the health impact on residents who live near asphalt plants (Ref. 4 contains a collection of references); details are as follows:
   - Page 64: A survey shows that 45% of the residents living within half a mile of the two-year old "Rhodes Brothers" asphalt plant reported deterioration in their health which began after the plant began operating. The most frequent problems include high blood pressure (18% of people surveyed), sinus problems (18%), headaches (14%), and shortness of breath (9%).
   - Page 117: Childhood brain cancers near asphalt industry in Salisbury, North Carolina.
   - Page 137: A new peer-reviewed study in England shows that children have an increased danger of having cancer if they live within three to five kms (2 to 3 miles) away from certain kinds of industrial facilities. The study found that the danger is greatest within a few hundred yards of pollution sources and tapers off with distance. The incidence of childhood cancers per 100,000 children in England and the U.S. has been rising steadily for at least 20 years. One of the industries linked to cancer as reported are factories making bitumen (a British term for asphalt, crude petroleum and tar).

- International studies indicate that well water has also been examined in areas near asphalt plants. Water samples from wells and streams in an area near an asphalt plant were found to contain high levels of formaldehyde. Asphalt plants are a major source of formaldehyde, which is highly soluble in water. Formaldehyde is a known carcinogen (4).
- According to international standards (9), factories must adhere to controlling specific quantities of annual pollution. This includes but is not limited to:
  - The concentration of volatile organic compounds (VOCs) and particulate matter (PM) in cement fumes should be no more than 0.5 mg/m^3 and 5mg/m^3 in air, respectively (4, 9).
  - International studies indicate an annual accumulation of dangerous organic pollutants in the soil of nearby areas (100-1000 m from similar asphalt plants) (11).
- It is worth noting here that in January 2020, the Ministry of Environmental Protection closed an asphalt factory in Haifa due to an increased emission of various pollutants that exceeded permissible levels (12).
- Is there a local capacity for monitoring and analyzing air pollutant emissions in industrial areas? Are these inspections done routinely? Based on our knowledge and experience in the field, air-sampling devices are still not available in Palestine, and we must first import such equipment from abroad to be able to complete such inspections and monitoring. Thus, how will these pollutants' concentrations be monitored? How will the health of residents in the area be protected?

Conclusion: Based on local and international available data, studies, and reference projects, the committee concludes that the construction of the Hot Blend Asphalt Plant in its current location will have serious health and environmental damage resulting from the construction of the plant in the place, where it is currently being built. This damage will likely occur from the transport, handling, production, storage, and disposal of hazardous waste.

Members of Birzeit University Committee, who prepared this study:

Dr. Maysaa Nemer, Institute of Community and Public Health

Prof. Dr. Rashed Al-Sa`ed, Institute of Environmental and Water Studies

BIRZEIT UNIVERSITY 1924

List of scientific references:

1. U.S. Environmental Protection Agency, 2000. Hot Mix Asphalt Plants-Emission Assessment Report. EPA-454/R-00-019, December 2000. U.S. Environmental Protection Agency. North Carolina, USA.

2. U.S. Environmental Protection Agency, 2015.Background Document: General Air Quality Permit for New or Modified Minor Source Hot Mix Asphalt Plants in Indian Country. http://www.epa.gov/air/tribal/tribalnsr.html. Accessed: May 13, 2020.

3. Plosay, J., Reed, A., Jones, D. 2017. Technical Analysis Report for Air Quality Control Minor General Permit 3 for Asphalt Plants. Alaska Department of Environmental Conservation Air Permits Program, Alaska, USA.

4. CHEJ, Center for Health, Environment and Justice. 2016. Asphalt Plants: Fact Pack - PUB 131. www.chej.org. Accessed: May 14, 2020.

5. Krewski D, Hogan V, Turner MC, Zeman PL, McDowell I, Edwards N, Losos J. An integrated framework for risk management and population health. Human and ecological risk assessment. 2007 Nov 9;13(6):1288-312.

6. Edwards R, Pless-Mulloli T, Howel D, Chadwick T, Bhopal R, Harrison R, Gribbin H. Does living near heavy industry cause lung cancer in women? A case-control study using life grid interviews. Thorax. 2006 Dec 1;61(12):1076-82.

7. Pascal M, Pascal L, Bidondo ML, Cochet A, Sarter H, Stempfelet M, Wagner V. A review of the epidemiological methods used to investigate the health impacts of air pollution around major industrial areas. Journal of environmental and public health. 2013;2013.

8. Kriech, A.J., Schreiner, C.A., Osborn, L.V., Riley, A.J., 2018. Assessing cancer hazards of bitumen emissions – a case study for complex petroleum substances. Critical Reviews in Toxicology, 2018. 48(2), 121-142.

9. Burstyn, I., Randem, B., Lien, J.E., Langård, S., Kromhout, H. 2002. Bitumen, polycyclic aromatic hydrocarbons and vehicle exhaust: exposure levels and controls among Norwegian asphalt workers. Ann. Occup. Hyg., 46(1), 79-87.

10. Thé, J.L., Thé, C.L., Johnson, M.A., 2016. SCREEN View: Screening Air Dispersion Model (SCREEN3). Lakes Environmental Software. Ontario, Canada.

11. Ilechukwu, I., Osuji, L.C., Onyema, M.O., Ndukwe, G.I., 2016. Occurrence and sources of aliphatic hydrocarbons in soils within the vicinity of Hot Mix Asphalt Plants in Obigbo and Igwuruta areas of rivers state, Nigeria. J. Appl. Sci. Environ. Manage. 20(4), 1087-1094.

12. Zafrir Rinat. Environment Ministry Shutters Israeli Asphalt Factory Over Excessive Emissions. Haaretz. Published on 19.1.2020. https://www.haaretz.com/israel-news/.premium-environment-ministry-shutters-israeli-asphalt-factory-over-excessive-emissions-1.8413690

13. Sadler, B., McCabe, M., 2002. EIA Training Resource Manual. The Institute of Environmental Management and Assessment Centre, UK.

:

Appendices:

Appendix 1: Critical review of the investor's EIA study report.
Appendix 2: Result of model simulation on air pollutants dispersion using the US EPA SCREEN V.4 software.
Appendix 3: A general overview of the proposed HBAP site and the measured aerial distances to nearest residential areas and current industries near the site.

Appendix 1: A critical review of the EIA study report

Below is the summary of a critical review of the EIA study report, submitted by the proponent for the proposed project in Birzeit town.

EIA process under review	Explanation and notes	Quality ranking
(1) Scoping session	• Public involvement did not reflect representatives of affected stakeholders/groups, no active participation of relevant government agencies. At local level, a few public participated from Jiffna village and the town of Birzeit. Community concerns though partially identified, but suffers sufficient evaluation or adequate solutions. • The baseline data on the environmental situation was not discussed comprehensively • No alternatives were discussed for the site and the principle of saving at annual operating costs was adopted • Compliance with the terms of reference of the Environmental Quality Authority (EAQ) is deficient.	F
(2) Identification and analysis of impacts	• Methods applied for the determination of positive and negative impacts is unclear • Incomplete reference to the literature and experience gained from similar or reference projects • No regional or international standards were used to analyse the negative impacts • Attempts to identify and analyses potential impacts outside the projects site with time and space boundaries do not exist • An integrated analysis of the existing environmental impacts from existing projects is imperfect and lacks discussion	F
(3) Mitigation and Environmental Management Plan	• The proposed mitigation measures are not adequate to reduce or minimize the severity of most likely negative impacts • Services and infrastructure in the area are missing (sewerage network, wastewater treatment plant and solid waste) • The disposal of hazardous solid waste (electrostatic filters/ bags) is not guaranteed in emergency situations • The suggested tree belt and a protective concrete wall (height of two meters) are useless to reduce emissions of dust, fumes and gases as the chimney height might exceed 18 meters.	F
(4) EIA report	• Spatial and temporal limits, the existing environmental situation, classification and use of land, site alternatives, explanation of social and economic conditions are incomplete • No reference was made to measurement and control standards, local expertise and equipment for analysis of air pollutants and absence of national air quality standards • The terms of reference of the Environmental Quality Authority have not been complied with, some tasks were omitted	E
(5) EIA review	• The draft report was not discussed in a workshop with public participation and feedback • The participation of academic experts, meetings and visits to similar reference sites are lacking or unsatisfactory • Insufficient/inadequate public hearings and weak public debate	E

The general measures of quality ranking for the EIA review (13)

Rating	Explanation
A	generally well performed, no important tasks left incomplete
B	generally satisfactory and complete, only minor omissions and inadequacies
C	just satisfactory despite omissions and/or inadequacies
D	parts well attempted but must, on the whole be considered just unsatisfactory because of omissions and/or inadequacies
E	unsatisfactory, significant omissions or inadequacies
F	very unsatisfactory, important task(s) poorly done or not attempted

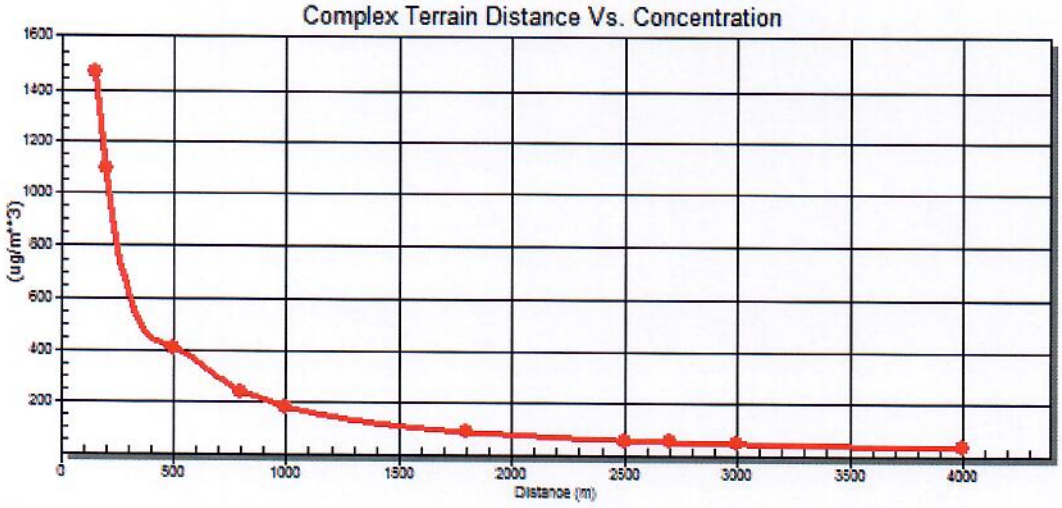
Appendix 2: Result of model simulation on air pollutants dispersion using the US EPA SCREEN V.4 software

```
                                                                    05/25/20
                                                                    15:29:27
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 13043 ***

 C:\Lakes\Screen View\Projects\BZ_HMAP_test.scr

 COMPLEX TERRAIN INPUTS:
    SOURCE TYPE            =        POINT
    EMISSION RATE (G/S)    =      21.0000
    STACK HT (M)           =      18.0000
    STACK DIAMETER (M)     =       2.5000
    STACK VELOCITY (M/S)   =       5.0930
    STACK GAS TEMP (K)     =     450.0000
    AMBIENT AIR TEMP (K)   =     293.0000
    RECEPTOR HEIGHT (M)    =       0.0000
    URBAN/RURAL OPTION     =        RURAL

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


 BUOY. FLUX =   27.226 M**4/S**3;  MOM. FLUX =   26.389 M**4/S**2.


 FINAL STABLE PLUME HEIGHT (M) =   72.7
 DISTANCE TO FINAL RISE (M)    =  151.3

                          *VALLEY 24-HR CALCS*   **SIMPLE TERRAIN 24-HR CALCS**
 TERR          MAX 24-HR              PLUME HT               PLUME HT
  HT     DIST    CONC        CONC    ABOVE STK     CONC     ABOVE STK     U10M USTK
 (M)     (M)   (UG/M**3)  (UG/M**3)  BASE (M)  (UG/M**3)  HGT (M)  SC    (M/S)
----- ------- ---------- ---------- ------   ---------- ------  -- ---- ----
  70.    150.   1470.       1470.       72.4     1091.       5.4   4 20.0 21.8
 100.    200.   1091.       1091.       72.7     0.000       0.0   0  0.0  0.0
 100.    500.   410.5       410.5       72.7     0.000       0.0   0  0.0  0.0
  90.    800.   238.2       238.2       72.7     0.000       0.0   0  0.0  0.0
 100.   1000.   181.8       181.8       72.7     0.000       0.0   0  0.0  0.0
 200.   1800.   85.91       85.91       72.7     0.000       0.0   0  0.0  0.0
 120.   2500.   55.47       55.47       72.7     0.000       0.0   0  0.0  0.0
 100.   2700.   50.01       50.01       72.7     0.000       0.0   0  0.0  0.0
 150.   3000.   43.34       43.34       72.7     0.000       0.0   0  0.0  0.0
 200.   4000.   29.60       29.60       72.7     0.000       0.0   0  0.0  0.0
                                                                    05/25/20
                                                                   15:29:27

***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 13043 ***

 C:\Lakes\Screen View\Tutorial\BZ_HMAP_test.scr

 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE            =        POINT
    EMISSION RATE (G/S)    =      21.0000
    STACK HEIGHT (M)       =      18.0000
    STK INSIDE DIAM (M)    =       2.5000
    STK EXIT VELOCITY (M/S)=       5.0930
    STK GAS EXIT TEMP (K)  =     450.0000
    AMBIENT AIR TEMP (K)   =     293.0000
    RECEPTOR HEIGHT (M)    =       0.0000
    URBAN/RURAL OPTION     =        RURAL
```

```
   BUILDING HEIGHT (M)     =        0.0000
   MIN HORIZ BLDG DIM (M) =        0.0000
   MAX HORIZ BLDG DIM (M) =        0.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   STACK EXIT VELOCITY WAS CALCULATED FROM
   VOLUME FLOW RATE =   25.000000     (M**3/S)

BUOY. FLUX =   27.226 M**4/S**3;  MOM. FLUX =   26.389 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF   18. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -------  -----  ------  ------  ------  ------  -----
    50.     3546.       4    20.0   21.8  6400.0     5.36    4.39    2.68    NO
   100.     4124.       4    20.0   21.8  6400.0     5.36    8.31    4.84    NO
   200.     1843.       4    20.0   21.8  6400.0     5.36   15.71    8.77    NO
   300.     1052.       4    15.0   16.4  4800.0     9.64   22.92   12.66    NO
   400.     716.6       4    15.0   16.4  4800.0     9.64   29.79   15.91    NO
   500.     552.1       4    10.0   10.9  3200.0    18.21   36.76   19.48    NO
   600.     455.2       4    10.0   10.9  3200.0    18.21   43.24   22.24    NO
   700.     378.6       4    10.0   10.9  3200.0    18.21   49.64   24.95    NO
   800.     330.0       4     8.0    8.7  2560.0    24.64   56.20   28.05    NO
   900.     289.4       4     8.0    8.7  2560.0    24.64   62.44   30.63    NO
  1000.     255.0       4     8.0    8.7  2560.0    24.64   68.64   33.16    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    50. M:
    73.     4666.       4    20.0   21.8  6400.0     5.36    6.30    3.75    NO

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF   18. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -------  -----  ------  ------  ------  ------  -----
  1000.     255.0       4     8.0    8.7  2560.0    24.64   68.64   33.16    NO
  1100.     227.7       4     8.0    8.7  2560.0    24.64   74.78   35.13    NO
  1200.     206.2       6     4.0    5.5 10000.0    39.07   41.77   19.72    NO
  1300.     211.2       6     4.0    5.5 10000.0    39.07   44.68   20.37    NO
  1400.     214.8       6     4.0    5.5 10000.0    39.07   47.58   21.02    NO
  1500.     217.2       6     4.0    5.5 10000.0    39.07   50.48   21.65    NO
  1600.     218.6       6     4.0    5.5 10000.0    39.07   53.36   22.28    NO
  1700.     219.1       6     4.0    5.5 10000.0    39.07   56.23   22.90    NO
  1800.     218.9       6     4.0    5.5 10000.0    39.07   59.10   23.52    NO
  1900.     218.0       6     4.0    5.5 10000.0    39.07   61.95   24.13    NO
  2000.     216.6       6     4.0    5.5 10000.0    39.07   64.79   24.73    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND  1000. M:
  1000.     255.0       4     8.0    8.7  2560.0    24.64   68.64   33.16    NO
```

```
**********
*** SCREEN AUTOMATED DISTANCES ***
**********

*** TERRAIN HEIGHT OF   18. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -----  -----  ------  ------  ------  ------  -----
  2000.     216.6        6    4.0    5.5 10000.0   39.07   64.79   24.73    NO
  2100.     213.8        6    4.0    5.5 10000.0   39.07   67.63   25.24    NO
  2200.     210.8        6    4.0    5.5 10000.0   39.07   70.45   25.74    NO
  2300.     207.6        6    4.0    5.5 10000.0   39.07   73.27   26.24    NO
  2400.     204.4        6    3.5    4.8 10000.0   41.64   76.16   26.98    NO
  2500.     201.9        6    3.5    4.8 10000.0   41.64   78.95   27.45    NO
  2600.     199.2        6    3.5    4.8 10000.0   41.64   81.73   27.92    NO
  2700.     199.6        6    1.5    2.1 10000.0   58.20   85.21   30.42    NO
  2800.     200.5        6    1.5    2.1 10000.0   58.20   87.95   30.85    NO
  2900.     202.0        6    1.0    1.4 10000.0   66.62   91.16   32.61    NO
  3000.     203.8        6    1.0    1.4 10000.0   66.62   93.87   33.02    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND  2000. M:
  2000.     216.6        6    4.0    5.5 10000.0   39.07   64.79   24.73    NO

**********
*** SCREEN AUTOMATED DISTANCES ***
**********

*** TERRAIN HEIGHT OF   18. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -----  -----  ------  ------  ------  ------  -----
  3000.     203.8        6    1.0    1.4 10000.0   66.62   93.87   33.02    NO
  3500.     205.2        6    1.0    1.4 10000.0   66.62  107.35   34.67    NO
  4000.     204.2        6    1.0    1.4 10000.0   66.62  120.68   36.24    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND  3000. M:
  3505.     205.2        6    1.0    1.4 10000.0   66.62  107.46   34.68    NO

**********
*** SCREEN AUTOMATED DISTANCES ***
**********

*** TERRAIN HEIGHT OF   18. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -----  -----  ------  ------  ------  ------  -----
  4000.     204.2        6    1.0    1.4 10000.0   66.62  120.68   36.24    NO
  4500.     201.5        6    1.0    1.4 10000.0   66.62  133.86   37.73    NO
  5000.     197.7        6    1.0    1.4 10000.0   66.62  146.91   39.15    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND  4000. M:
  4000.     204.2        6    1.0    1.4 10000.0   66.62  120.68   36.24    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB
```

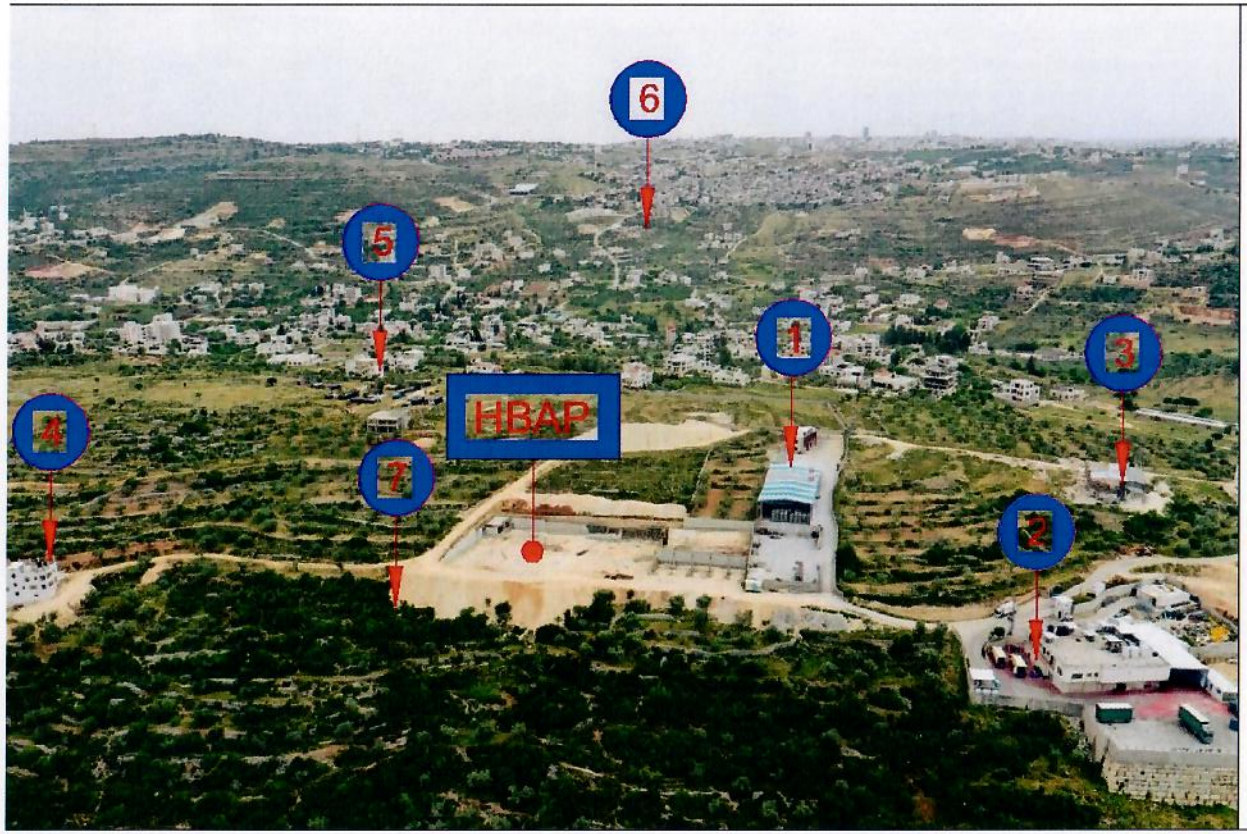
```
*******************************************
*  SUMMARY OF TERRAIN HEIGHTS ENTERED FOR  *
*     SIMPLE ELEVATED TERRAIN PROCEDURE    *
*******************************************

      TERRAIN          DISTANCE RANGE (M)
       HT (M)        MINIMUM      MAXIMUM
      -------       --------     --------
          18.            50.        1000.
          18.          1000.        2000.
          18.          2000.        3000.
          18.          3000.        4000.
          18.          4000.        5000.

*** INVERSION BREAK-UP FUMIGATION CALC. ***
 CONC (UG/M**3)    =     203.1
 DIST TO MAX (M)   =   3599.27

    ************************************
    *** SUMMARY OF SCREEN MODEL RESULTS ***
    ************************************

 CALCULATION          MAX CONC     DIST TO    TERRAIN
  PROCEDURE          (UG/M**3)     MAX (M)     HT (M)
--------------      -----------   ---------   -------
SIMPLE TERRAIN        4666.           73.        18.

COMPLEX TERRAIN       1470.          150.        70. (24-HR CONC)

INV BREAKUP FUMI      203.1         3599.        --


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```



Non-compliance with international standatds by a setback distance up to about 3.60 km

Note: It is assumed that the HBAP complies with annual pollution loads of 100 tons per years [US EPA 2002]

Appendix 3: A general overview of the proposed HBAP site and the measured aerial distances to nearest residential areas and current industries near the site



NOTE: All Distances are measured to the Asphalt Plant

Legend:

HBAP=HotBlend Asphalt Plant

1=Bricks Factory<60m

2=poultry slaughter house<150m

3=Stone Cutting

4=House<150m

5=Jifna Class A housing <150m

6=Jalazon RC <1500m

7=Irreversible Damage to Olive Trees