

AFRICAN DEVELOPMENT BANK



ALGERIA: EAST-WEST HIGHWAY CONSTANTINE BYPASS PROJECT

SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACT STUDY*

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACTS STUDY ON THE EAST - WEST HIGHWAY CONSTANTINE BYPASS PROJECT

1. Introduction

1.1 The project covers a major 13km stretch of the proposed 7,000 km Maghreb Unity Highway (AUM) which will link up Nouakchott, Rabat, Algiers, Tunis, and Tripoli. The Algerian segment will be approximately 1,200 km long and has been subdivided into several sections for planning and design reasons. The section proposed for ADB financing forms a part of this AUM and was the subject of a specific environmental impact study conducted by the "Contrôle Technique des Travaux Publics" (Public Works Technical Inspection Agency)

- Ain El Bey – El Meridj (13 km) February 1997
- Analysis of Initial State of Section
- Impact Analysis
- Mitigative Measures
- Synthesis Report

1.2 The updating of the routing and the definition of the related structures, including those planned for the protection of the environment, are contained in the Detailed Designs finalized in 2000. The data concerning damage to private property were updated and finalized in July 1998 and are contained in the document prepared by the "Bureau d'Etudes Techniques et Topographiques A. Facih" (A.Facih Technical and Topographical Studies Agency), entitled:

- "Projet: Expertise foncière de l'emprise d'Autoroute Est-Ouest,
3ième tranche Ain El-Bey et El Meridj" (Project: Land Assessment
of the
East-West Highway Right-of Way, 3rd Section, Ain El-Bey – El Meridj;
July, 1998)

1.3 The environmental impact study considers as the project area a 40 to 100 m wide strip of land depending on whether the right-of-way is on natural ground, made-up ground or excavated land; an additional 10m strip is planned on either side of the highway's running surface, the width of which is felt to be sufficient to protect farms from deposits of atmospheric pollutants which would lower the agricultural value of soils, and will also allow for the installation of pollution control equipment. The EIS also takes into consideration those farm areas indirectly affected, which could become unusable as a result of being cut off or isolated, or becoming too small to be cultivated.

2. **Project Description and Justification**

The stretch of highway from Ain El Bey to El Meridj includes the development of the bypass of the Constantine urban area. The project concerns a 13 km section. It has a 34 m, 2 x 2-lane roadbed which can be widened. Though every endeavour has been made in the routing to avoid dwellings as much as possible, some houses will, however, be affected by the project. The water courses will be crossed either by box culverts or by viaducts; drainage culverts will be laid to ensure the drainage of small watersheds; settling tanks equipped with oil separators will be built all along the route to collect the run-off water and discharge it into channels; rural roads and farm tracks will be crossed by highway viaducts or underpasses. Archeological remains have been identified and special digs will be organized to recover them throughout the entire works phase. The grass verges, slopes, embankments and excavation areas will be reforested and planted in order to prevent any risks of erosion and landslides and to control vapour contamination from vehicles.

3. **Political, Legal and Administrative Framework**

3.1 From the administrative standpoint, the institutions responsible for the enforcement of compliance are the Ministry for Regional Development and the Environment, the General Directorate for the Environment, the General Inspection for the Environment, the Walis, and the Wilaya Inspectorates. From the legal standpoint, environmental legislation may be divided into two categories, namely texts of a regulatory nature and specific texts.

3.2 The regulatory texts concern Decree no 87-91 in 1987 relating to the Regional Development Impact Study, Executive Decree 90-78 in 1990 on EIA, Law 91-11 of 1991 regulating the conditionalities of expropriations for public purposes. The forthcoming establishment of the Environment Observatory will permit the gathering of information and its dissemination to interested organizations and the public.

3.3 The specific texts concern air (public health, the ozone layer, gas and smoke emissions, etc.) and water (water code, tax on polluting activities, transportation of hazardous material, the extraction of mineral substances, the discharge of oils and lubricants, inventories of pollution levels of surface water) pollution control, sound nuisance control (noise abatement legislation and listing of classified facilities), the landscape and national heritage (tourist sites, historical monuments and the archeological excavations), the natural environment, wildlife and plant life (Decree on nature conservation, protected species, Algeria's ratification of International Conventions, the classification of nature parks and reserves, pest control), the forest (forestry system, logging, sale, felling and sale of wood products), urban planning (land tenure policy, urban planning and regional development, public land law, title deeds, approval of land use plans and expropriations for public purposes)

4. **Description of the Project Environment**

4.1 From an orographic standpoint, the Constantine bypass section (altitude 640-690 metres) is characterized by gently sloping land (3%) and rises towards the East of Constantine over moderately sloping land (7%). The pluviometry in the Wilaya is characterized by storms with irregular precipitations of between 600 and 400 mm. The annual temperature range is between 2.9 and 32.9 °C, with the highest temperatures in the south of the Wilaya; the number of days of snow is said to be 6.9 (1975-1984 period) and 35 for frost. Mist and fog are infrequent (an average of 33 days per year). These climatic data are incorporated into the

design of the structures and will in no way impede the implementation of the project. The analysis of the geological map shows a complex structure dominated by chalk marl (cretaceous-Paleocene) on limestone bedrock. The project will cross areas the geological characteristics of which (clayey conglomerates, loamy formations, old pediments), the stability of the natural slopes and the slight erosion caused by rain water will facilitate the construction of the highway. The routing crosses lithological complexes of average permeability where alluvial-type aquifers have been identified (Rhumel and Boumerzoug Wadis). The biological environment of the Wilaya is poor owing to the severe degradation of the plant cover and the development of agriculture. The routing will cross the edge of the Meridj recreational forest (202 ha) at two levels but will only affect the areas planted with Eucalyptus and Cypress trees. The communes of Constantine and El Kroub crossed by the routing account for 75% of the total population of the Wilaya, the principal activities of which in a radius of 15 km are industry (46 establishments) and agriculture (46,000 out of a total of 61,000 hectares). The Constantine Wilaya is known for its richness in historical remains and its landscapes.

5. Alternative Project Solutions

5.1 In view of the international socioeconomic and international impacts, a without project option cannot be conceived or considered. The project concerns a 300 metre-wide corridor, with a specific spatial boundary beyond which it would be difficult to recommend a shift in the alignment or propose a sub-variant of it.

5.2 This bypass was selected from three variants on the basis of (i) a comprehensive study of the traffic trend over a 20-year period and (ii) a desire to minimize threats to the environment (crossing of the H'mim Wadi Valley by a viaduct, by-passing the reservoir of the future H'Mimim Wadi dam, crossing of the landslide area, and the esthetic appeal and functionality of the outputs). The building of this section will ensure the consideration of community and individual interests (tighter security and enhanced driving comfort, the opening up of remote areas, the creation of jobs during and after the works and the establishment of commercially-oriented infrastructure). Daily traffic in 2005 is estimated at 15,000 vehicles per hour over the first part of the section (6 km) and 9,500 vehicles for the second part (7 km).

6. Potential Impacts and Mitigative and Improvement Measures

A. Impacts during the Works

6.1 The project area is not very built up and the routing avoids houses as much as possible. It is estimated that 8 families will be displaced. The surface area used by the project will be 74 hectares. The impact on housing (expropriations) only concerns 4 houses (706 m²) and three sheds (1152 m²) for the population density is fairly low on the routing.

6.2 During construction, the impacts will stem from the works carried out within the right of way (earthworks, resurfacing work and expropriation) as well as outside it, though remaining directly related to the project (excavation areas, site construction and related works and the storage of building materials); they may cause the discharge of sediment into water courses (clogging), air and soil pollution by the coating sites, and sound nuisance caused by construction equipment. They may sometimes disfigure the landscape and cultural heritage sites; they will upset the communications systems and increase the risks of accidents (electric

power, PTT, gas, drinking water supply and sanitation); there will also be increased risks of pollution of the soils, surface and underground water, noise nuisance (the use of heavy duty vehicles and explosives) and air pollution (gas seeps and liberation of dust).

6.3 The damage to the countryside will be caused by land clearing, including the edges of the El Meridj Forest, approximately 5 ha of which will be affected (the felling of Alepe Pines and Eucalyptus trees). This work could be a potential source of erosion. The closing down of some secondary roads or bypasses will cause disruptions to communications. The different networks could be damaged and lead to water, electric power or gas shortages. Soil and water contamination could arise primarily on temporary housing areas and deposit or borrow areas, in the vicinity of coating sites caused by toxic substances contained in the asphalt (phenols, chloro-phenols and polyaromatics including benzopyrene), by slow setting emulsions of bituminous material, by the discharge of used oil on vehicle maintenance sites (leakage from equipment or accidental discharge of liquid pollutants). An increase in the turbidity of water courses and sedimentation levels are considered to be serious potential impacts which could alter the quality of water downstream and clog up the natural drainage system. The erosion process will be triggered by the cut and fill works. The alteration of the drainage network (obstruction, diversion, gauging and construction of culverts) will impact negatively on the natural system. Noise and air pollution could harm the health of local residents and workers. The security of residents could be affected by deep excavations, the movement of construction site plant and heavy-duty vehicles, landslides, disruptions to the network, storage conditions and the use of explosives. Many archeological remains have been discovered and there is every likelihood of uncovering new ones during the earthworks. Special measures are taken to protect them.

6.4 Works off-site or outside the right-of-way are still linked to the project, in particular, the building sites and related installations such as raw materials extraction and treatment areas. The site living quarters will be located outside the sensitive sectors as well as the base sites (storage of materials, maintenance and cleaning of equipment, and prefabrication work). The ancillary and temporary sites could compete with the population in respect of the utilization of water resources: they could cause pollution of the surface water by inappropriate liquid (chemical substances, detergents, various solvents, accidental leakages and spillage) et solid waste, and by the movements of heavy duty vehicles using the local road network which is unsuitable for such traffic. Backfill requirements will necessitate the opening up of borrow areas near the construction sites and excavated material should be, as far as possible, reused or stored. They will induce impacts in view of the risks of modifying hydraulic flows, the drying up of the areas around the edges, the deterioration of the countryside and some pollution (various discharges, noise nuisance, etc), increase in traffic and mud and loose chippings spread over the road surface.

Mitigative Measures

6.5 The contractors will be required to take all the required measures to mitigate the impacts pursuant to Executive Decree 98-339 of 03-11-1998 regulating all public or private installations which might present a danger or inconvenience for the environs, for the health and security of the population and the conservation of nature. In the event of disaster, the contractors shall be responsible for the costs. The establishment of sites will be subject to the issuing of authorizations according to the type and scale of the foreseeable dangers, either by the Minister for the Environment, the Wali or by the Chairman of the People's Assembly. The mitigative measures will be as follows: (i) damage to the country side will be repaired at

the contractor's expense; damage to private property will be compensated and trees planted to improve the sites (ii) damaged local networks will be rehabilitated, (iii) topsoil will be stored with a view to its reuse at a later date, (iv) unreuseable or excess excavation material will be compacted in selected areas to avoid unaesthetic dumps, (v) traffic will be rerouted on local access roads and roads signs put in place following their approval by the administration, (vi) with regard to soil and water contamination, contractors will see to its control and reduction and will ensure that there is no accidental discharge of polluting substances into the water courses, (vii) soil erosion will be prevented by carefully selecting the site opening periods on the basis of the works programme and will focus mainly on clearing works, the required drainage systems, and the storage of materials away from water courses, (viii) noise levels will be contained by locating the sites at least 1 km from inhabited areas, building sites will be sprayed with water to minimize dust, water supply points will require authorizations, crushing work will be carried out away from inhabited areas and care will be taken to prevent damage to crops and houses, (ix) the discovery of archeological sites will be brought to the attention of the Ministry of Culture which will enforce the necessary measures to protect them, (x) site locations will be away from fields or on the periphery of urban areas; they will incur considerable opportunity costs which will be taken into consideration; no opening of a product storage site will be accepted within at least 50 metres of interceptor wells or boreholes, and prior to their opening, the Wilaya inspectorate concerned shall issue its opinions and authorizations, (xi) transport and supply vehicles will be subject to compliance controls with a view to minimizing the risks of accident and the discharge of toxic waste, (xii) dangerous products will be listed and their handling subject to the utilization of special equipment, (xiii) oil waste will either be recycled or used for the treatment of form lumber, intervention plans will be prepared by the contractors to offset any risk of accident, (xiv) waste water and liquid waste can only be discharged into the receiving water body or on to the earth after treatment in the settling tanks, solid waste will be channeled towards places approved by the local services, and construction and works sites will be periodically cleaned, (xv) quarries will have to meet the conditions of the legislation regulating their ecological value, hydrology as well as access to them. The slopes will be remodelled, covered by top soil and replanted, and water will be drained so as to create temporary water points, and (xvi) the consumption of water for the sites shall not compete with village drinking water supply.

6.6 With regard to damage to private property and public utilities, the EIS mentions that: (i) expropriation of, and damage to 21 properties belonging to approximately 50 families will be compensated. Those concerned will be given the opportunity to buy similar land in the area. No family has lost its entire farm property. The reparcelation of cropping lands is scheduled and structures will be built to open up the area.; ii) with a view to protecting houses in the immediate vicinity of the highway, 7 x 100 metre long by 2 metre high earth berms will be raised as noise barriers; iii) in order to guarantee farmers access to cut-off land, 5 highway viaducts or underpasses will be constructed in the farming areas; iv) a bridge will also be built at the railway intersection; v) and the high voltage power line, the telephone line and the pipeline will be moved.

6.7 Hydraulic restoration will consist in the laying of 4 box culverts (at PK 0.850, 3.930, 4.355, 11.351), 7 culverts with a 1000 diameter and 5 with a 1200 diameter. The crossing of the Boumerzoug and Yacoub Wadis will require the building of two viaducts of 523 and 75.5 metres respectively. Run-off water will be collected in 10 retention ponds (equipped with settling and oil separating apparatus) with a total surface area of 442.5 m².

B. Impacts during the Operational Phase

6.8 The impacts on the countryside will concern the disfiguration of the landscape by cut and fill operations, by the modification of the natural topography, by the presence of untreated and unaesthetic borrow sites and by different types of visual intrusion.

6.9 The impacts on agriculture essentially concern the cutting off of some land and the reduction

of the farming area, the loss of fertile land, the splintering of concessions and the loss of jobs. Farming in the area is usually of the extensive type and primarily concerns grain farming and market gardening. Though dry farming techniques are usually used for tree crops, it was observed that some orchards are irrigated from Wadis or wells. However, the EIA notes that 3 of the farms requisitioned for the construction of the highway fall within the public domain, while the owners of 7 farms are unknown.

6.10 The socioeconomic impacts were taken into consideration with the assistance of the population concerned and were the subject of an in-depth study. The routing was selected to create minimum damage and should not lead to any massive population displacements, nor significant job losses (to be compensated in kind), loss of income or falls in schooling or social facilities. Compensation has been determined on the basis of Ministerial Order of 16 March 1991 relating to the conditions of cost ceilings to be used as the basis for the assessment of low cost urban housing.

6.11 The impacts of water pollutions will stem from the surface runoff of stormwater on the asphalt or accidental pollution caused by the discharge of dangerous substances (oil and grease from vehicles, leaded petrol, brake asbestos, tire wear (65% rubber or organic adjuvants and 2% zinc oxide, and the wearout of the pavement). They could impact on the harnessing of underground water and risk altering its chemical and physical characteristics, as well as the granulometric and biological structure of riverbeds. The accumulation of polluting substances could lead to risks of contamination of water supply especially as the underground resources are very little known.

6.12 There will be little impact on air quality (exhaust fumes: nitrogen monoxide, sulphur oxide, lead and its adjuvants) because of the low population density along the routing. The risks will increase slightly in view of the longer distances and increased speed of the vehicles.

6.13 Noise nuisance has easily identifiable effects on health (tiredness, insomnia, loss of auditory acuity, poorer communication, stress, increased rate of heart beat). They are responsible for a fall in productivity and affect the economy. According to assessments, the maximum noise level should not exceed 70 dB(A). On the other hand, a reduction in traffic on local feeder roads will significantly reduce noise nuisance for local residents.

Mitigative Measures

6.14 The mitigative measures to be taken in favour of agriculture will primarily consist in reparcelation measures and a new organization of the feeder road network which will make it possible to maintain the balance of the affected farms. As already mentioned, they will also comprise financial compensation for production losses during the works, compensation for the loss of land or fixed assets and/or the integration of farmers in new workstations so as to guarantee income. The planting of trees with a pollution control role (dispersal of

hydrocarbon and lead pollutants) will be carried out in sensitive cropping areas. To mitigate the risks, market garden plants (leafy vegetables) will be planted at least 50 m from the highway. The integration of the highway into the agricultural landscape will require the building of 5 passageways (2 highway viaducts and 3 underpasses).

6.15 The measures in favour of the natural environment will essentially comprise the planting of trees and hardy shrubs adapted to the project region which will mitigate the visual impact and create a homogeneous and natural landscape design with impeccable aesthetic and land form qualities, act as an air filter and provide new ecological niches for wild life. They will adopt two courses, one of mimetism or of affirmation by clearly establishing themselves as new features of the landscape. The fencing of the highway and screens of trees will constitute biodiversity protection measures by preventing animals from crossing the highway or birds from flying low over it. No tourist site or site of any special value is mentioned in the study apart from some panoramic views in the vicinity of the Wadi valleys.

6.16 From the drainage standpoint, sanitation measures will be organized for stormwater from the roadway by the installation of 10 settling and oil removal tanks (essential protection) and retention ponds (minor additional protection) in the vulnerable areas (proximity to boreholes and along the aquifers).

6.17 With regard to acoustic corrections, the planting of a screen of trees or the raising of earth berms (7 x 100m barriers will be built) or vertical noise abatement walls will constitute effective measures.

6.18 From the security standpoint, a highway will be four times safer than a traditional road. However, security measures will be taken if required; protection of the sides by crash barriers, appropriate road signs and special equipment on downward sloping roads, rest areas, etc.

C. Positive Impacts

6.19 The construction of the TransMaghreb highway is the only infrastructure that will permit the irrigation of the country's entire industrial and social fabric. It is pivotal to the socioeconomic development of Algeria. Furthermore, traffic studies have shown network saturation on the approach to Constantine, one of the major cities of Algeria. The principal benefits will be the decongestion of traffic on the RN 5 trunk road generated by the sectors of activity which links the West with Constantine and the RN 3 from Constantine to the East, the rapid access of persons and goods and the opening up of isolated areas by meeting the requirements of the region and retaining their importance as centres for local trading, job creation on the sites and during the operation of the project with the establishment of commercially-oriented infrastructure (simple lay-bys, filling stations, catering facilities, maintenance centres and hotels, etc), and a reduction in Vehicle Operating Costs (VOC) through an increase in the quality of service provided to users.

7. Environmental Management and Monitoring Plan

7.1 The EIS as well as the Social and Environmental Management Plan (PGES) were submitted to, and approved by the Wilayas concerned. The Wilayas through their 7 Technical Directorates (agriculture, health, housing, population, public works and water supply) carry out regular environmental impact monitoring. The Public Works Directorate will be

responsible for the in-field enforcement of Law 91-11 governing expropriation and the declaration of public purpose. The Roads Directorate (Ministry of Infrastructure), as the project manager will be responsible for the environmental monitoring on the basis of the conclusions of the impact studies and specifications. Works monitoring will be carried out by experts from a consulting firm, including one environmentalist. The environmental recommendations made in the specifications and the EIS will be analyzed in periodic reports and on provisional or final works acceptance

7.2 With regard to housing, the households concerned will be compensated financially or in kind as they wish. The cost of this compensation will be DZD 8500/m² and DZD 6,000/m² for sheds. Passageways will also be constructed to enable them to link up with the nearest trunk roads or districts. Noise barriers will be installed where required.

7.3 With regard to agricultural activities, private property owners with an act of ownership will be compensated financially or in kind to the tune of DZD 737,000/ha; farm land which has been broken up will be re-parcelled. The other farmers on public land or State farms will receive financial compensation, at least in the case of large farms. Farmers on small State farms will be supported with a view to their integration into the labour market and will receive financial compensation.

7.4 With regard to employment, those affected by the project are for the most part farmers or seasonal workers. Their integration into the labour market will be assisted.

7.5 With regard to ecology, though the majority of sites are in an advanced state of degradation, the project manager shall ensure that measures are taken for the planting along the slopes of the highway of species adapted to the areas concerned, and to ensure the protection of the sites from all types of pollution, in conformity with the specifications. With regard to pollution from oil and hydrocarbons from traffic, the project manager will ensure that the collection network for polluted residual water does not discharge into the Wadis without prior treatment

8 EIS methodology – Public Consultations

8.1 The Environmental Impact Study (EIS) was prepared in 1997 by the consulting firm CTPP. It includes the project technical data contained in the Detailed Designs (DD) finalized in 2000. The data concerning expropriations were updated in July 1998 and action taken.

8.2 The approach adopted for the conduct of the EIS focuses on consultation with the different organizations and administrations concerned by the project, as well as on the gathering of basic data from field visits. Surveys were carried out locally by contacting the public works directorates and services of the APC, Wilaya, the Water and Forest Department, as well as the inhabitants concerned by the project.

8.3 Exhaustive surveys concerning information related to agriculture and the socio-economic environment of the project, and to the archeological data were conducted on the basis of plot plans through the distribution of questionnaires to those whose properties were affected by the project. Floristic inventories as well as wildlife surveys at the level of the perimeter and its environs were carried out all along the highway routing.

9. Cost of the Environmental Protection Measures

The administrative and logistic costs relating to environmental monitoring are taken into account under the general project heading “Works monitoring”.

Description of Measures	Ain El Bey -El Meridj
Expropriation of Land	DZD 177,087,000
Expropriation of Buildings	DZD 12,913,000
Movement of Equipment	DZD 47,000,000
Protection of Water	DZD 8,000,000
Acoustic protection	DZD 3,395,000
Reforestation and Landscaping	DZD 91,900,000
TOTAL	DZD 340,295,000

10. Conclusions and Recommendations

10.1 The routing of the Constantine bypass which constitutes the project, has an impact corresponding to a loss of 74 hectares of farmland, 5 ha of natural habitat, the displacement of 8 families, and the partial loss of employment for 75 people.

10.2 The loss in farm income will be between DZD 35,000/ha and DZD 195,000/ha depending on the cropping pattern. The field surveys show that farmers wish compensation in kind for farmland. Farmers on State-owned land, who are not owners, but who enjoy usufruct, will also receive financial compensation.

10.3 As with any basic infrastructure project, it has the drawback of impacting on the socio-economic situation of the region, albeit minimally.

10.4 From an ecological standpoint, the areas crossed are in an advanced state of degradation and, consequently, the project will have little impact on the fauna and flora of the sites.

10.5 Noise-related impacts are negligible in view of the low population density of the area; noise barriers will be installed at different points on the routing. The pollution caused by the sites and traffic will make it necessary to ensure that the discharge of water contaminated by oils and hydrocarbons is not released into the Wadis without prior treatment.

This summary of the potential environmental impacts of the Constantine Highway Construction Project is submitted to the Board of Directors for information.

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