East Meets West Foundation (EMWF)

Environmental Assessment

For the Kon Ray Ethnic Minority Boarding School

Dak To Lung Commune, Kon Ray District, Kon Tum Province

(Final, March 6, 2007)

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List of Acronyms

ADA	American Disability Act
ADB	Asian Development Bank
As	Arsenic
BOD	Biological Oxygen Demand
CHC	Community Health Center (CPC or DPC level)
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
CPC	Commune People's Committee
CWP	Clean Water Program (EMW)
D/EPC	Danang Environmental Protection Center
dBA	Decibels (measurement of noise level)
DANIDA	Danish International Development Agency
DOE	Department of Education (provincial level)
DOH	Department of Health (provincial level)
DONRE	Department of Natural Resource and Environment (at provincial level)
DPC	District People's Committee
DPI	Department of Planning and Investment (provincial level)
EA	Environmental Assessment
EMWF	East Meets West Foundation
F. Coli	Fecal coliforms (which cause diarrheal disease)
FAO	Food and Agriculture Organization under UN
GOV	Government of Vietnam
HEPR	National Target Program for Hunger Eradication, Poverty Reduction and Job Creation (also known as Program 134)

HHs	Households
HSBC	Hygiene and Sanitation Behavioral Change
INGO	International Non-Governmental Organization
HEPA	High Efficiency Particulate Air
HI	Hazard Index
IBC	International Building Codes
IEC	Information, Education and Communication
ISO	International Organization for Standardization
ISO/IEC	IEC International Electrotechnical Commission
Kg/cm^2	Kilograms per square centimeter
KV	Kilo-volt (1,000 volts)
KVA	Kilo-Volt Amp
LPCD	Liters per capita per day (measure of water consumption)
mg/m^3	Milligrams per cubic meter
MONRE	Ministry of Natural Resources and Environment
m^3	Cubic meters (of water)
m^3/day	Cubic meter per day (water production or use)
m/s	Meters per second (also ms), such as wind speed or water flow
mm	Millimeters (1,000 mm = 1 meter)
MPN	Most Probable Number (of E. coli in a water sample)
MSE	Micro and Small Enterprises
N	Nitrogen
NGO	Non-Governmental Organization
NO_x	Nitrogen Oxide
NTU	Nephelometric Turbidity Units -- a measure of the clarity of water
O&M	Operation and Maintenance
P	Phosphorus
PDCED	Program for Socioeconomic Development in Communes faced with Extreme Difficulties (also known as Program 135)

PM	Particulate Matter
PPC	Provincial Peoples' Committee
RWC	Rain Water Catchment
S	Sulfur
SSF	Slow Sand Filter
SOx	Sulfur Oxide
TCVN	Tieu Chuan Viet or Vietnam Standards
TT-BTNMT	Circular from the Ministry of Natural resources and the Environment
VVF	Vietnam Fatherland Front
VND	Vietnam Dong (about VND 16,000 per US$ 1 as of June 2006)
VOC	Volatile Organic Compounds
WC	Water Closet (toilet)
WHO	World Health Organization
WQ	Water Quality
WU	Women's Union
WSS	Water Supply and Sanitation
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
VND	Vietnam Dong (currently VND 16,100 = US$ 1
WHO	World Health Organization

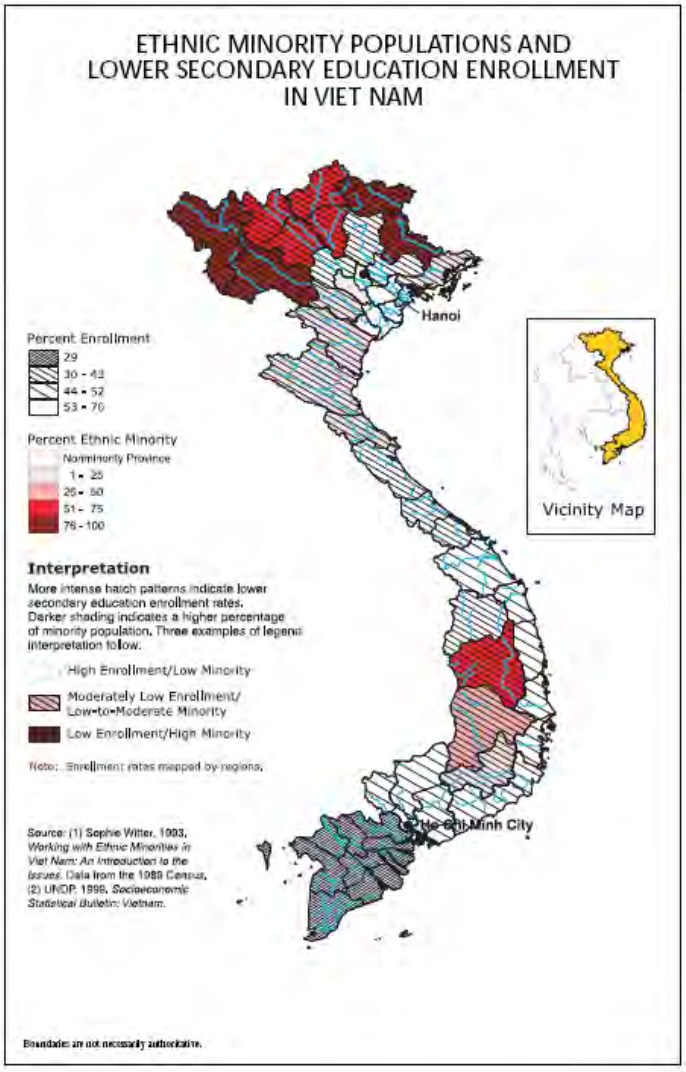
NOTE: US$1 = VND 16,000 approximately as of February 2007

1. EXECUTIVE SUMMARY AND RECOMMENDATION

Directed by the East Meets West Foundation (EMWF), the Danang Environmental Protection Center (D/EPC), assisted by EMWF staff and consultants, and has prepared this Environmental Assessment (EA) for the consideration of the relevant agencies of the Government of Vietnam and the U.S. Agency for International Development (USAID). The purpose of this Environmental Assessment is to define the process of addressing anticipated impacts resulting from the construction and utilization of the proposed Kon Ray Ethnic Minority Boarding School, located in Dak To Lung Commune of Kon Tum Province, in the Central Highlands of Vietnam. The draft Scoping Statement on which this EA was based is given in Appendix 5 of this EA.

1.1. Project Description and Purpose

The project intends to build a school / vocational training center to address the needs of ethnic minority pupils. The school will have eight classrooms, 25 dormitory rooms for students, two additional rooms for teachers, and toilets. There will be a dining room and kitchen for the students, teachers, and support staff. There will also be workshops for vocational training, including agricultural extension intended to help improve the socioeconomic conditions in the local economy. A dedicated piped water system will also be built to provide water to the planned 250 school students in grades 6-9, plus 50 teachers and support staff. Finally, there will be a microcredit program, the details of which remain to be determined.



In Vietnam, ethnic minorities tend to be located in the hilly and mountainous areas, and particularly in the Central Highlands provinces, such as Kon Tum[1] (where 54% of the population of more than 363,000 people is ethnic minority). Their livelihoods generally focus on uplands and subsistence agriculture, and educational levels are generally low. The map[2] at right shows the percentage of school enrollment by province (30-43% in Kon Tum). In Vietnam (as in neighboring countries such as Cambodia and Laos) literacy rates are significantly lower for highland peoples than for lowland peoples. For example, the literacy rate among the Kinh majority in Vietnam is over 87%, compared to highlands minority groups such as the Ede (42%) and Hmong (10%).[3]

[1] Kon Tum is the province just above the only bright red province (Gia Lai) in the lower half of Vietnam.

[2] The Status of Ethnic Minorities in Southeast Asia, Asian Development Bank, Manila. May 2002.

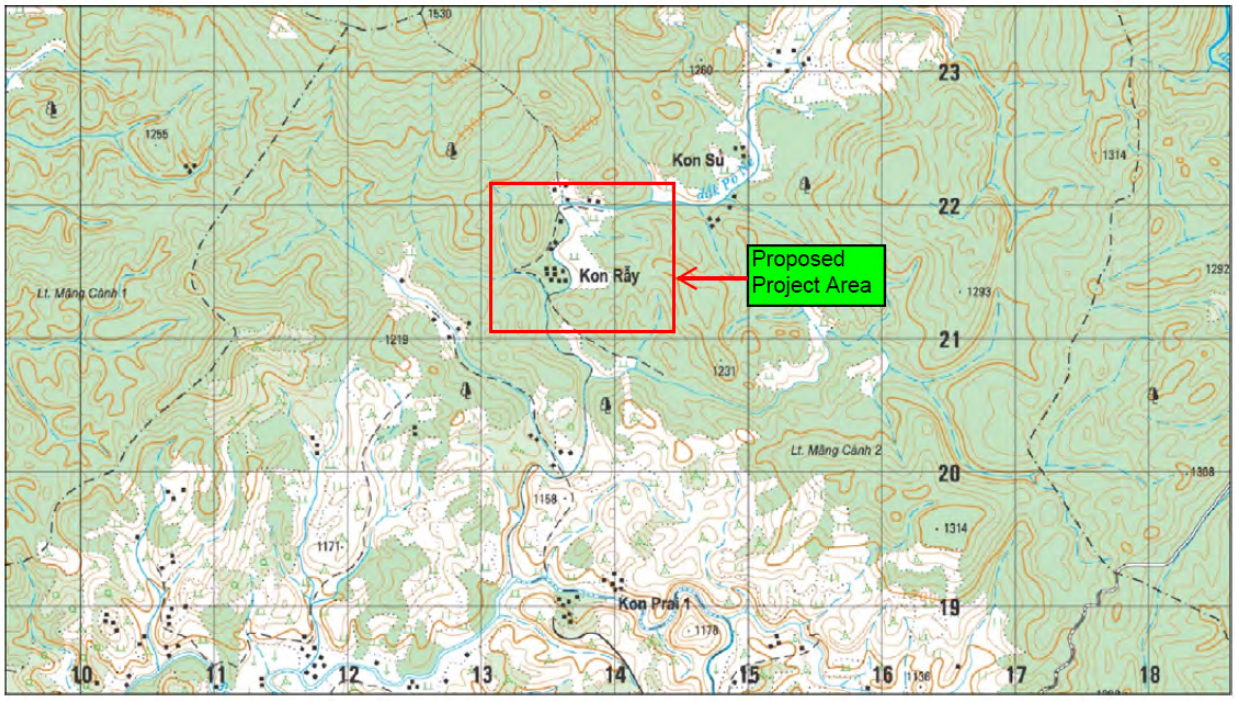
[3] *Status of Ethnic Minorities*, Asian Development Bank, Manila.

These data clearly document the need to improve literacy rates in particular and educational levels in general among ethnic minority people, particularly those living in the highlands provinces, such as Kon Tum.

The multiple benefits of this project therefore include: 1) reducing the student drop out rate due to higher quality educational environment; 2) attracting more experienced and qualified teachers due to an improved working environment; 3) increasing the graduation rate at all school levels; 4) improving basic sanitation hygiene and nutrition through a targeted behavioral change program that will help improve both student and family health, helping to minimize sick days and enable students to take advantage full advantage of the improved educational facilities; and 5) providing an additional source of income to local residents who can participate in the construction of the school, as well as providing operation, maintenance and repair support over the long term.

1.2. Environmental Setting

Location and Scope – The project is in Dak To Lung Commune, Kon Ray district, about 30 km west of central Kon Tum. This is near the point where Vietnam, Cambodia and Laos meet. The project area covers about 2 hectares, and construction will consist of a boarding school, dinning room, vocational training workshops and other supporting facilities. The closest neighborhood or village is “Dak To Lung” which is about 2 km from the proposed construction site.



Map of the Project Area

Population - The population of Dak To Lung Commune is 1,447 people (366 families) spread across seven villages. The local residents are primarily from the Xra’ ethnic group (95%). The estimated annual population growth rate is about 4%.

Topography, Land Use, and Political Divisions - Kon Ray District is located in the mountainous Central Highlands region. The area of Kon Tum Province is about 1 million hectares, about 15%

of which is agricultural land, and the remainder forest and a small amount of industrial land. There are seven districts in Kon Tum, one town, and 92 Communes/wards[4]. The Google Earth photograph below shows the geographical location of Kon Tum Province with regard to the East Meets West Office in Danang (upper right corner).

Satellite Photograph of Kon Tum, Quang Nam and Quang Ngai

Water Sources - The River Dak Coi is 140 meters east of the proposed site (refer to the detailed site map in section * below). It is the main and untreated source of fresh water for the District of Kon Ray, supplying an estimated population of 21,000. Next to the proposed site and almost abutting the proposed location are two streams. It was noted that while the rainy season in May-October, water flow in the streams adjacent to the school still maintained ample flow in February, suggesting that the streams were fed at least partially by groundwater springs, which are a potential source for the school water supply.

[4] *Report to VUFO-NGO Resource Center Members on the INGO Visit to the Central Highlands (Gia Lai and Kon Tum Provinces),* May 2004.

Air and Water Quality – Due mainly to the low level of development and low population density in Kon Tum Province and Kon Ray District in particular, air quality is generally very good. While these conditions suggest that water quality is good (at least compared to the much more industrialized areas such as those around Hanoi and Saigon, where many water sources are highly polluted), typical sanitation and hygiene behavior is such that surface water sources may be polluted by human and animal waste, so that treatment is required before consumption.

1.3. Impact Assessment

Based on meetings with the local authorities (at the Commune, District and Provincial levels), consultations with all homeowners in the vicinity of the proposed project site, and a thoroughly detailed technical assessment of all relevant environmental parameters, there are likely to be modest or negligible negative impacts in the following areas:

- Air Quality (dust and gaseous emissions) – will be relatively modestly impacted during construction, but essentially negligible during the operation phase. Along transportation routes to construction waste (and later on, solid waste from the school operations) disposal sites could be negatively impacted, if construction waste is not properly covered when transported from the site, and properly disposed of thereafter.
- Noise – There will be modest and intermittent noise levels from trucks carrying construction materials, and from heavy equipment (backhoes, skip-loaders, etc.) during land clearing and building operations during the construction phase, but only very modest increases in noise level will occur over the long term, largely from an anticipated modest increase in traffic flow on the (currently dirt, but to be upgraded by the local authorities) school frontage road (*see photo*). School operations will generate some noise, primarily as the students arrive and depart.

Road Fronting the Proposed School Site

- Traffic – During construction, traffic will increase as trucks carry construction materials in and waste out. During the operation phase, the only significant traffic increase will be due to students and teachers arriving and departing (mostly on foot or by bicycle), some motorbikes (mostly teachers and admin staff) and traffic related to small retail stores and food shops that will evolve to meet the needs of the 300 students, teachers and admin staff off the school. Vehicular transport (primarily small trucks and motorbikes) will be required to bring in food and school supplies. A culvert has already been installed in the road so that the stream will run under it.
- Deforestation – While deforestation has been an issue of considerable concern in the Central Highlands (and elsewhere in Vietnam) due to both legal forest harvesting as well as illegal logging, in recent years GOV has paid considerable attention to forest protection and reforestation.

The Proposed Site

The area of annually destroyed forest has declined compared to previous years, and the area of new forest continues to increase. However, since the proposed project site is entirely a manioc and cassava field (*see photo*), no significant deforestation impact is anticipated.

- Land Appropriation – Land owners or renters will be compensated appropriately for loss of access, according to GOV regulations. However, as there no residences or commercial buildings on the proposed site, no relocation or associated compensation will be necessary.
- Health - Potential risks to workers health and safety will be mitigated with appropriate remediation activities. Community health with the school population will likely show a very positive improvement, as their water and sanitation facilities will be substantially improved.
- Water – The stream that flows down more or less along the northern side of the proposed school site feeds the Dak Koi River down below the road. EMW staff have already observed the stream flow three months into the dry season, and it appears adequate. However, we intend to make precise stream flow measurements in another two weeks or so (e.g., late February) in order to help ensure sufficient water flow more towards the end of the dry season (our local colleagues claim that April is the end of the dry season). The contribution of this stream to the Dak Koi River flow is minimal, so partially utilizing the stream would have a nearly immeasurable impact on the river flow rate.
- Flora and Fauna – This is a very small site that is already in use for low value agriculture. There will be a positive impact and the local flora as trees, shrubs and gardens will be planted as part of the landscape architecture plan. Because of the modest size and rural agricultural location of the site, impact on local fauna is likely to be minimal.

In brief, no major negative impacts on natural, physical, or economic resources were identified during the development of this EA. No cross-sectoral or cumulative impacts have been identified. Details of the environmental management, mitigation and monitoring tasks required to be in full compliance with relevant GOV and USAID regulations are described in section 7 herein. These measures are further broken down into the construction and operating phases of the proposed project, and an estimated budget for carrying out these mitigation and monitoring measures is provided.

1.4. Comparison of Alternatives

Alternatives include building the proposed new school, building it on a different site, upgrading other schools in the area, or doing nothing. There are limited options here. There are currently only three elementary schools in the commune (at Hamlet 1, 3 and 7) and one junior high school (at Village 3). The proposed location was already identified in the Kon Ray Master Plan for about the last ten years, but no progress has been made thus far due to insufficient funding. Other schools in the area include one elementary school with four classrooms, with a student population of about 150, located about 2 km from the proposed project site. The high school is about 15 km away from the proposed project site. Their current state is best described as modest at best. The school children that are likely to attend the school live from about 5-12 km from the proposed site.

A very recent GOV report (see section 2.4.1 below) confirmed that many schools in the Central Highlands do not meet the educational demands of ethnic groups, which are the majority of the population in provinces such as Kon Tum and certainly in Kon Ray. Also noted was the fact that classroom conditions were largely substandard, compounded by a general shortage of well-qualified teachers and necessary educational equipment in the Central Highlands. The proposed site is included in the Commune/District Master Plans as the site of a new school. It has convenient access to transportation (a dirt road to be upgraded by the local authorities), water (two streams and a river are nearby), and has suitable soils for a septic system for wastewater disposal. Therefore, the proposed project his project appears to be the best alternative.

1.5. Impact Management, Mitigation, and Monitoring

Mitigation measures will be implemented to control potential negative environmental impacts. Mitigation measures will be the responsibility of EMW, but will be carried out by qualified contractors (and later by school staff), and will include the following (refer to section 7, which includes a table summarizing all impacts, mitigation measures, and monitoring responsibilities):

- Dust control - Spray water on material to be transported, cover truck beds, and water down dirt roads to reduce dust.
- Emissions control - Require owners of the transport vehicles to only use properly inspected and registered vehicles with mufflers to mitigate noise and emissions.
- Noise abatement - Require vehicle operators to minimize use of horns on the site.
- Onsite storage and handling of hazardous materials – Use proper storage facilities and train handlers in proper use, storage, and emergency procedures.
- Mitigation of potential impacts on traffic - through traffic control planning, road improvement and installation of a drainage culvert (paid for by the local authorities), and by strictly overseeing truckers' driving habits (which are the cause of numerous and often fatal road accidents in Vietnam), and dismissing any recurrent violators.
- Worker protection and risk prevention - All workers will be trained about health and safety protection practices, protective equipment will be provided, and compliance monitored and enforced by construction management staff.
- Managing and reducing wastewater – Contractors will provide portable toilets, and surface water runoff will be properly managed by using drainage pits. Proper latrines and septic tanks will be built for the use of school pupils and staff, and regularly de-sludged.
- Solid waste management – contractors will be required to properly manage and dispose of construction waste and other solid waste on a regular and proper basis, recycling wherever possible.

1.6. Policy and Program Context

The socioeconomic and political situation in Kon Tum Province is quite different in many physical and policy respects than in Quang Nam, where the majority of EMW community development activities have been carried out. Most potential program beneficiaries in Kon Tum are relatively poor ethnic minorities, many of whom live in small dispersed settlements in the mountains, often without convenient access to paved roads, without piped treated water. The Government of Vietnam (GOV) has made significant investments to improve the lives and livelihoods of many of these people by providing a variety of rural infrastructure including electricity, schools, dirt roads, communal meeting houses, private homes and improved water supply.

GOV developed a series of policies and programs to support infrastructure and other development activities in minority areas of the Central Highlands, including the National Target Program for Hunger Eradication and Poverty Reduction (HEPR) for 1998-2000 (approved in July 1998). For 2001-2005, it was extended to include job creation, and was renamed the National Target Program for Hunger Eradication, Poverty Reduction and Job Creation (HEPR, or simply Program 134). Another program – the Program for Socio-Economic Development in Communes faced with Extreme Difficulties (PDCED for short, also known as Program 135, also approved in 1985) focused on poverty reduction in the poorest regions of Vietnam. This EMW project will help the local authorities to achieve some of the development objectives of these programs.

This Environmental Assessment (EA) reflects the environmental policies of the Government of Vietnam (e.g., with regard to detailed technical standards for air, water, wastewater, and soil

quality standards – see Appendix 3 for a summary of GOV environmental policies relevant to this EA), and USAID (e.g., with regard to required tasks such as community consultation, format and presentation of results, and issues required to be addressed).

1.7. Recommendation

The construction and use of the Kon Ray Ethnic Minority Boarding School, located in At Dak To Lung Commune, Kon Ray district, Kon Tum province, Vietnam will have a direct positive impact by: a) supporting the Government's efforts to reduce the high dropout rates in many schools whose students are primarily ethnic minorities; and b) building a school and vocational training center for ethnic minority students, where improved quality of education and facilities will help encourage students to continue their education. Secondary objectives include: a) providing core skills in order to improve the incomes of graduates; and b) a program focusing on improving nutrition and hygiene and sanitation behavioral change for both students and area residents.

2. PROJECT DESCRIPTION

2.1. Project Setting

The project setting on the proposed Vocational Training Centre is in Dak To Lung Commune, Kon Ray District, in Kon Tum province, which is about 30 km west of central Kon Tum. The project sponsor is the East Meets West (EMW) Foundation. For over 17 years, EMW has worked with the people of Vietnam to build a peaceful and prosperous future. Currently the largest non-governmental organization (NGO) working in Vietnam, EMW has built a reputation of implementing high quality programs and projects that make a lasting impact on thousands of children and families living in poverty. EMW focuses on a variety of programs for enhancing the education and health of children, building and renovating vital institutions - schools, hospitals, medical clinics, and clean and safe water systems for home and agricultural use.

In addition to the majority Kinh ethnic population, there are 53 minority groups in Vietnam. Ethnic minorities account for 13–14% of the total population in Viet Nam, and are scattered across the country in 45 of 61 of provinces. Minority groups are largely concentrated in mountainous areas such as Kon Tay Province. In the north, 31 of 54 groups are found. These include large groups like the Tay, Muong, and Thai in the valleys and foothills; the San Chay and San Diu in the more mountainous areas; and the Dzao, Khmu, and Hmong in the middle stretch of uplands. In the Central Highlands, there are an estimated 19 ethnic groups, and the groups tend to be more concentrated. Groups include the Dzao, Muong, Nung, Tay, and Thai that have migrated from the north, as well as others in the Mon-Khmer and Malayo-Polynesian linguistic groups[5].

This proposed project takes full advantage of several of EMW's core competencies, namely development of schools and water systems. The project objective is to build a school and vocational training center for ethnic minority students, with the objectives of reducing the currently high drop out rate, improving the quality of education, and thereby increasing the graduation rate of participating students. Secondary objectives include providing core skills in order to improve the incomes of graduates, and a program focusing on improving nutrition and hygiene and sanitation behavioral change for both students and secondarily for area residents.

[5] *The Status of Ethnic Minorities*, Asian Development Bank, Manila, 2003.

2.2. School Facilities and Conditions

Other existing schools in the area include one elementary school with four classrooms, with a student population of about 150, located about 2 km from the proposed project site. The high school is about 15 km away from the proposed project site. Each school room nominally has about 25-30 kids in typical elementary schools, but sometimes limited space forces class sizes of up to 45-60 in reality.

2.3. Proposed Action

The project intends to build a school / vocational training center to address the needs of ethnic minority pupils. The school will have eight classrooms, 25 dormitory rooms for students, two additional rooms for teachers, and toilets. There will be a dining room and kitchen for the students, teachers, and support staff. There will also be workshops for vocational training, including agricultural extension intended to help improve the socioeconomic conditions in the local economy. A dedicated piped water system will also be built to provide water to the 300 school students, teachers and support staff.

2.3.1. Project Preparation Phase

This phase will last for about 3 to 6 months. The Kon Ray DPC is responsible for cooperating with Dak To Lung CPC (*see photo*), EMW project staff, and working with the contractor to be selected by EMW to develop a detailed implementation plan and schedule for all required activities. These will include land use planning, compensation for current users of the proposed site (note that no relocation will be required), overall school design and layout, landscaping, water system design and source identification, wastewater and solid waste management design, procurement of good and materials, contracting for construction, and interfacing with the beneficiary community.

Kon Ray Commune Peoples Committee

EMW has built numerous schools (and piped water systems) in the Central Region of Vietnam, and has identified a variety of qualified contractors to carry out the work. For tasks that are the responsibility of the DPC (e.g., site preparation, frontage road improvement, development of roads into the building sites in the proposed project area, electrical hookup to a nearby transformer of adequate capacity, etc.), DPC will identify and manage the contractor(s). All other tasks will be carried out by contractors hired directly by EMW. It has yet to be determined whether a single General Contractor or multiple contractors will be selected (most but not all of the buildings could be at least partially subcontracted). Tender documents have already been sent to six qualified contractors that have been pre-qualified based on previous work with EMW. The short-listed contractors have 30 days to submit their proposals. The EMW Financial Department is very experienced in the financial management of similar infrastructure development contracts, and applying due diligence in the carrying out of complex infrastructure development projects.

After the initial planning process is completed, the Kon Ray's DPC will competitively select a contractor to carry out ground clearing and development, identifying the need for improvements to

streets and (where necessary) extension of electrical power lines (including an additional transformer to ensure good quality power, if required[6]) that will be affected by the new school construction, and finally agreeing on procedures for transferring ownership and responsibility for maintaining all facilities to be financed under the project. The water system for the school will be built and financed separately under the EMW Clean Water and Sanitation Program (CWSP). A concept drawing of the proposed school facilities is shown on the following page.

2.3.2. Project Implementation Phase

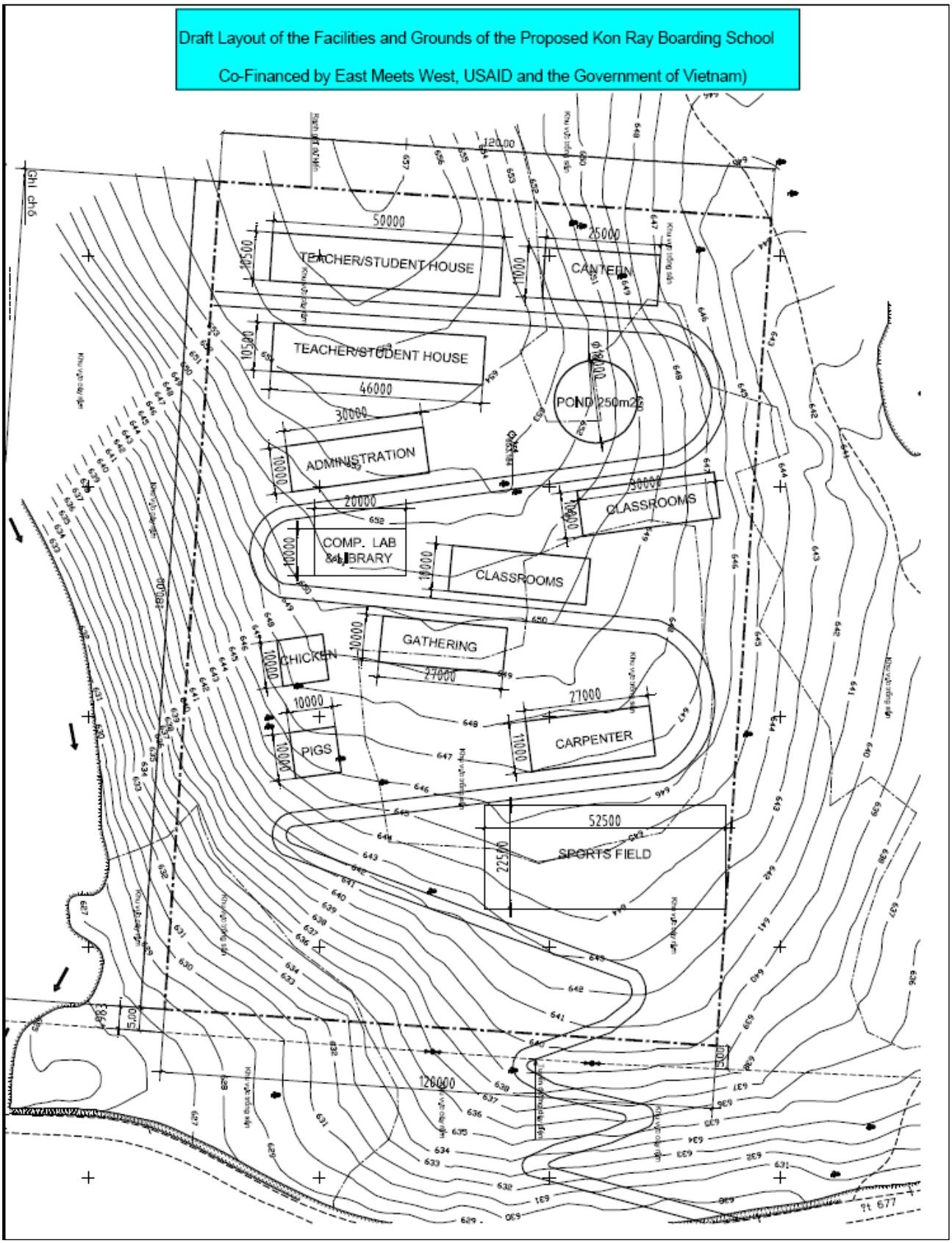
Implementation will be carried out over a 9 - 12 month period, during which the project will initiate and complete the construction of the following facilities:

- Boarding school, consisting of eight classrooms (adequate for class sizes of approximately 250 students, administrative rooms, vocational training workshops.
- Dining room and kitchen facilities adequate to accommodate all 300 students, teachers and administrative support staff;
- 25 boarding rooms for the approximately 250 students (ten students per room, with separate facilities for boys and girls), and two rooms for the teaching staff.
- Adequately sized bathroom and shower facilities for the 250 pupils and 50 teachers and administrative staff, and suitably sized septic treatment facilities for human waste and wastewater.
- A piped water system (separately contracted under the EMW CWSP) providing treated, piped water 24 hours a day, with quality meeting GOV standards, and a drainage system for grey wastewater and rainwater runoff. The water system shall be designed to meet International Building Codes (IBC) fire detection, prevention and fighting capability.
- A rainwater catchment system (using the school roofs as the collectors) to supplement the piped water system, if a preliminary assessment study shows the utility and cost-effectiveness of such a system.
- Construction management, periodic inspection, quality control and quality assurance.

2.3.3. Project Operating Phase

After finishing construction and a joint final inspection by the relevant agencies (Dak To Lung CPC, Kon Ray DPC, and EMW), the ownership of the project facilities will be transferred to the local government (especially for Kon Ray district education division) for management. DPC and EMW will jointly determine the detailed staffing requirements and establish appropriate administrative procedures for managing the school. A financial plan and operating budget will be jointly prepared by the CPC, DPC and EMW. School fees (at least for the first year of operation) will be calculated and agreed to by all parties, with the understanding that school fees may well have to be revised from time to time to reflect evolving operational requirements to ensure the school's financial sustainability.

[6] The existing power line feeds the District Public Works office a few hundred km down the road from the school site. The school can connect directly to the good quality, low-voltage line, and will not require an additional transformer.


Draft Layout of the Facilities and Grounds of the Proposed Kon Ray Boarding School
Co-Financed by East Meets West, USAID and the Government of Vietnam)
TEACHER/STUDENT HOUSE
CANTEEN
TEACHER/STUDENT HOUSE
POND 250m2
ADMINISTRATION
CLASSROOMS
COMP. LAB
LIBRARY
CLASSROOMS
GATHERING
CHICKEN
PIGS
CARPENTER
SPORTS FIELD
50000
25000
46000
30000
20000
27000
52500
120000

3. ENVIRONMENTAL SETTING

3.1. Field Study Methodology

The detailed outline of this Environmental Assessment is based on the format of a somewhat similar USAID-financed school in Egypt[7]. This report also integrates the directives included in the GOV Circular No. 08/TT-BTNMT[8] of the Ministry of Natural Resources and the Environment (MONRE) regarding strategic environmental assessment, environmental impact assessment, and the GOV commitment to environmental protection. The next section references documents from the field assessment and other stakeholder meetings and interviews that were used to define the EA scope. Appendix 4 of this EA lists the technical references used for the preparation for this report, including the relevant MONRE decrees and circulars, with which this EA is compliant. A summary of these discussions is given below.

3.2. Stakeholder Consultations

The preparation of this EA was based on an agreement between East Meets West Foundation (EMWF) and the Danang Environment Protection Center (D/EPC), after consulting with the local authorities in Kon Tum and Kon Ray. The report content was discussed and agreed upon in meeting[9] on November 16, 2006, held at the Kon Ray District People Committee (DPC) office. Meeting participants included the following:

- Vice chairman of the Kon Ray DPC;
- Chairman of the Kon Ray District Vietnamese Fatherland Front (VFF);
- Chief of the Kon Ray District Education Division;
- Chief of the Kon Ray District Natural Resources and Environment Division;
- Representative of the Kon Tum Provincial Department of Planning and Investment (DPI);
- Representative of the Kon Tum Provincial Department of Natural Resources and Environment (DONRE);
- Representatives of the EMWF; and
- Representative of the Danang EPC.

During this meeting, the general report outline was agreed upon. While the overall content has been essentially retained, the format and content was modified somewhat to meet the requirements of one of the major potential donors, the U.S. Agency for International Development (USAID). During the meeting, an agreement was made that the Kon Ray DPC and the Dak To Lung Commune Peoples Committee (CPC) would proactively cooperate with the EA study by providing expeditiously and without charge all required information and data on the environmental, educational, and socioeconomic and any other data required to successfully prepare this EA. In

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[7] *Environmental Assessment, Delta Solb Preparatory School Livelihood and Income from the Environment Program Lead Pollution Clean-up in Qalyoubia*, USAID/Egypt, May 23, 2006

[8] GOV Ministry of Natural Resources and Environment (MONRE), September 08, 2006.

[9] See Appendix Two of this EA, which lists the detailed agenda and participants of this meeting.

carrying out this EA for the proposed vocational training center, the consultants carried out the following tasks:

- Assessed all relevant environmental, technical and socioeconomic indicators and conditions in the proposed project area,

- Carried out a consultative process whereby a representative selection of all appropriate stakeholder groups would be duly consulted about their interests, knowledge, suggestions and potential concerns about the project planning and development process, and

- Identify, analyze and propose appropriate mitigation measures for all likely negative impacts from the project.

EMW and Danang EPC staff consulted at length with the local authorities at the Provincial, District, Commune and hamlet level, including members of the few households living near the perimeter of the proposed school site. EMW Country Director (Mark Conroy), in collaboration with Professor Ha of Danang University's Department of Education, met with local authorities in Kon Tum two years ago in an effort to address the problem of improving the quality of provincial educational programs, especially the poor performance and high drop-out rates of ethnic minority students there. Professor Ha will be responsible for designing and managing the teacher training program for the proposed new school.

One of the primary purposes of this proposed project is to better prepare and motivate ethnic minority students to enter and graduate from universities. A parallel objective is to provide high quality vocational training for students who are unlikely to follow the university track. During that visit, Mr. Conroy and Professor Ha met with several representatives of the local authorities, including the Provincial Department of Planning and Investment (DPI), Education, Foreign Affairs, and the Kon Ray District PC (which is located just a few kilometers up the road from the proposed school site). Also joining the two days of meetings was EMW's Dick Borgdon, the Assistant Country Director of Educational Programs at that time.

Several other consultations were made by EMW staff. Construction Supervisor Mr. Nam met with the local authorities and together with them carried out the site topographic survey (paid for by EMW) and met with some of the local residents to assess their water system and sources. Mr. Conroy did a further site investigation, and signed the MOU with Ms. Anh, the Kon Tum PPC Vice Chairman. Among other matters, the MOU noted the financial contributions from each of the three major contributors (USAID - $512,906 for school construction, EMW for professional services of $32,793, and the local authorities – Kon Ray DPC $12,000 for the lot clearing, landscaping, power line extension, road improvement (*see photo above of the road fronting the proposed site*), and fence building, and the Kon Tum PPC will provide the estimate annual school operating costs of $83,250).

Road Frontage on East (Downhill) Side of Site

EMW has retained the services of John Troha of Delta Construction, who was commissioned to do the Master Plan. Together with Mr. Conroy and the local authorities, they visited the school site, assessed potential locations for the proposed water system catchment site, and visited other

ethnic minority secondary schools in the district, along with two other small schools that were about 2-3 km from proposed site.

Most recently (January and February 2007), there was a series of meetings and discussions held with the relevant local authorities. The initial meeting was with the provincial Department of Planning and Investment (DPI), attended by the Department of Natural Resources and Environment (DONRE), Department of Health (DOH), Department of Education (DOE), Women's Union (WU) and other local authority representatives[10]. The meeting agenda (see Appendix 2) focused on all activities to be carried out during the planning, construction and operations phases, including (inter alia):

- Project site and scope - including specific building construction and layout details, including number of classrooms and other rooms for students, teachers and other support staff, and that there would be no more than one-story buildings.

- Beneficiaries - About 300 people will use the facilities (students, teachers, admin and other support staff);

- Schedule - Estimated planning / construction activity schedule (not detailed budget); and

- Procurement - Contractor selection process, procurement of goods, materials, educational and other required equipment,

- School Design - Comments from DOET on school design, from all three levels Kon Tum, Kon Ray, Dak To Lung.

Subsequent discussions focused on the environmental assessment process and schedule:

- Purpose and objectives of the proposed project, in particular to increase the number of ethnic minority students attending school, the number of students graduating, and the higher quality of education that they will hopefully receive.

- Administrative, financial and technical requirements of the donors and local authorities, including contact information of all individuals and organizations involved in the project preparation and implementation, and their standard administrative, environmental, procurement, and other procedures, so that the project can be fully compliant and minimize delays in activities and approvals on both donor and local government sides.

- Environmental Technical Issues - Danang EPC gave a presentation of the technical EA issues, data collection requirements and procedures, including water, soil, and air quality tests, and other related data to be collected on flora and fauna, religious and cultural sites, and other issues that needed to be examined before the project could be implemented.,

- Water Supply and Source Development - Specific technical matters were discussed, such as the need to preserve the natural ecological system around the site, preserving and avoiding potential damage to all nearby water resources (streams, river, and groundwater), such as minimizing increased turbidity in the Dak Coi River[11], and maintaining the natural

[10] See the meeting agenda and list of attendees in Appendix 2.

[11] The Dak Coi River, numerous small streams in the area, and rainwater are the only sources of fresh water serving the 21,000 people in Kon Ray District.

surroundings. There were also discussions about the importance of minimizing the impact of agricultural fertilizers and pesticides on groundwater, but the current low-level agricultural use (cassava) does not require high levels of either chemicals.

- Environmental Sanitation – the importance of reducing diarrheal disease through the use of appropriate sanitation facilities, coupled with hygiene and sanitation behavioral change. The project will financially support improved sanitary latrines for all people involved directly or indirectly with the school, and appropriate facilities would be constructed for human sanitation and wastewater treatment, i.e., a proper septic system[12] with an appropriate drainage field, and periodic de-sludging of the septic tank(s).

EMW and Danang EPC staff13 also met with all of the families located in the vicinity of the proposed school site (of which there were very few. This is a very under-developed area, with only three houses within the immediate vicinity (meaning a kilometre or so in each direction along the dirt road that fronts the proposed site). Except for the cassava field, and the three homes along the lightly used dirt road, there are no other structural improvements near the proposed project site. It is very unlikely that if a new facility is built in the nearby forest, that the dirt road servicing the school will encourage illegal logging or poaching. Nonetheless, it is important to note that: "Road rehabilitation is the single greatest threat to the nature reserves and parks in the Central Highlands. This is because roads, in the absence of enforcement and monitoring, provide easy inflow of people and uncontrolled increases in the extraction of wildlife and NTFPs therefore the limiting improvements and upgrading to the Ministry of Transport Type B road should be closely adhered to".[14]

EMW and local government staff discussed with families in all of the houses near the site about the new school, and they were quite positive in their response, as this will no doubt provide them with income generating opportunities. Also discussed were the potential direct impacts on river from construction site. The discussions with the family members in the only 3 houses near the site, it was clear that they knew the DPC and CPC had been planning the new school for a long time, but there had been no progress because of lack of funding. EA staff talked to people about their awareness of the proposed school, and the response was uniformly positive. While it may seem surprising that so few people lived anywhere near the proposed project site, Kon Ray district has a very low population density of only 21,000 per km^2. Dak To Lung Commune has only about 300-400 people living there. Note that this is nearly the same number of people who will be at the school, most of whom will come from the surrounding district(s).

Public Works Office and House East of Site

[12] Percolation tests will need to be carried out to ensure that the septic system will work properly, but given the soil conditions and the slope, this is unlikely to present any problems.

[13] A five-person team from EPC and an EMW representative carried out this survey.

[14] Summary Initial Environmental Examination for the Central Region Livelihood Improvement Project (CRLIP), Asian Development Bank (ADB), Manila, the Philippines, and Hanoi, Vietnam, 2001.

The EA team found that local people get drinking water from three one-meter wide drilled wells that are about 40 or more meters deep. Essentially they are pumping up from the river 40-50 meters down the hillside. Each house had a basic pit latrine (e.g., not pour-flush). The EA team spoke with five staff from the new Public Works office (*see photo, left side*) located 1-2 km down the road to discuss the D/EPC EA questionnaire. During these visits, D/EPC and EMW staff discussed with the local residents and local authorities about environmental issues related to school construction (dust, noise, inconvenience, job possibilities, will the contractor only use outside labor, will they pay reasonable wages, etc.).

They also discussed what are the likely impacts upon their lives, such as that: a) their children could have access to better education; b) better school facilities are likely to encourage more students to regularly attend classes; c: what the tuition costs are likely to be, and whether they could afford to pay them; d) how many students in the nearby areas are likely to want or be able to attend, and; e) whether the construction or the school itself might have any socioeconomic impact on their lives such as employment, etc.

The consultants and participating agencies would like to express their appreciation for the cooperation of all agencies and individuals supporting this EA by providing required data and information, participating in a variety of technical surveys, and suggesting appropriate responses to various problems. In particular, we would like to thank the members of the Kon Ray DPC and the Dak To Lung CPC, and the other community members who participated in the surveys.

3.3. Definition of Study Area and Current Land Use

Land designated for the school is a 2 hectare parcel currently used to grow cassava, located on an existing dirt road along the lower (east) end of the site, about 60-100 meters above the river. As the road is relatively undeveloped, traffic is slight and sporadic. The local authorities have agreed to upgrade the road if the school is to be built on that site. It is likely that the new road will be concrete in order to minimize erosion. Concrete roads are quite common in rural Vietnam, and local contractors are skilled in their design and construction. Alternatively, they could use paving brick. The site slopes uphill from the road on about a 1:12 grade (it is about 22 m difference from the lowest to the highest point on the site). A stream (fed by both groundwater springs and surface water flow) flows down the north side of the proposed site. The uphill border of the site is forested. Only three houses are located along the road near the site. There as yet is no commercial or industrial development near the site.

Kon Ray CPC owns the property, and leases it to a farmer for small scale agricultural purposes (cassava). There is no existing forest on the site (cleared to plant the cassava), so no new land clearing is required. There are no residents living on the site, so no relocation will be required. This is fortunate, as relocation and appropriate levels of compensation can be very problematic issues. The farmer(s) who currently use the land would have to be compensated for their loss of access, but as they do not own the land, this would be a small or negligible cost.

3.4. Socioeconomic and Public Health Conditions

3.4.1. Population, Income, Education and Public Health

Basic socioeconomic data on Kon Tum Province includes the following[15]:

[15] *Statistical Yearbook of Vietnam* (2005 edition), Statistical Publishing House, General Statistics Office, Socialist Republic of Vietnam, 2005.

- Population - The population of Kon Tum Province in 2005 was 1,114,600 people, the area was 9.614 km^2, and the population density was 39 persons per km^2, which is the second lowest population density of all provinces in Vietnam, higher only than Lai Chau Province. The population of Dak To Lung Commune is 1,447 people (366 families) in seven hamlets. In the project area, there are 22 families (Hamlet 5). There main ethnic minority group is the Xra' ethnic group, which represents 95% of the local population. Population growth rate is about 2.2% per annum[16].

- Family Income - Local people's livelihoods focus on uplands and subsistence agriculture and forestry product exploitation. Educational levels are generally low. Family income is mainly agricultural and forestry-based. Average income is about 700 kg rice per year, equivalent to VND 2.8 million (US$ 174, based on a farm gate price of VND 4,000-5,000/kg, and a retail price of VND 10-12,000 per kg.[17]. Somewhat dated estimates suggest that rubber plantation workers average monthly income is VND 600-700,000[18].

- Education - Educational levels are generally low, as in most Central Highlands minority areas. School enrollment in Kon Tum province is about 30-43%. In Vietnam (and neighboring Cambodia and Laos) literacy rates are significantly lower for highland than for lowland peoples. For example, the literacy rate among the Kinh majority in Vietnam is over 87%, compared to highland minority groups such as the Ede (42%) and Hmong (10%). There are currently three elementary schools in the in the Dak To Lung Commune area. One is in Village 1 (about 3 km south of the proposed site), another is in Village 3 (about 1 km north of the proposed site, and the third is in Village 8[19] (about 3 km north). There is an intermediate school in village 3. The Commune is now making an effort to improve the educational levels to meet GOV policy goals by the year 2010, and has agreed to provide housing for teachers from their governmental budget.

- Community Health– the rates of incidence of amoebic dysentery, bacillary dysentery and diarrhea are much higher in Kon Tum Province compared to most of the other provinces in Vietnam (see the table on the following page for comparison to other provinces).[20] Important indicators of community hygiene and sanitation conditions include: incidence of diarrheal disease (from public health records; coverage of improved household and school latrines; existence of sanitation and hygiene behavioral change promotion; and effective Commune Health Centers (CHC) and quality of the services that they provide. The proposed school will actively promote health education to improve this situation, and potentially carry out community health outreach programs as well.

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[16] Summary Initial Environmental Examination for the Central Region Livelihood Improvement Project (CRLIP), Asian Development Bank (ADB), Manila, the Philippines, and Hanoi, Vietnam, 2001.

[17] In many ethnic minority families, household incomes often cannot meet basic minimum needs, so that school fees may be deemed an unaffordable luxury. So instead of going to school, many children join their parents in income generating activities.

[18] *Xe Dang Minority End Nomadic Way of Life*, Vietnam News, May 2004.

[19] Yes, those are the real names of the villages.

[20] *Concept Paper for the Proposed EMW Clean Water Program in Kontum Province*, Rick McGowan, East Meets West Foundation, Danang, November 2006.

The table on the next page shows the incidence (by Province) of water borne diseases such as cholera, typhoid, bacillary dysentery, amoebic dysentery and common diarrhea. Provinces with high rates of bacillary and amoebic dysentery and diarrhea are shaded red. Kon Tum has a higher than average incidence of those diseases. Compare this to Quang Nam, the current focus of the EMW Clean Water Program (CWP). While these data are slightly dated, they show that significant health improvements are needed in Kon Tum. This is partly due to poor access to proper water and sanitation facilities, an example of which are the many no longer functioning water tanks and taps originally financed by UNICEF (*see photo*). It is also due to generally poor access to proper sanitary latrines, and poor hygiene and sanitation behavior. Most water projects financed by multilateral / bilateral donors and NGOs now include hygiene and sanitation behavioral change (HSBC) promotion. EMW has decided to do so as well, and is currently in the process of developing an effective HSBC program.

No Longer Functioning UNICEF Water Tank

This project will improve health conditions of the 300 school students, teachers and support staff through a hygiene and sanitation behavioral change promotion program tailored to meet their respective needs. Improving sanitation and hygiene behavioral change can have a significant positive impact upon community and families, largely by reducing the frequency of diarrheal disease. Provision of a targeted program to encourage students and (by extension) their families to take advantage of access to improved water supply and sanitation facilities (proper sanitary latrines) will have a clear positive impact on community health.

3.4.2. Rural Infrastructure

Rural infrastructure in Kon Tum and Kon Ray in particular, is below national standards. There remains considerable room for improvement of rural roads, water supply, buildings (e.g., schools) and basic services such as community health and education. The rural transportation system in the project area consists of National Highway No. 24, which is a large width (3.5-5 meters), asphalted road. There is the provincial road No. 677 to Dak To Lung Commune (which passes by the project area) with a length of 24 kilometers, which is a level V highland soil road. Others roads in the area are dirt, gravel and often seasonal roads. GOV has also funded bridge construction to facilitate local business and trade, as well as allowing children to more easily get to schools (*see bridge photo*).

Foot Bridge over Stream

The rural electrification system consists of the following electrical lines in Kon Ray district: a) a high tension 500 KV line passes by Dac Ruong town area; b) a medium tension line (22 KV) is connected to a 110kv/22 KVA transformer of Kon Tum town, and goes along Highway No.24, and c: A low tension line (22 KV) and a 0.4 KV line connects Dak To Lung Commune, and runs along the road near the proposed school. The electrical power requirement for the school will be determined during the design phase.

Selected Provincial Data on Certain Water Borne Diseases

Area and Number	Cholera		Typhoid		Bacillary Dysentery			Amoebic Dysentery			Diarrhea			Provincial Population	Prov/Town Name
	prevalence	dead	prevalence	dead	prevalence	>0.2%	dead	prevalence	>0.1%	dead	prevalence	>0.2%	dead		
All VN	0	0	5,030	6	43,973		36	19,185		368	########		11		
North	0	0	1,249	6	4,556		35	5,635		368	539,951		7	2002 Data	
Middle	0	0	668	0	12,987		0	4,399		0	134,095		0	Extrapolated	
South	0	0	3,088	0	15,429		1	4,102		0	274,044		4	by 10%	
Highland	0	0	25	0	11,001		0	5,049		0	63,628		0		
1	0	0	13	1	0	0.00%	0	0	0.00%	0	57,945	2.1%	0	2,700,000	Hanoi*
2	0	0	0	0	315	0.02%	0	395	0.02%	0	5,770	0.3%	0	1,700,000	Hai Phong
3	0	0	0	1	148	0.01%	35	474	0.03%	368	93,989	5.2%	0	1,800,000	Thai Binh
4	0	0	0	0	0	0.00%	0	3	0.00%	0	10,822	0.6%	0	1,900,000	Nam Dinh
5	0	0	1	0	43	0.01%	0	79	0.01%	0	12,560	1.6%	0	800,000	Ha Nam
6	0	0	14	0	43	0.00%	0	43	0.00%	0	10,548	1.2%	0	900,000	Ninh Binh
7	0	0	61	0	473	0.01%	0	391	0.01%	0	20,392	0.6%	2	3,500,000	Thanh Hoa
8	0	0	0	0	27	0.00%	0	213	0.01%	0	15,268	1.0%	0	1,500,000	Bac Giang
9	0	0	0	0	99	0.01%	0	176	0.02%	0	12,250	1.2%	0	1,000,000	Bac Ninh
10	0	0	0	0	297	0.02%	0	137	0.01%	0	8,492	0.7%	0	1,300,000	Phu Tho
11	0	0	0	0	7	0.00%	0	16	0.00%	0	13,083	1.2%	0	1,100,000	Vinh Phuc
12	0	0	1	0	107	0.01%	0	303	0.02%	0	13,274	0.8%	0	1,700,000	Hai Duong
13	0	0	2	0	367	0.03%	0	419	0.04%	0	12,460	1.1%	0	1,100,000	Hung Yen
14	0	0	0	0	107	0.01%	0	40	0.00%	0	4,320	0.4%	0	1,100,000	Thai Nguyen
15	0	0	0	0	20	0.01%	0	18	0.01%	0	3,273	1.1%	0	300,000	Bac Can
16	0	0	1	0	39	0.00%	0	48	0.00%	0	9,190	0.9%	0	1,000,000	Quang Ninh
17	0	0	1	0	597	0.02%	0	903	0.04%	0	26,781	1.1%	0	2,400,000	Ha Tay
18	0	0	0	0	7	0.00%	0	19	0.00%	0	3,480	0.4%	0	800,000	Hoa Binh
19	0	0	3	0	420	0.01%	0	668	0.02%	0	25,655	0.9%	5	2,900,000	Nghe An
20	0	0	0	0	376	0.03%	0	390	0.03%	0	10,971	0.8%	0	1,300,000	Hai Tinh
21	0	0	474	2	79	0.02%	0	145	0.03%	0	25,475	5.1%	0	500,000	Dien Bien
22	0	0	27	0	91	0.03%	0	143	0.04%	0	17,007	5.0%	0	340,000	Lai Chau
23	0	0	18	0	119	0.02%	0	95	0.01%	0	12,144	1.6%	0	750,000	Lang Son
24	0	0	1	0	95	0.01%	0	85	0.01%	0	20,094	2.9%	0	690,000	Tuyen Quang
25	0	0	1	0	39	0.01%	0	183	0.03%	0	19,862	3.2%	0	620,000	Ha Giang
26	0	0	2	0	4	0.00%	0	22	0.00%	0	13,100	2.6%	0	500,000	Cao Bang
27	0	0	2	0	55	0.01%	0	36	0.01%	0	17,954	2.6%	0	690,000	Yen Bai
28	0	0	76	0	258	0.04%	0	64	0.01%	0	17,343	2.8%	0	610,000	Loa Cai
29	0	0	551	2	324	0.04%	0	127	0.01%	0	26,449	2.9%	0	900,000	Son La
30	0	0	0	0	733	0.09%	0	326	0.04%	0	8,674	1.1%	0	800,000	Quang Binh
31	0	0	150	0	1,710	0.29%	0	733	0.12%	0	5,960	1.0%	0	600,000	Quang Tri
32	0	0	7	0	1,178	0.11%	0	628	0.06%	0	18,001	1.6%	0	1,100,000	Tien Hue
33	0	0	5	0	900	0.12%	0	155	0.02%	0	6,079	0.8%	0	750,000	Danang
34	0	0	59	0	1,679	0.11%	0	953	0.06%	0	21,897	1.5%	0	1,500,000	Quang Nam
35	0	0	53	0	954	0.08%	0	594	0.05%	0	25,729	2.1%	0	1,250,000	Quang Ngai
36	0	0	247	0	1,063	0.13%	0	309	0.04%	0	6,811	0.9%	0	800,000	Binh Duong
37	0	0	94	0	374	0.05%	0	77	0.01%	0	5,665	0.7%	0	800,000	Phu Yen
38	0	0	0	0	3,358	0.31%	0	394	0.04%	0	16,326	1.5%	0	1,100,000	Khanh Hoa
39	0	0	32	0	569	0.10%	0	40	0.01%	0	9,159	1.7%	0	550,000	Ninh Thuan
40	0	0	21	0	469	0.04%	0	190	0.02%	0	9,794	0.9%	0	1,100,000	Binh Thuan
41	0	0	75	0	473	0.01%	0	76	0.00%	0	6,815	0.1%	2	5,500,000	HCMC
42	0	0	53	0	905	0.10%	0	114	0.01%	0	17,165	1.9%	0	900,000	Ba Ria-Vg Tau
43	0	0	20	0	455	0.02%	0	109	0.01%	0	10,310	0.5%	0	2,100,000	Dong Nai
44	0	0	79	0	232	0.01%	0	17	0.00%	0	16,618	1.0%	1	1,700,000	Tien Giang
45	0	0	6	0	352	0.03%	0	71	0.01%	0	21,399	1.5%	0	1,400,000	Long An
46	0	0	18	0	899	0.08%	0	90	0.01%	0	15,177	1.4%	0	1,100,000	Lam Dong
47	0	0	13	0	608	0.06%	0	168	0.02%	0	4,799	0.4%	0	1,100,000	Tay Ninh
48	0	0	57	0	314	0.03%	0	7	0.00%	0	20,052	1.7%	1	1,200,000	Con Tho
49	0	0	101	0	548	0.07%	0	51	0.01%	0	4,973	0.6%	0	800,000	Ha Giang
50	0	0	579	0	4,149	0.35%	0	869	0.07%	0	29,103	2.4%	0	1,200,000	Soc Trang
51	0	0	724	0	1,203	0.06%	0	490	0.02%	0	20,195	0.9%	0	2,150,000	An Giang
52	0	0	71	0	533	0.04%	0	56	0.00%	0	25,896	1.9%	0	1,350,000	Ben Tre
53	0	0	0	0	81	0.01%	0	92	0.01%	0	8,576	0.9%	0	1,000,000	Tra Vinh
54	0	0	69	0	531	0.05%	0	271	0.02%	0	13,535	1.2%	0	1,100,000	Vinh Long
55	0	0	557	0	1,314	0.08%	0	453	0.03%	0	20,836	1.3%	0	1,600,000	Dong Thap
56	0	0	0	0	182	0.02%	0	276	0.03%	0	7,880	1.0%	0	800,000	Binh Duong
57	0	0	26	0	590	0.08%	0	280	0.04%	0	6,490	0.9%	0	700,000	Binh Phuoc
58	0	0	556	0	564	0.04%	0	375	0.02%	0	9,946	0.6%	0	1,550,000	Kien Giang
59	0	0	71	0	1,037	0.09%	1	164	0.01%	0	8,900	0.7%	0	1,200,000	Ca Mau
60	0	0	13	0	459	0.06%	0	73	0.01%	0	5,379	0.7%	0	800,000	Bac Lieu
61	0	0	12	0	2,925	0.16%	0	1,286	0.07%	0	21,569	1.2%	0	1,800,000	Dak Lac
62	0	0	0	0	609	0.15%	0	355	0.09%	0	6,779	1.7%	0	400,000	Dac Nong
63	0	0	13	0	4,235	0.42%	0	2,195	0.22%	0	20,547	2.1%	0	1,000,000	Gia Lai
64	0	0	0	0	3,232	0.81%	0	1,213	0.30%	0	14,733	3.7%	0	400,000	Kon Tum
						> 0.15%			>0.1%			>0.2%			
Population data from: http://www.statoids.com/uvn.html (rounded up 10% in each province)														79,600,000	In 2006 should be 84 million

Note that the high disease incidence in Hanoi is likely because of better reporting not higher incidence of disease

> Provinces under consideration for expansion of the EMW Clean Water Program

> Provinces with much worse than average incidence of water borne diseases

> Provinces where EMW Clean Water Program is currently being implemented

Rick McGowan, Water Sanitation Specialist, Nov. 9,2006

There is no central piped water supply system in Kon Ray. Local residents use water almost always from unprotected sources such as streams, rivers, lake, ponds and dug wells. These water sources are often only sufficient in the rainy season, and water scarcity is common in the dry season. There are some groundwater springs that produce water on a year around basis. Except for these groundwater springs, surface water typically does not meet Ministry of Health or WHO water quality standards. Nonetheless, such alternative sources will be used by the local people until such time as a piped clean water system becomes available. In the future, a piped, treated water supply system for Dak Ruong town could be developed and provide treated water to the school site, but for now an independent system is required.

Currently there is no intention that the water system to be financed under the Project will also provide water to a larger service area than the school itself. This could be a contentious issue, as there will no doubt be some development of shops and homes in area adjacent to the school. This issue needs resolution before any undue expectations are raised. It has been suggested that the water system (and perhaps the proposed rainwater catchment system, and maybe the wastewater management – septic system, etc.) could be financed out of the EMW water program budget. This also needs further discussion among the principals. It was noted in the D/EPC draft document that a piped water system is being planned for the nearby town of Dak Ruong, which might be able to meet domestic water demand in the area outside of the proposed project boundaries.

3.5. Physical Environment

According to meteorological records[21] the climatic features of the proposed project area are as follows (using data from Kon Tum Province, as data for Kon Ray District is not readily available).

3.5.1. Climate

- Temperature - Air temperature in Kon Ray is characteristic of highland tropical monsoon conditions. Temperature does not change appreciably over the day, months and years. Average temperature is about 24-25^{0}C.

- Rainfall - Average rainfall ranges from about 2,000-2,200 mm, and the rainy season is usually from May to October.

- Wind - Wind direction is stable. In winter, wind is mainly from the northeast. In summer, the main wind direction is southwest. Annual wind speed is less than 2 m/s, and varies little over the year. Winds in the dry season are usually higher than in the rainy season. At the end of the dry season and beginning rainy season, there are often strong but short-lived thunderstorms and whirlwinds with wind speeds of more than 30 m/s.

- Humidity - Humidity in the rainy season is higher than the dry season, is highest in August, and lowest in February and March. Average humidity is 82-87%.

- Clouds and Sunshine – Annual average cloud is lower than the country average. In the dry winter months, clouds are lower than in rainy months. In Kon Ray, cloud cover is lowest in January and February, and highest in August. In March and April when the seasons typically change, it is cloudier than in January and February, when clouds are black and dense, conditions indicating thunderstorms, hail and occasionally whirlwinds. Kon Tum

[21] Statistical Yearbook of Vietnam (2005 edition), Statistical Publishing House, General Statistics Office, Socialist Republic of Vietnam, 2005.

has a comparatively high level of sunshine due to the tropical monsoon circulation, so that the dry season often lasts up to six months.

3.5.2. Soils and Topography

Kon Ray is in the Central Highlands region, where soils are often relatively infertile. Typically soils consist of average soils with modest clay levels, and high absorbent capacity. They are generally characterized by low protein, humus, phosphorus, low pH, often steep, and given to erosion. Data from borehole drilling by the Dong Sang Company (July 2004) at sites with an average depth of 7 meters showed that:

- In the upper layer, there is alluvial soil to a depth of about 0.5 m.
- In the middle layer, there is clay with 4.3–4.9 m. When hydrated, the soil has high softness, low humidity (16.4%), average natural voids about 42%, and soil capacity R0=1.92 kg/cm^2.
- The lower clay layer is sandy to depths of 1.6 – 2.2 m, low humidity (~17%), natural hollow (n = 44.02%), and soil capacity Ro = 1.58 kg/cm^2.

While the risk of landslides exists in the more mountainous areas nearby, it is very unlikely given the modest slope and relative soil stability at the proposed site of the school. Every year at beginning of rain season, surface vegetation is stripped to plant manioc. The existing dirt road along the front of the proposed site is less than 3 m below upper grade of the proposed site, and the existing slope is stable with vegetation. Forthcoming soil test results will provide a more complete assessment.

3.5.3. Geology, Hydrology and Drainage

Kon Tum is situated on the Kon Tum block, which has an exceedingly diverse structure of geology and minerals[22]. There are 21 stratigraphic (layered) units and 19 magmatic (originating from molten rock) complexes in the province that have been identified by geologists thus far. Numerous minerals have also been identified, included iron, chromium, gold, fireproof materials (metamorphic and hydrous magnesium silicates such as asbestos), precious metals, radioactive metals, rare earth, and minerals widely used in construction and different industries. As a result, there is considerable mineral development potential.

In the district there is mapped gold mineralization, thermal mineral water and piezolite deposits. Piezolite is a residual product of laterite weathering. Laterite weathering can lead to the formation of useful aquifers associated with the accumulation of quartz gravel deposits at the base of a laterite weathering profile. The presence of thermal mineral waters at the contact between Tac Po Formation and Que Son Complex granodiorite is evidence of a deep hydrology that may be controlled by deeper tectonic structures. The main kinds of minerals found in Kon Tum include:

- Minerals used in construction: Including brick clay, construction sand, gravel, marble, limestone, granite, puzzoland, etc.
- Soundproof, heatproof and environmentally friendly materials such as diatomaceous earth and bentonite (found especially around Kon Tum town).

[22] *Natural, Socioeconomic Essential Conditions for industrialization and Modernization,* an informational CD produced by the Kon Tum Peoples Committee, 2005.

- Fireproof materials such as silimanite (silimanite brick is an advanced refractory material), dolomite and quazit (found in Dak Glei, Dak Ha and Ngoc Hoi).

- Fuel minerals such as peat (mainly found in Kon Tum town, Dak Ha and Dak To districts.)

- Black, non-ferrous, ferrous minerals such as manganese (in Dak Ha district), tin, molybdenum, wolfram, uranium and thorium (mainly in Dak To, Dak Glei, Ngoc Hoi and Kon Plong districts), and bauxite (mainly in Konplong District).

- Gemstones such as ruby, sapphire, opal, and calcedon (in Dak To and Konplong districts in Kon Tum).

Soils in Kon Tum are divided into five groups with 17 main soil types, including:

- Three types of types of alluvial soils, consolidated, scattered and streamside.

- Two types of grey soil, including grey soil on acid magma and on ancient alluvium.

- Six types of yellow soils, including brownish yellow soil on ancient alluvium, red and yellow soil on acid magma, red and yellow soils on clayed stone and degenerated soil, red brown soil on weathered basalt soil, and light yellow soil on sandy stone and purple brown on basalt stone.

- Five types of yellow humus land on mountain, namely light yellow humus with potzon, light yellow humus on clay stone and consolidated soil, red brown humus on base magma, and neutral soil and red yellow humus on acid magma.

- Valley land is typically mainly sloping soil.

A summary of major geological formations of Kon Ray District from youngest to oldest follows[23]:

- **aQ_2^3** - Upper Holocene (a): sand, cobble, granule, silty sand; (m): quartz sand, fragments of coral, Mollusc she6,5-7m thick.**aaQ_1^3** - Upper Pleistocene Upper part (a): cobble, granule, sand, silt; (m): sand, silt, clay; (am): clay, sand, cobble, granule. ranule, sand, silt; (m): sand, silt, clay; (am): clay, sand, cobble, granule. 3-17m thick.
- **amQ_1^{2-3}** - Middle- Upper Pleistocene (m): sand, silt sand, clay; (a): sand, cobble, granule, grit. 2-8m thick.
- **βN_2dn** - Dai Nga Formation: tholeiitic basalt, subalkaline olivine basalt. 30-180m thick.
- **GπE*pr*** - Phan Rang Complex: porphyritic granite, felsite dykes.
- **$GbπE_cm$** - Cu Mong Complex: gabbrodiabase, diabase dykes.
- **GaT_3nhv_1** - Hai Van Complex Phase 1: medium to coarse-grained porphyritic biotite granite, two- mica granite.
- **$DiPZ_3bg\text{-}qs_4$** - Ben Giang- Que Son Complex Dyke phase: aplite granite.
- **$DiPZ_3bg\text{-}qs_3$** - Ben Giang- Que Son Complex Phase 3: granite, granosyenite.
- **$GdiPZ_3bg\text{-}qs_2$** - Ben Giang- Que Son Complex Phase 2: biotite hornblende granodioritte , tonalite.
- **GbMP*pm*** - Phu My Complex:gabbro amphibolite.
- **$Pkpp_cr$** - Cheo Reo Complex: hornblendite, pyroxenite.

[23] Thanks to Mr. Kim Patrick of FrOGTech for this detailed summary of geological and hydrological information on Kon Ray District and Kon Tum Province.

- **PP*tp*** - Tac Po Formation: biotite gneiss, biotite plagiogneiss, cordierite-garnet-sillimanite-biotite-quartz schist, thin layer of amphibolite, olivine marble, graphite schist. 1,000-1,100m thick.

Surface water sources in Kon Tum are primarily rivers and springs in northern Kon Tum, located in sloping beds, narrow valleys and usually have swift-flowing currents and very few lakes or ponds Major rivers drain from the north to south through Kon Ray district, eventually flowing to Kon Tum town. The main tributaries originate in an expansive area of Hai Van Complex Granite with elevations reaching up to 2068 m. Within the general vicinity of the main townships and commune centres of Kon Ray district there are some seven major reservoirs constructed. Six of the seven reservoirs capture stream flow from relatively short and steep streams that originate north (max elevation 1353m) and south (max elevation 1388m) of the main population centres in forested mountains of the medium to high grade metamorphic Tac Po Formation. Reservoir names include the following: D. Dak Po Kong 1996; D Dak Gui; D Dak Roang 1975; D Kon Bo Deh; D Dak So Ret; and Ho Dak Ro.

The main river systems include the Se San river, with two main branches, the Po Ko and Dakbla, the 121 km long Po Ko branch originates from the south of Ngoc Linh Range, running towards the north, a branch of which is supplemented by the 73 km long Dak Psy spring which comes from communes in Dak Ha district. The Dakbla is 144 km long, and arises in the Ngoc Krinh Range. Other major rivers and springs include: a) Northeast of Kon Tum is the source of the Tra Khuc River, which flows down to Quang Ngai Province; b) Northern Kon Tum is the source the Thu Bon and Vu Gia Rivers, which flow down to Quang Nam and Da Nang, respectively; and c) The source of the Sa Thay River is the Ngoc Rinh Rua Mountain, which then flows north almost parallel to the Cambodian border, and finally joins the Se San River.

In general, surface water resources in Kon Tum are becoming polluted due to inappropriate use of fertilizers, pesticides and herbicides in agriculture. The estimated potential groundwater water capacity in Kon Tum is industrial reserve grade C2 100.000 cubic meters/day. The reserves are somewhat higher at the 60 - 300 meter depth. In Dak To and Kon Plong districts, where there are nine hot mineral water spas which are popular spots for relaxation and health treatment.

Quaternary age fluvial river deposits adjacent to major rivers are particularly well formed over the area where the Dak A Koi and Dak Pone rivers join at the northern contact between the Tac Po Formation and the Ben Giang- Que Son Complex Phase 2: biotite hornblende granodioritte , tonalite. Depending on degree of weathering and secondary fracturing the Ben Giang-Que Son granodiorite may be a locally important source of shallow groundwater for many households. The main built up area corresponding to the area of the Ben Giang – Que Son Complex granodiorite and tonalite has an approximate elevation of 600 m.

Igneous dyke complexes intruding into the Ben Giang – Que Son Complex have a preferred NE-SW orientation. Major geological faults mapped follow a similar NE-SW trend and appear to have a potentially significant influence on stream morphology. The Cheo Reo and Phu My complex intrusives have similar orientation.

The area of Hai Van Granite that extends north of Kon Ray district has the highest elevation and is potentially a very important catchment area for formerly forested mountain areas. Use mapping indicates that it is formerly forested mountain areas that are being progressively deforested. The loss of forest cover is particularly advanced in the areas accessible by the main road that follows the Dak A Koi River north from Kon Ray centre.

3.5.4. Air Quality and Noise

There is very little industrial or commercial development in this area, so that air quality remains generally quite good. Because of the relatively modest scope of this proposed project, and

because there will be no significant new source of emissions other than from domestic cooking fires and to a very limited extent from vehicular traffic, air quality is unlikely to change significantly. Noise levels will change because of the natural noisiness of school children when they play, but this will be intermittent and largely confined to a small area. Transportation-related noise, currently almost non-existent, will increase to a limited extent, especially after the current dirt road is improved. This noise is likely to be very intermittent as the population density here and in the bordering areas is relatively very low.

3.5.5. Water Supply and Quality

There is currently very little piped water supply in this area. Homes in the area use deep dugwells that essentially tap into the river water down below. There is one spring on the north side of the proposed school property, which drains across the road then down to the Dak Koi River below. The measured water quality of the river and both streams is good (see details of the WQ tests in section 4.2.1 below, using the GOV surface and groundwater/drinking water standards[24]), as there is currently no commercial or industrial development, and the only nearby agricultural development is the cassava field where the school will be built.

The stream that runs along the north edge of the proposed site is largely fed by groundwater springs, and is proposed as the most likely source for a gravity flow, piped water system that will serve the school (possibly supplemented with a rainwater catchment system). A precise flow rate measurement remains to be carried out, as it is always advisable to measure spring / surface water output during the dry season so as to assess the worst case condition. Water from the spring will be treated using a sedimentation tank and slow sand filter (which when properly managed, will eliminate the great majority of faecal coliforms). Villages along the Road 677 (in front of the proposed school site) use surface water through a system built by UNICEF in 2002. The main water storage tank is still functional. Four others residential units are largely inoperable due to poor maintenance.

3.5.6. Flora

The highly variable topography in Kon Tum creates climatic and environmental niches for highly diversified flora systems[25]. There are more than 300 species of flora belonging to over 180 branches and 75 flowered plant lines. The gymnosperm has 12 species, five branches and four lines; the angiosperm consists 305 species, 175 branches and 71 lines; the monocotyledon tree includes 20 species, 19 branches and six lines; the dicotyledon tree covers 285 species, 156 branches and 65 lines, of which the more common ones beans, oiled-trees, camphor-trees, castor oil plants, mimosa trees, cashews, china-trees and canarium trees. Kon Tum is home to numerous flora species occurring in several different kinds of tropical monsoon forests.

The flora here is divided into three distinctive altitude belts, namely areas lower than 600 meters, 600 - 1,500 meters and higher than 1,500 meters. Much of Kon Tum is densely forested, where the most common trees two-leaf pine, cinnamon, poee, etc.. In the belt between 1,500 - 1,800 m, the most common trees are three-leaf pine tree and cinnamon. Non timber forest products are not numerous, except in the area around Ngoc Linh Mountain, where precious herbs such as Ngoc Linh ginseng, acanthopanax, multiflorous knotweed and cinnamon-tree are found. In spite of significant deforestation due war, illegal logging, and forest products exploitation; the forests in

[24] GOV Water Quality Standard TCVN 5942-1995 for surface water quality of the river, and TCVN 5944-1995 for ground water quality, which is comparable to the WHO drinking water quality standards.

[25] Much of this information was included on a very comprehensive and useful CD prepared by the local authorities in Kon Tum, Kon Tum Provincial Peoples' Committee, Government of Vietnam, 2005.

Kon Tum still has many areas containing rare and high value species. According to a preliminary investigation, the following are some of high value species in the Kon Ray area:

- Wood for ship building and railroad ties: including “gội nếp” (ironwood), “vên vên” (Anisoptera Costata Korth), “huỳnh đường”, “sao đen” (black star), “sao xanh” (green star), “săng lẻ”, “aglaia spectabilis”, “anisoptera costata”, “dysoxylum loureiri”, “hopea odorata”, and “hopea helferi”.

- Wood for furniture: including teak, “gội nếp” (ironwood), “xoay”, “đinh hương” (sandal wood), “lòng mang”, “giổi”, “giổi xanh”, respectively “aglaia spectabilis”, “dialium cochinchinense”, “đinh hương”, “Ipterospermum”, “manglietia”, “michelia mediocris”.

- Wood for eỗ dán lạng: thông nàng (pine), vạn trứng, trám hồng, cóc đá, gội, chiêu lieu, or “Thành ngạnh thơm”, or “fokienia hodginsii”, “diospyros martitima”.respectively.

- Wood for sculpture and fine art, such as: “thành ngạnh thơm”, “pơmu”, “trắc”, “cẩm cai”, “cẩm thị”, or “fokienia hodginsii”, “rosewood”, “dalbergia oliveri”, “diospyros martitima”, respectively.

- Wood for paper materials, such as: “Thông 3 lá”, “thông 2 lá”, “vạn trứng”, or “pinus kesiya”, “2-leaf pinus”, respectively.

- Forest species with a high medical or economic value, such as: “wind tree” (aloe wood); “sa nhân”, “vàng đắng”, “thông nhựa”, “quế”, “ươi”, “song mây”, “hà thủ ô”, “ngũ gia bì”, “bổ cốt toái”, or “bastard cardamon”, “coscinium fenestratum”, “pinus merkusii”, “cinnamon”, “scaphium macropodum”, “rattan”, “multiflorous knootweed”, “araliaceous bark”, respectively.

A new species of plant called Diplopanax Vietnamensis was recently discovered in the mountainous regions of Kon Tum Province, where it grows in wet evergreen broad-leaved montane closed primary forests along ridges and on mountain summits at elevations of 1000–2500 m on soils developed predominantly on silicate sandstones, granite, and gneiss. No near-site observations have been reported.[26]

3.5.7. Fauna

Kon Tum’s province fauna resources are abundant and diversified, and include several protected species. According to available investigations, there are 429 species; among them 116 economically valuable species of economic values, especially for species should be protected such as Asian elephant, gayal, tiger, buffalo, vooc, stags, gibbon, and numerous species of birds. There are over 165 bird species and subspecies, 40 families, 13 series. Animals on the Red List (which should be protected for their scientific and practical value), include the Tibetan bear, Asiatic Elephant, Kouprey, Banteng, Gaur, Wild-Water Buffalo, Eld's Deer, Tiger, Leopard, Slow loris Gibbon, Douc Langur, Phayres Langur, Delacour' Langur, Snub-nosed Monkey, Golden- headed Langur, Sarus Crane, Black-headed Ibis, Giant ibis, White-winged Wood duck, many species of pheasants, crocodile, python and other snakes.

No near-site observations of these protected fauna have been reported. It is important to note that Vietnam has been implementing a number of special projects that encourage local people's

[26] A New Species of Nyssaceae from Vietnam—One More Living Representative of the Tertiary Flora of Eurasia, Leonid V. Averyanov of the Komarov Botanical Institute of the Russian Academy of Sciences, and Nguyen Tien Hiep of the Institute of Ecology and Biological Resources of the National Center for Natural Sciences and Technology of Vietnam, Nghia Do, Cau Giay, Hanoi, Vietnam, Novon Journal, Vol. 12, Number 4, 2002.

participation in the protection of rare and precious species of fauna facing the threat of extinction. These species include the Vietnamese Pheasant in Ke Go of Ha Tinh Province, Delacour' Langur in Cuc Phuong, Ninh Binh Province, Snub-nosed Monkey in Na Hang, Tuyen Quang Province, tiger in Thua Thien - Hue Province and Chu Mom Ray in Kon Tum Province.[27]

3.5.8. Aquatic Ecology

According to the Initial Environmental Examination for the Central Region Livelihood Improvement Project (CRLIP)[28], in the upland areas of Kon Tum, Thua Thien-Hue, Quang Tri, and Quang Binh, aquatic wildlife (e.g., fish, crabs, and snails) account for more than 40 percent of total animal protein consumption and always appear to have been an important component of livelihood systems. Anecdotal evidence indicates that catches are declining. According to local officials, the main reasons are (i) over-fishing and the illegal use of highly destructive fishing methods (e.g., explosions and poisoning); (ii) loss of spawning grounds due to agricultural reclamation of wetlands; (iii) changes in hydrology caused by watershed deforestation and increased abstraction from rivers and streams for irrigation; and (iv) increased turbidity due to soil erosion from arable cultivation on steep slopes and improper road construction. However, as this proposed EMW-USAID project will affect only one small feeder stream that drains into the Dak Koi River, adverse impact on the aquatic ecology will likely be minimal. Compared to the nearby Dak Koi River, the stream is so small that little (if any) potential food sources will be significantly affected.

Another problem related to the aquatic ecology of Kon Tum Province is the steadily increasing reduction of the eel population in the rivers. This is because local fishermen have abandoned traditional ways such as fishing and netting, preferring to use electrical devices or toxic chemicals. The new methods are immensely devastating to the environment. Those chemicals kill not only the eels, but also other aquatic animals and plants, leaving the ecology in danger.[29]

3.5.9. Solid and/or Hazardous Waste and Waste Disposal Sites

There is currently no proper solid waste management facility near the proposed site of the school. This is in part due to the fact that there are very few people living nearby. Household income, and therefore consumption, is relatively modest, so little solid waste is generated. Easily recyclable materials (e.g., metal and plastic containers) are recycled for the income there from. Non-recyclable solid waste is simply disposed of in a conveniently nearby spot. Little or no hazardous waste is generated in this area, as the very limited population is involved in only very basic agriculture, and there are no nearby industries or commercial establishments. Solid waste management plans for the school are discussed in section 4.2.4 below.

3.6. Aesthetic and Cultural Conditions

The project area is a small cassava field, with no aesthetic/cultural elements or resources of any major importance. School designers will make every effort to take into account local architecture and the natural condition of the surrounding countryside (*see photo on the following page of one of the few homes near the proposed site*).

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[27] Vietnamese Association for the Conservation of Nature, Hanoi Vietnam, http://www.vacne.org.vn.

[28] CRLIP IEE, May 2001

[29] Education for Nature, website of the Ministry of Natural Resources and Environment dated July 31, 2006

4. ENVIRONMENTAL ASSESSMENT METHODOLOGY

4.1. GOV Environmental Policies

GOV, primarily under the purview of MONRE has adopted a wide ranging and detailed set of integrated environmental policies in order to preserve environmental quality, and to minimize the impact of all varieties of development activities. A brief summary of GOV environmental policies and procedures is listed below:

One of the Few Homes Near the Proposed Site

- Constitution of the Socialist Republic of Vietnam on Environment, including: "National organizations, enterprises, co-operatives, and public army units have to implement policies of natural resources protection, improvement and regeneration, and living environmental protection".
- Law of Environmental Protection (dated November 29, 2005).
- Decree 80/ND-CP (dated August 09, 2006) of the Prime Minister regarding detailed stipulation and guidance on applying Law of Environmental Protection.
- Circular No.08/2006/TT-BTNMT (dated September 8, 2006) of the Ministry of Natural Resources and Environment regarding guidance on strategic environmental assessment, environmental impact assessment, and commitment to environmental protection.
- Decision No. 13/2006/QD-BTNMT dated Septemper 08, 2006 of Ministry of Natural Resources and Environment regarding stipulation of organizations and operation of assessment board for reports on strategic environmental assesment and EIA.
- TCVNs of environment approved in Decision No. 35/2002/QD- BKHCNMT dated June 25, 2002 of Ministry of Science, Technology and Environment[30]:
  - TCVN 5937-1995: Quality of air - Ambient air quality standards.
  - TCVN 5938-1995: Quality of air - Allowable maximum concentration of toxic substances in the ambient environment.
  - Standard 12: Temporary standards of Ministry of Science, Technology and Environment - Allowable level of noise in operation area.
  - TCVN 5942-1995: Water quality – Standard of surface water quality.
  - TCVN 5944 - 1995: Standards for underground water quality - Ministry of Science, Technology and Environment.
  - TCVN 6772-2000: Wastewater from living – permitted levels
  - TCVN 5941-1995: Soil quality – permitted level of residue pesticides in soil.
  - TCVN 6962:2001 – Vibration – vibrating of constructional and industrial activities – permitted level in resident and public areas.

Project planning and implementation will be carried out in full compliance with GOV regulations.

[30] Vietnam Standards or Tieu Chuan Viet Nam (TCVN) are national standards developed on the basis of research, application of scientific and technological advances, and adoption of international / regional/foreign standards. (Ref: U.S. Commercial Service, US Department of Commerce website).

4.2. Investigation, Sampling and Analysis

For assessing the status of air, water and biological quality in the area, investigating, sampling and analyzing program, the sampling methodology was as follows:

4.2.1. Water Quality Testing

a. River Water:
   - Location: two locations at Dak Coi River (ahead and behind project discharge).
   - Objective: Assessing quality of water source (discharge point).
   - Parameters: Fifteen parameters for water quality.
   - Standard: TCVN 5942-1995 – surface water quality.

b. Stream Water Testing:
   - Location: Five locations at streams in the area.
   - Objective: Assess drinking water quality.
   - Parameters: 15 related parameters.
   - Comparative standard: TCVN 5942 – 1995 – Standard on Surface Water Quality (column A – for drinking) and TCVN 5944 – 1995 – Standard on Groundwater Quality.

c. Groundwater Quality Testing (*see photo*):
   - UNICEF built 1-meter diameter dugwells at the three homes near the site, with one storage tank collecting surface water from a small catchment dam. The water was then piped to the houses, but as the system was not maintained, it no longer functions.
   - Stream Testing (but apparently fed in part by groundwater springs, as the stream flow is still strong at the height of the dry season) water quality measured near the proposed catchment dam location met current standards as per 4.1.1.b above.

Collecting Water Sample from Well

4.2.2. Air Quality Testing

- Location: Sampled at only location around the area.
- Objective: assessing ambient environment quality of the area.
- Parameters: six parameters measured.
- Comparative standard: TCVN 5937-1995 – Standard ambient environmental quality and TCVN 5949-1998 – Degree of noise in resident's areas – permitted noise level.

4.2.3. Soil Quality Testing

- Location: Sampled at only one location at Dak Coi River sediment.
- Objective: Assessing environmental quality of soil/sediment.
- Parameters: Pesticide levels in the soil are not above permissible limits.
- Comparative standard: TCVN 5941-1995 – Soil quality - level of residue pesticides in soil does not exceed permissible levels.

4.2.4. Solid Waste Management

- Location: collecting information on using and treating solid wastes in the area.
- Objective: assessing status of using, collecting and treating.
- Comparative standard: List of hazardous wastes in accordance with Decision No. 155/1999/QD-TTg of the Prime Minister on hazardous waste management.
- Samples were analyzed at the Danang EPC laboratory (certified ISO/IEC 17025) in accordance with TCVN standards.

4.3. Method and Schedule for Environmental Assessment Field Studies

The experimental method used incorporated environmental impact assessment, secondary statistics and data processing from hydrographs, environmental results, and rapid assessment based on WHO standard pollution indicators. The analytical procedures used included sampling technology, sample storage, analysis and comparison with TCVN standards as follows:

- Implementing sampling, investigating comments of Dak To Lung's Commune PC on environmental status, socio-economic conditions for the project area (one day).
- Sample analysis in accordance with existing TCVN (7 days).
- Preparation of report on environmental assessment (10 days).
- Review and comments from environmental experts (2 days)
- Revision and submission of draft final report for EMW review and comment (2 days).
- Revision and incorporation of comments in final draft for submission to the client (1 week).

4.4. Results of Environmental Analysis

For assessing the environmental quality status and predicting impacts to the project's area, investigating, sampling and analyzing of environmental parameters have been implemented. Results are presented in the following tables:

4.4.1. Air and Microclimate Monitoring Results

Table 3.1: Air Quality Monitoring Results

Id	Name of parameter	Unit	Result	TCVN 5937 - 1995
1	Temperature	^0C	28.5	-
2	Humidity	%	76	-
3	Noise degree	dBA	50-55	-
4	Wind velocity	m/s	1-3	-
5	Dust	mg/m^3	0.4	0.3
6	NO_x	mg/m^3	0.02	0.4
7	SO_x	mg/m^3	0.009	0.5
8	CO	mg/m^3	2	40

Note: Sampling date: November 19, 2006, weather marks: sunny and light winds. Unit of sampling and analyzing: Danang Environment Protection Center. **Comment:** Analyzed results show that there is no significant pollution in the project area. Results of environmental parameter measurements are lower than permissible guidelines, with the exception of dust from the (currently dirt road on the lower border of the site. There are already plans to upgrade this road, which will mitigate much of the current problem.

4.4.2. Water Quality Monitoring Results

Water quality results are given below in two separate tables, with Table 3.2 showing the results of the river water quality testing, and Table 3.3 showing the results of the stream / spring water testing results. The latter is the proposed water source for the school water supply system.

Table 3.2: River Water Quality Monitoring Results

No.	Parameter	Unit	Result		TCVN 5942-1995
			S_1	S_2	
1	pH	-	6.9	6.9	5,5-9
2	Color	Pt Co APHA	15	16	-
4	TSS	mg/l	36	46	80
5	Coliform	CFU/100ml	430	1500	10.000
6	Turbidity	NTU	10	7	-
7	BOD_5	mg/l	4	3	< 25
8	COD	mg/l	7	5	<35
9	NO^-_3	mg/l	6.9	7.8	15
10	NO^-_2	mg/l	0.017	0.001	0,05
11	As	mg/l	0.001	0.002	0,1
12	Residual pesticides	µg/l	KPH	KPH	-

Notes: KPH: undetected.
- S1: Water Sample of Dak Coi River, water source above the project site.
- S2: Water Sample of Dak Coi River, water source after the project site.
- TCVN 5942-1995: Standard of surface water quality (column B)
- Sampling date: November 19, 2006, weather marks: sunny and light winds.
- Unit of sampling and analyzing: Danang Environment Protection Center.

Table 3.3: Stream Water Quality Monitoring Results

No.	Parameter Name	Unit	Result					TCVN
			M_1	M_2	M_3	M_4	M_5	
1	pH	-	6.9	6.9	7.2	7.2	7.2	6-8.5 (1) 6.5-8.5 (2)
2	Color	Pt Co APHA	21	22	7	16	19	5-50 (2)
3	TSS	mg/l	11	13	4	10	8	20 (1)
4	Coliform	MPN/100ml	1200	1500	43	230	250	5000 (1) 3 (2)
5	Hardness	mg/l	14.7	15.6	78	59	56	300-500 (2)
6	S^{2-}	mg/l	0.007	0.009	0.012	0.006	0.008	< 4 (1)
7	As	mg/l	0.002	0.001	KPH	0.001	0.001	0.05 (1) 0.05 (2)
8	NO^-_3	mg/l	8.5	9.4	7.7	8.7	7.6	10 (1)
9	F. Coli	MPN/100ml	150	120	KPH	KPH	13	<3 (2)
10	Pesticide Residue	mg/l	KPH	KPH	KPH	KPH	KPH	0.15 (1)

- KPH: undetected
- M1: Stream water sample at east-north project
- M2: Stream water sample at west-south project
- M3: Well water sample at Dak To Lung Commune PC
- M4: Water sample at the public water tank of Dak To Lung Commune
- M5: Water sample at water tank no. 1 of Đăk Tơ Lung Commune
- Sample 3 is applied to (2): TCVN 5944-1995; others are applied to (1): TCVN 5942-1995

- (1): TCVN 5942-1995 – Standard of surface water quality (column A)
- (2): TCVN 5944-1995 – Standard of groundwater
- Sampling date: November 19, 2006, weather marks: sunny and light winds
- Sampling date: November 19, 2006, weather marks: sunny and light winds.
- Unit of sampling and analyzing: Danang Environment Protection Center.

Comments: The above results show that:

- The river just below the proposed project area has not been significantly polluted (S_1 and S_2), according to the testing results that that key parameters are lower than permitted levels.
- Groundwater quality tests (from underground springs that flow into the streams) show that key parameters are lower than permitted levels. A very small portion of the stream flow is already being utilized by the three residences along the road.

4.4.3. Soil Quality Monitoring Results

For soil environmental assessment, sampling and analyzing were carried out in the project's area. The result shows that the content of residue pesticides is below detectable levels. Thus, there is no existing significant pollution of the soils in the proposed project area. (*the table of the soil quality testing results is still under preparation by the Danang EPC).

5. ENVIRONMENTAL IMPACTS

This EA involved a public scoping process wherein concerned stakeholders were consulted at the scoping stage of the EA process to identify their potential concerns about the project implementation. Issues and concerns relevant to the remediation activities were raised during the public consultation meetings, and in meetings with the (very few) households in the immediate area of the proposed site.

5.1. Land Use and Regional Planning Impacts

Anticipated impacts of the project are summarized below according to each phase of the project.

5.1.1. Design Phase

Design phase impacts are anticipated to include:

Current Agricultural Use of Proposed Site

- <u>Change of the local ecology due to change of land use</u> - This will involve loss of cultivated area (but only the 2 hectare cassava field where the school will be constructed – *see photo*), and adjacent areas that will be developed to provide services (see Operation Phase below) such as food, vehicle repair, small retail shops, etc. to the residents of the school. There will be a modest impact on forest ecology, with minor effects on local flora and fauna, as the site was already developed for agricultural use, and is not forested.

- Water System and Proposed Source- The estimated 250 pupils, plus 50 teachers and administrative support staff, consuming about 100 liters per capita per day (LPCD, for drinking, cooking, bathing and washing clothes) means that the water system must provide 300 persons x 100 LPCD = 30,00 liters or 30 m^3 of water per day. The precise location of the water intake has not yet been identified, but several EMW staff and local officials have visited the proposed stream source running along the north side of the property, perpendicular to the road, and identified suitable potential sites for a small catchment dam and slow sand filter that might well be the best solution. The water system will include a catchment (diversion) dam, with a sedimentation tank, then a slow sand filter, and then flow by gravity to a tank suitably sited above the school so as to provide adequate water pressure to the distribution system covering the school area. Depending upon the water quality tested after construction of the intake and water treatment facilities, it may be necessary to chlorinate the water before use. Slow sand filters are easy to maintain. The upper (5 cm) layer of sand and accumulated scum is simply removed and replaced. The frequency depends upon the turbidity of the water. In addition, the water will be chlorinated to ensure that no excess E.Coli remains. EMW uses chlorinators on all of its new systems, and is retrofitting them on the older systems as well. The device the chemicals are readily available in Vietnam.

- Legal Access to Water Source - The water catchment is nearby (but uphill) of the school, and will be regularly inspected by school maintenance staff to ensure that it remains sanitary. EMW's MOU with the local authorities stipulates that the latter take responsibility to obtain all necessary authorizations other Provincial offices, including authorizing legal access to water from the Provincial Department of Natural Resources and the Environment (DONRE), which is responsible for groundwater management in Vietnam.

- Rainwater Catchment – Although it is not yet specified in the project design, it is recommended that the design engineers should consider the use of rainwater catchment (RWC) to supplement the primary piped water system. This would have at least two benefits. One is that a RWC system, using the school roof(s) as the primary collector, could reduce the size (and hence the cost) of the piped water system. It would also have the added benefit of directly utilizing rainwater falling on the project site, thereby minimizing the size and cost of the waste water drainage system.

- Wastewater System – Depending upon the soil structure at the school site, a properly designed and constructed septic tank(s) should be able to properly treat the school effluent to the point where there will be only a modest impact on the local hydrology, and that is well within allowable limits for wastewater treatment. The soils appear to be suitable in terms of percolation.

- ADA Compliance - Since the site is elevated, from the frontal road along the property, additional set back will be required to meet ADA requirements. Potential and previously unidentified cost of additional site access ramp, additional measures for slope stability, even retaining wall maybe needed for the site.

- Land Use Planning – As mentioned previously, the DPC / CPC do have a formal Development Land Use Plan, and the school site is already specified on that plan.

- Incorporating Local Aesthetics in Architectural Design – it is important to take into account local aesthetics relating to building design so as to help preserve the ethnic minority architectural style, to the extent practical.

5.1.2. Construction Phase

The building construction aspect of the project will involve construction of a school, accommodation for students, teachers and admin support staff, a kitchen and dinning room for all personnel, a piped water system, drainage and environmental sanitation, and possible minor upgrading of local roads (the cost of which will be covered under the local government budget). In the agreement, the Kon Ray DPC agreed to upgrade existing road, but no timetable was confirmed. The Kon Tum PPC is responsible for planning, and the DPC/CPC will be directly responsible for overseeing and eventually owning the proposed facilities.

Execution of these civil works will generate a relatively modest amount of noise, dust, water and soil runoff to nearby streams, and require waste management of construction debris and trash generated by the workers. This will impact water quality in the nearby streams. This is likely to be only a temporary basis, assuming that: a) construction procedures take into account the need to minimize soil erosion into the streams, and b: that the wastewater (septic) system properly treats the septic system effluent before it is discharged into the streams and groundwater table. Other potential negative impacts and associated mitigation measures include:

- Digging soil and chopping trees (although this will be minor as the site is largely agricultural, which can cause dust and dirt to dispersed to ambient air and nearby streams. This pollution will most directly affect workers at the site.

- Exhaust from transportation of construction materials, on-site equipment (generators, earth movers, etc.) in the form of dust, SOx, NOx, CO and VOC.

- Noise and vibration from transportation vehicles, large and small equipment (e.g., generators) will occur during construction (*see table*). However, because the Project site is 15 km to Kon Ray DPC, there are likely to be modest long term adverse impacts, other than the initial small-scale transport, until DPC upgrades the dirt road along the front of the site. The CPC office is 3 km away from the school. At this time, there is only a small residential area (three homes) nearby, although this will no doubt increase as small shops are built to meet demand for food and other necessities by those attending or working at the school. Thus, these initial impacts will mainly affect workers on the site, and the three homes in the immediate area. Average noise level from construction equipment (in decibels) at a distance between machinery and observer is given in the table at right:

Equipment Type	Average Noise Level (decibels) at 20 m
Loader	78
Vibration Roller	74
Sprayer	75
Generator	86
Impact Drill	75
Concreter Mixer	79
Pneumatic Hammer	86

- Solid waste generated during construction includes materials (wood, steel bar, waste cement, etc.), paper, packing and domestic waste that have an adverse visual impact in an otherwise physically attractive area.

- Wastewater pollution is largely limited in this human waste from workers at the Project site. If not properly controlled, this could affect ambient air (smell) and water quality.

- In the rainy season, there will be run-off rainwater from the Project site that will sweep away residues, garbage, leaves, grease, thereby polluting nearby surface water.

- With regard to the types, quantities and source of construction materials, and their origin from sources such as quarries, borrow pits, and relatively un-degraded forests, while detail bills of quantity will be developed and included as part of the proposed detailed design, most if not all school facilities in Vietnam are reinforced concrete structure. Both concrete and steel reinforcement bars are made in Vietnam. A small quarry was identified along the way to Kon Ray.

- With regard to where construction workers will sleep, what types of water supply, sanitation and solid waste disposal will be provided for workers, and what steps will be taken to ensure that these services are provided in an environmentally sound manner, the site on Road 677 is 12 km to Hwy 24 and is about 2 km to the closet village and 10 km from Kon Ray District. Successful bidders will be responsible to arrange sleeping quarters for non-local workers, if any. Temporary water supplies and portable toilets will be required on-site both during and post construction. Public health education for construction workers and carrying out such informational campaigns about HIV/AIDS are the responsibility of local authorities.

- The site on road 677 is 12 km to Hwy 24 and is about 2 km to the closet village and 10 km from District Kon Ray. The successful bidder(s) will have to arrange sleeping quarters for non-local workers, if any. Temporary water and portable/or septic tank will be provided onsite during and post construction.

- With regard to where the construction workers will come from, and whether the construction schedule will compete with local crop harvesting, the most qualified successful bidders shall be awarded the contract(s). Evaluation factors shall include, but not be limited to, hiring goals and usage of ethnic minority members and other local resources. Construction will not compete with local crop harvesting, mainly because the manioc/cassava crop is usually harvested by the Lunar New Year, prior to the current proposed construction start date.

- There will be excavation, leveling, clearing and cutting prior to construction; most of the mentioned items are the responsible of the local partners and government. Details shall be address during design.

- With regard to how construction and demolition debris will be disposed of, scrap with any commercial value scrap will be sold as salvage. Non-valued materials will be hauled offsite and properly disposed of by the prime contractor.

- With regard to how will construction materials be conveyed to the site and stored, materials will be transported to site via truck and usage of Road 677. Excavated topsoil will be temporarily stored and later reused. A temporary storage site at the corner of the site will be made available for contractor to store materials.

- With regard to toxic materials that will be used during construction, whether there are any non-toxic substitutes available, and whether measures are in place to ensure that toxic materials are properly disposed of, these are not applicable as no toxic materials other than those mentioned above will be used on the site.

- Appropriate measures for monitoring environmental impacts and ensuring adherence to environmental guidelines will be developed prior to construction.

- Finally, there may also be some modest impact from “social evils” (prostitution, theft, drug use, karaoke bars, gambling, etc.) on the part of construction workers on their off-hours.

Apart from the building construction and grounds development, the water system (depending upon the water source to be selected) is likely to have only modest environmental impact, primarily being the reduced stream flow from the selected stream source (as currently proposed), or a groundwater source (if there is a suitable source in terms of proximity, water yield, and quality) that is technically and financially feasible to develop. So far it has not been determined whether good quality groundwater (either from a drilled borehole or a suitably located spring) is available and financially feasible. The water source needs to be quickly identified and water quality and quantity parameters measured to assess their suitability. The location of the septic field must also be specified, its soil qualities measured, and must meet existing GOV requirements for small-scale wastewater treatment.

The positive impacts during the construction phase include:

- Upgrading the land use category from low-grade agriculture (cassava) into higher value long term social benefits of better and more widespread education for ethnic minority students;

- Improving environmental sanitation infrastructure with a proper water system and wastewater drainage, and improving the hygiene and sanitation of students (and secondarily their family members) thereby reducing diarrheal disease, with the associated benefits of fewer missed school days on the part of students (and teachers), fewer missed workdays on the part of parents who have to stay home to take care of their children, and avoided costs of medical care, lost income from sick days on the part of parents.

- Short term employment generation within the local community - Assuming that at least all of the required unskilled laborers, and hopefully at least some of the skilled laborers used in construction, will be recruited from the local community, thereby enhancing local economic status.

5.1.3. Operational Phase

Significant long term employment generation will result from the Project. While some teachers and administrative personnel would be hired from other areas, presumably, at least some of the local teachers and administrative staff would be sufficiently qualified to be hired at the new school. Unskilled laborers (e.g., cleaners, guards, etc.) needed for school operations would also be hired from the local community. This results in a significant amount of long term employment generation.

After the completion of construction, as the school enters the operational phase, and teachers and students begin their classes, the project manager will have to make periodic measurements to ensure that soil, wastewater, dust, noise, and traffic congestion indicators are within allowable ranges. If not, mitigation measures will have to be implemented accordingly.

One often useful approach to minimizing adverse environmental impacts is to include a required course in the school curriculum dealing with hygiene and sanitation behavioral change. Environmental sanitation covers a variety of different activities, including:

- Building (and regularly using) proper sanitary latrines;

- Appropriately treating wastewater (“grey water” from kitchens, and “black water” from toilets) before it is discharged into the environment;

- Training students and teachers about the importance of proper handwashing with soap, which can have a dramatic positive impact on reducing diarrheal disease among teachers, students, and their respective families.

- Proper disposal and solid waste (with special treatment for hazardous waste and medical waste).31

Positive and negative environmental impacts during the operation phase include the following:

a. Positive impacts:

- The Project will have a significant positive impact on Kon Ray socioeconomic conditions, particularly enhancing education quality, improving living standards for local citizens (in particular those finding employment from the Project) and Kon Tum's educational level in general.

- The Project will provide a significantly improved educational environment for ethnic minority pupils, decreasing the number of students leaving school too early, increasing the number of pupils graduating from secondary to high school, and providing training useful in useful skills that will be valuable in the job market.

- The Kon Ray DPC noted that they think that the Project in Kon Ray will attract citizens from other regions, helping to reduce unemployment Dak To Lung Commune in particular and Kon Ray District in general.

- Upgrading rural infrastructure, including educational facilities, transportation, water supply, etc. will contribute to improving living standards and intellectual standards of citizens in the region.

- While the 300 new students, teachers and support staff represent a significant portion of the current population of the Commune (1,400+), many of these students, teachers and staff may come from outside the commune to compete for access to the better facilities. Students from local schools will no doubt also compete to attend the new school, and leave existing local schools to do so. Most students will come about 3-12 km to attend the school.

b. Negative Impacts:

Besides the positive impacts listed above, when the project is operational, it will also have certain negative impacts to local socioeconomic conditions in the area, namely:

- Unless properly managed, increased population at the project site will increase sources of pollution (wastewater, noise, solid waste, etc.) will directly or indirectly impact citizens near the project site.

- The Project will concentrate many people (pupils, teachers, support staff, and the inevitable commercial activity nearby) that will certainly impact security, community health, and transportation safety.

5.2. Socioeconomic and Community Health Impacts

It is anticipated that the main socioeconomic impacts will include the following:

[31] Like most areas of rural Vietnam, there is no upgraded facility for solid waste management near the project site or in the Commune for District, except for the standard recyclable materials (mainly metal and plastic containers). There are currently only small scale waste disposal sites (where people toss their garbage and trash). As solid waste management will become much more of an issue after the school is constructed, a suitable waste disposal site will have to be identified near the site area.

- A higher percentage of the children in the nearby area will attend school;

- A higher percentage of those attending school will graduate, in part because of the improved facilities, better trained teachers, and the distinct likelihood of being able to obtain more remunerative employment after graduation.

- The hygiene and environmental sanitation behavioral change promotion program, if properly carried out, will likely decrease the currently very high levels of diarrheal disease, including bacillary and amoebic dysentery which currently have a significant negative impact upon the local communities, and especially upon school children in the area.

- There may be impacts upon demographics and migration, as the appeal of the new vocational training school will likely draw more students into the area. However, as it is a boarding school, it is not likely to have significant migration impact, as families will send their children to the boarding school, not relocate to be nearer the new school.

- The construction of the school will lead to new short term employment opportunities for the local community for local skilled and unskilled laborers. The school construction is estimated to generate approximately * person-days of work for skilled laborers, and * person-days of work for unskilled laborers. After completion of the school, about 50 teachers and administrative support staff will be hired over the long term.

5.3. Physical Environment

Building a new school for an estimated 250 pupils, plus 50 teachers and administrative support staff, will have a definite though relatively modest impact on the area around the school, and upon traffic (mostly bicycles, and to a lesser extent motorbikes, but likely very few cars and trucks) in the immediate area. However, as it is mainly a boarding school, and most of the students will not be going home after school, there is unlikely to be the typically large surge of students piling out the front gates of the school on bicycles and on foot twice a day, as one normally encounters in most rural schools in the Vietnamese countryside. There will presumably some students who do live nearby and will commute from their homes and back on foot or by bicycle, but this is likely to have no more than a brief (10-15 minutes) impact upon the local traffic. According to the local public officials, specifically, DPI of City of Kon Tum and Chairman of the people committee of district of Kon Ray, the existing Road 677 connecting into Highway 24 is in their capital program to be upgraded within next two years to support the government office's relocation of the new site[32].

5.3.1. Water and Wastewater Impact

As the project includes the construction of a piped water system for the school, and should have good quality sanitation facilities (pour-flush latrines) for the students, teachers and administrative support staff. As good quality toilets are unfortunately not so common in many rural schools, the construction plans and accompanying budget must ensure that proper latrines and handwashing facilities are readily available to easily accommodate the number of people who will use them.

In addition, a proper septic tank system must be built (and regularly cleaned) in order to get full health and hygienic benefit from the facilities. There must be separate facilities for boys and girls, and separate facilities for the teachers. If not, it is not unusual for teachers to take over the

[32] *Site* Investigation – *Questions and Answers for the Proposed Kon Ray Ethnic Minority Boarding School*, Nam H. Nguyen (12/2006). The impact of planned road improvements and traffic flow need to be assessed on the next site visit.

improved toilet facilities, and lock the doors so that students cannot use them. This will force the students to go into the nearby forests or fields to defecate, creating a significant public health and aesthetic problem. Appropriate landscaping of the grounds will help to reduce soil erosion that will eventually end up in nearby streams and ultimately rivers.

Finally, there will undoubtedly be a number of small shops that will spring up along the road near the new school, mostly small food shops, in response to the demand for this service among students, teachers and administrative support staff. The location of these shops must be regulated so as to minimize any significant blocking of traffic (foot, bicycle, motorbikes, etc.).

The school's production wastewater includes the following components:

- Domestic wastewater: generating from activities of officers, teachers and pupils. It contains the dregs, suspended substances, organic compounds, nutrients (N, P) and micro organism that have to treat before discharging to environment.

- Rainwater Run-off: Rainwater runoff will flow throughout the school property, sweeping away the anticipated modest level residues, garbage, leaves, grease, etc. Rainwater runoff must be channeled so as to minimize downstream water source contamination.

According to pollution coefficient of Tran Duc Ha (Scientific Report #B94-34-06, the weight of pollutants in domestic wastewater for one person entering environment daily without treatment is:

Polluted agent	Units	Concentration
BOD_5	mg/l	250
COD	-	315
SS	-	270
Ammonia	-	32
Phosphorus	-	12,5

It is estimated that the project will have to serve the needs of about 250 pupils plus 50 teachers and administrative support staff. According to the WHO pollution coefficient, average estimation of water demand for one person is 100 liters of water/day for domestic activities, therefore requiring water about 30 m^3 of water/day. That mainly addresses the following needs: drinking, cooking, bathing, washing clothes and sanitation.

As mentioned above, components of wastewater with a big amount of pollutants that are able to cause terrestrial water and underground water environment are such as:

- Organic compounds (BOD, COD): Major organic compounds in wastewater are carbon hydrogen. These compounds easily degraded by microorganisms by using oxygen concentration in the water because the bacteria use dissolved oxygen when decomposing organic compounds. The depletion of dissolved oxygen seriously has an impact on the aquatic life (the standard limit for dissolved oxygen regulated by FAO for aquatic breeding is not below 50% of saturated concentration, meaning above 4 mg/l at 250^{o}C).

- Suspended solids: SS results in harmful impacts of water quality and aquatic resource. They also affect aesthetics (causing turbidity of the water) and make sediment raised. The TCVN 5942-1995 for suspended solid is 50 mg/l in discharge into class surface water and 100 mg/l in discharge into class B surface water.

- Nutrients (such as nitrates and phosphorus) can enhance eutrophication of the water source. It leads to negative affects on water quality, changing the aquatic ecology balance. It also affects on underground water quality and surface water quality, seriously affect on the aquatic floras.

- Pathogenic bacteria, which are sources of diseases caused by E.Coli and F. Coli.

In addition, they can also cause air pollution due to generating toxic gases from organic substances. Base on the anticipated discharge flow and concentration of various pollutants, calculating the individual pollutant loads in untreated waste water is as follows:

Pollution agent	Unit	Concentration
BOD_5	kg/per day	7.5
COD	-	9.45
SS	-	8.1
Ammonia	-	0.96
Phosphor	-	0.375

According to TCVN 6772:2000 (for Domestic Wastewater) – the allowable pollution limit for level 2 contaminants, the concentration of pollutants in domestic waste water exceeds the standard many times (column B). This pollution level is very high and has negative effects on the ambient environment where no appropriate treatment is available. However, wastewater from sanitary toilets and an appropriate septic tank with adequate design capacity will appropriately treat wastewater before it is discharged to the environment.

5.3.2. Solid Waste Impact

Typical components of domestic waste likely to be generated as a result of this project include plastics, paper, and food waste, in particular:

- Paper, chalk, pens, and other such school supplies;
- Standard domestic solid waste such as rubber, plastic containers, metal, glass (at least some of which is recyclable)
- Readily biodegradable food product waste, including vegetables, bones, and other food waste.
- Sludge from sewage system (septic tanks have to be de-sludged periodically to ensure their proper operation), and
- Leaves, branches, and other such decayed matter.

According to the standard pollution coefficients in Vietnam[33] the weight of pollutants in domestic solid waste emitted per person per day to the environment is about 0.53 kg. The total daily solid waste production of the school would then be about 159 kg/day. The amount of solid waste will be appropriately sorted and stored for pickup and disposal by a private waste disposal operator. The availability of this service must be ensured in order to keep the project area to maintain its clean and healthy environment.

5.3.3. Noise Impact

Noise mainly affects domestic life and human health. Noise adversely affects hearing over the long term; causes stress, headache and cardiovascular disease, which can readily lead to decreasing work ability. Therefore, noise mitigation is an important goal to achieve. Besides the students

[33] See *Solid Waste Management – 2001*, Tran Hieu Nhue.

themselves, much of the noise indirectly generated is likely to be from motorbikes and other vehicles to transport people, goods and materials to the school. As most of the students will board at the school, home to school to home transportation is likely to be a relatively modest source of noise pollution.

5.3.4. Environment Impact on Local Ecology

In the Project's operational phase, wastewater that is not properly treated before discharge will adversely affect surface water source, and adversely impact the local aquatic ecology. In this region, there are few valuable flora or fauna species, so that the impact of the project on the local flora and fauna is limited.

5.3.5. Environment Risks

Other potential risks in this region in particular and the Central Highlands zone in general is flooding, and subsequent land erosion. This not only can adversely affect human life and property but also affect negatively the ambient environment. Therefore, when designing the project, it is important to pay adequate attention to proper treatment of sewage and solid waste to minimize such potential adverse impacts. Besides risks caused by natural calamities, other risks that are potentially dangerous for human lives and property are unexploded ordinance and fires. Explosions and fires can be caused by a wide variety of agents, such as improper cooking, poor quality electrical wiring, improper use or storage of flammable materials, poor quality building construction, and lack of preparedness for fighting fires when they do occur.

5.4. Aesthetic and Cultural Conditions

As the site is currently an open field solely used for small-scale agriculture, and there are no temples, pagodas, churches or other cultural structures or activities nearby, there is unlikely to be any significant aesthetic or cultural adverse impact as a result of either construction or use of the proposed school facilities. The standard Community Meeting House is located at the District level.

5.5. Assessment of Overall Impacts

The USAID assessment form used to identify environmental impacts from the proposed project activities is given on the following page.

Table 5.1: Assessment of Probable Risk Levels from Project Activities (by phase)

Id	Activities	Evaluation		
		Low Risk	High Risk	Average Risk (or unknown)
I.	**Preparation Phase**			
1	Establishing profile	x		
2	Planning land use, compensation			x
3	Clearing the grounds		X	
4	Improving local transportation system		X	
5.	Providing living quarters for site workers			x
II.	**Implementation Phase**			
1.	Construction activities: + Classrooms, Library + Boarding Rooms		X	

	+ Dining Rooms + Vocational Training Workshops + Sanitation Facilities and Treatment + Wastewater and Storm Drainage System			
2.	Transportation of Construction Materials			x
3.	Living Quarters for Construction Workers			x
II.	**Operating phase**			
1.	Training and education	x		
2.	Entertainment	x		
3.	Housing for teachers and students at school			x
4.	Local Transportation	x		

From the identification of probable impacts in the project's three phases, preventive measures to help prevent and/or reduce adverse environmental impacts, as well as ensuring good public health are necessary to maximize both the educational benefits to the students, and the overall socioeconomic benefit to the larger community. For activities rated "high risk" and "average risk or unknown" preventative measures must be developed and proper precautions must be taken. Potential risks which may adversely impact the ambient environment must be especially taken into careful consideration, and full cooperation of the Project residents should be actively encouraged. Therefore, measures of prevention and reduction are also recommended.

6. COMPARISON OF ALTERNATIVES AND RECOMMENDATION

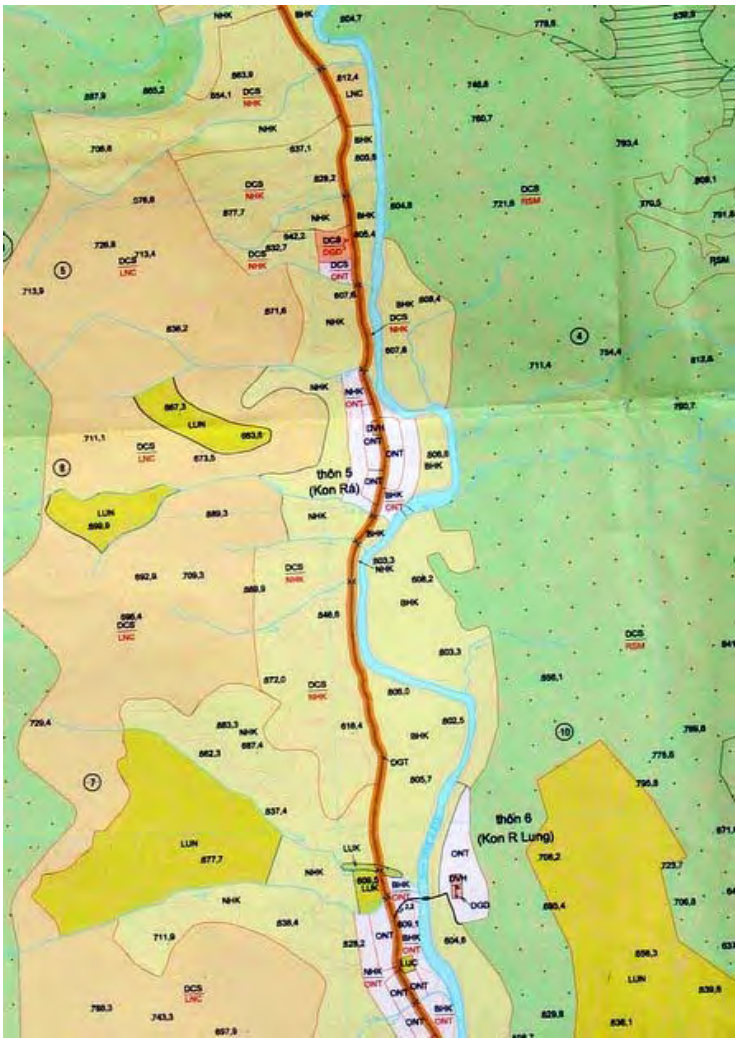
6.1. Enhancing Capacity and Quality of Existing Schools in the Area

There are limited options here. There are currently only three elementary schools in the commune (at Hamlet 1, 3 and 7[34]) and one junior high school (at Village 3). At this time, the commune is trying to improve the educational levels to the year 2010 and build houses for teachers from the currently available governmental budget.

[34] Note that many hamlets in Vietnam are simply called Hamlet #1 or #2 of Commune Dak To Lung (or whatever commune).

The proposed location was identified in the Kon Ray Master Plan (*see the map at right*, where the brown colored blocks labeled DGG and DCS near the top are the proposed school site) for about the last ten years, but no progress has been made thus far due to insufficient funding. The other schools in the area include one elementary school with four classrooms, with a student population of about 150, located about 2 km from the proposed project site. The high school is about 15 km away from the proposed project site.

Both would require substantial modification (renovation) and potentially higher investment to achieve the capacity and standards proposed for the new school in Kon Ray. The existing schools are located in more developed areas, which would very likely involve relocation and compensation of families and businesses located very close to the school. Relocation and compensation are often very problematic issues in Vietnam, and best avoided whenever possible.



Kon Ray District Master Plan Showing Project Site

6.2. Justification for Using the Proposed Site and Plan

The proposed site itself is well-situated not far from town. It is currently used for low value agriculture (cassava), farmed by people who rent the field from the local government, and who can rent other plots in the area, so there is no need to relocate any households. No significant deforestation will take place as a result of the proposed school, as the proposed site is already cleared. It has convenient access to good quality water sources for the proposed water scheme. It has appropriate soils for a septic system for wastewater treatment. It has a road (currently dirt, but already agreed upon for upgrading by the local authorities. For about ten years, it has been included in the Commune and District Master Plans as the site of a future school, and would require no change of zooming. Therefore, building the proposed school at the proposed site is the best alternative.

6.3. Alternative Water Sources

There are three water source options (and one supplemental option) that could be used to supply the proposed new school:

- Pumping water up about 40-60 meters from the river below the proposed school site. This alternative has the following disadvantages: a) Using river water with its typically high sedimentation level would requirement multiple treatment, including simple filtration, possibly flocculation to remove fines, then chlorination to make it meet water quality

standards for drinking water; b) It would require substantial O&M costs, primarily the cost of electricity for pumping; and c) water levels in the river vary substantially over the year, and as rainfall feeding the river can vary considerably over the year, it is uncertain whether dry season flow rate would be adequate to meet demand over the long term.

- Pumping water up from a drilled well (borehole) near the site. This alternative has the following advantages and disadvantages: a) the groundwater (if it is readily accessible) is likely to be of higher quality the river water, thereby reducing costs of water treatment to meet required standards; b) while pumping costs (assuming 40-60 m borehole depth) would remain about the same,

- Building a catchment dam to divert stream water into a slow-sand filter: This alternative has the following advantages and disadvantages: a) no requirement for electricity for pumping, as it is gravity-flow; b: Using river water with its typically higher sedimentation level would requirement multiple treatment, including simple filtration, possibly flocculation to remove fines, then chlorination to make it meet water quality standards for drinking water (although a Slow Sand Filter (SSF) could be used for primary water treatment, then chlorinated to bring the water up to GOV standards).

- Rainwater Catchment (RWC) – RWC can only be regarded as a supplementary water source, as it is periodic by its nature. However, it could be an economical supplementary source, because the catchment area would be the school roofs, with piping carrying the rainwater from the roofs down to a catchment tank. An estimated design and budget estimate will need to be developed for this option. If used on a regular basis, this water would not require chlorination (i.e., if it sits too long unused the water will require subsequent treatment). No pumping would be required.

7. MANAGEMENT, MITIGATION, AND MONITORING

This final section focuses on the following:

- Mitigation and Monitoring of Physical Impacts;
- Mitigation and Monitoring of Socio-Economic Impacts;
- Mitigation and Monitoring of Cultural Impacts;
- Mitigation and Monitoring of Cumulative Impacts;
- Environmental Plan of Action; and
- Risk Prevention and Emergency Response

Based on the analysis of sources of pollution, characteristics, loading, concentrate of waste, and negative impacts caused by the Project's operations, we propose measures to mitigate these agents that will be listed in detail below:

7.1. Minimizing Adverse Impacts during the Construction Phase

As mentioned in chapter 5, the major impacts site-preparation process, project implementation, building construction, educational equipment installation, construction of the water and wastewater facilities, are mainly noise and dust. While these impacts are fairly limited, nonetheless proper mitigation measures should be applied to minimize hazards and negative impacts on the ambient environment. Details are given in the following sections.

7.1.1. Management Measures

- Organize work implementation schedules and tasks reasonably, so as to minimize adverse impacts on the construction process.
- Require that the owners and operators of the vehicles and heavy equipment have proper registration for their vehicles, driving licenses, required skills and experience, and strictly follow regulations, especially those regarding speeding and overloading.
- Provide essential personal protective equipment for relevant staff.
- Workers must be educated, trained and obey regulations on work safety and risk prevention.
- No transport or operation of heavy equipment will take place at night.
- No concrete or asphalt mixers will be set up near any archaeological or religious sites.

7.1.2. Reducing Wastewater Impacts

Wastewater in this phase is primarily domestic wastewater. To prevent pollution to ambient environment, especially to surface water sources, contractors will be required to build temporary toilets at the site, regularly and thoroughly collect and properly dispose of solid waste, and not directly discharge any wastewater to the ambient environment.

7.1.3. Reducing Dust, Emission and Noise Impacts

- Spray water on material to be transported and covering the truck beds to reduce dust.
- Require the owners of the transport vehicles to only use properly registered vehicles with mufflers to mitigate noise and emissions.
- Require vehicle operators to minimize use of horns on the site.
- No project transportation allowed during rush hour to minimize potential traffic accidents.
- Manage construction process and individual tasks closely, operating equipments properly and providing the essential personal protective equipment for relevant staff.

7.1.4. Reducing Solid Waste impacts

For solid waste generated during construction such as: broken brick, wood, rubber, scrap iron and domestic waste, the Owner will require the contractor(s) to do the following:

- Paper, resin, iron and steel are sold for other enterprises to recycle;
- Inorganic solid waste (concrete, bricks, etc.) will be disposed of properly; and
- Domestic waste will be regularly collected and disposed of in appropriate places.

7.1.5. Reducing Impacts in Workers Living Areas

The contractor and subcontractors in construction implementing phase should:

- Maximize the use of the local labor, in part to minimize temporary camps, and also for socioeconomic equity.

- Assure that appropriate numbers of proper WCs will be accessible by laborers at the site.

- Establish clear regulations for living arrangements for workers, and that work is properly organized and labor properly managed.

7.2. Minimizing Project Impacts during the Operating Phase

7.2.1. Mitigating Air Pollution

- The project will implement proper ventilation systems for study rooms, dining rooms and workshops.

- To control smell from solid wastes, the contractor(s) will regularly collect and properly dispose of solid waste that is not recyclable, and will temporarily store it in proper containers before disposing of it.

7.2.2. Domestic Wastewater Treatment

Human waste will be properly treated by a septic system with 3 chambers. There it will be properly treated by the two processes of settling and fermenting. Estimated water consumption is about 60 liters/person/day, so that the estimated amount of wastewater is calculated as follows:

- Qn= 10.5m^3/day and night (300 people).

- Volume of septic tank is determined by: W = Wn + Wc;

- In which: Wn : Water volume; m3, and Wc = Sludge volume; m^3;

- Value of Wn can be from 1-3 times of waste water flow. Here is Wn =1.5Qn = 15.75m3;

- Value of Wc is: Wc = [a.T(100 - W1)b.c].N/[(100 - W2).1000] ; m^3;

  In which:

- a : Average sludge amount/person/day (0.5-0.8 l/day and night)

- T : time between twice of taking sludge, day;

- W1, W2: humidity of fresh sludge, %; respectively 95%, 90%.

- b: coefficient of decreasing volume of fertilizer (decreasing 30%), corresponding to 0.7.

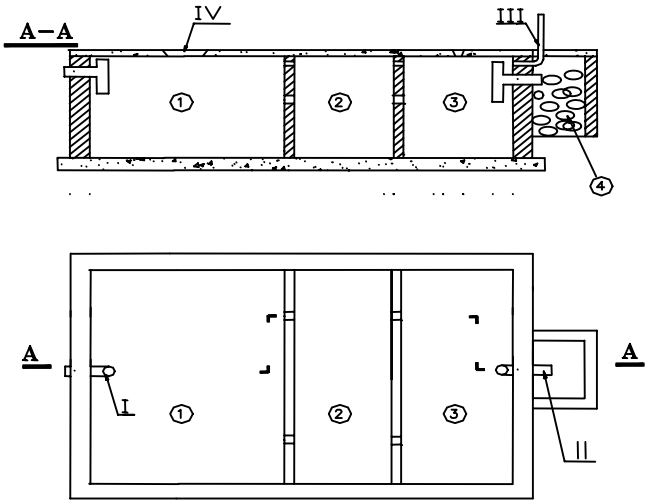
- c: coefficient of fertilized solid absorption (20%) corresponding to 1.2.

- N: number of worker => Wc = 30 m3

- Total septic volume is: W = 45.75 m3.

- Treatment productivity of septic tank is about 85%.

- Chart of septic tank as follows:



Legend:

I- Input pipe

II- Output pipe

III- Air escaping pipe

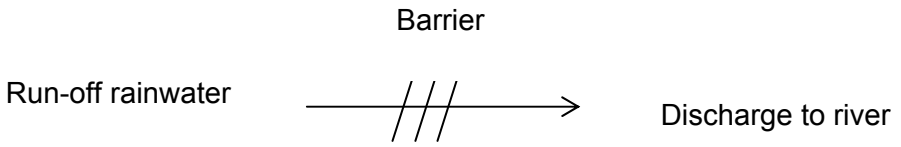
IV- Cover

Rainwater run-off treatment: The project will design and construct a separated rain gully system. The run-off rainwater will enter into this and then discharging into Dak Coi River. In the rainy season, workers will always monitor the rain gully system, barrier to treat the garbage. Note that the project may design a supplemental rainwater catchment system for drinking water, using water collected from the school roofs as a supplement to the spring water based system.

7.2.3. Solid Waste Treatment and Collection System

The project's domestic solid waste contains mainly organic substances, plastic, paper, etc. This solid waste will be collected by school support personnel and students. It will then be temporarily stored within the school confines in a suitably isolated area. To minimize the solid waste stream, and to minimize its potential adverse impacts, efforts will be made to ensure that the greatest possible degree of recycling is carried out within the project area, as per the procedures described in “Management of Solid Waste from Residential, Commercial and Industrial Facilities”. Waste that cannot reasonably be recycled will be periodically trucked to a nearby solid waste dump, and disposed of according to the district local authorities regulations. With the exception of common materials such as gasoline, oil, paint and batteries, there will not likely be any hazardous chemicals, radioactive waste or other types of hazardous materials produced, so that there is no need for the design to include proper storage, handling and disposal facilities for other hazardous materials (e.g., heavy metals, dyes, glue, solvents, acids, etc.), as described for some sectors in “Activities with Micro and Small Enterprises (MSEs, Chapter 3 on Small Scale Construction).

Proper management of rainwater run-off will be taken into when designing drainage throughout the school compound. The proposed rainwater catchment system discussed in the section on water supply will help to divert a portion of the rainwater falling on the school compound (that falling on the building roofs that will flow off the roofs into collector pipes, then diverted into ground-based storage tanks for supplementing the school water system.



7.2.4. Planting Trees

As part of the above environmental protection measures, the Project will plant green trees around external walls and elsewhere where it is convenient to mitigate the impacts of the project activities to surrounding areas. Green trees also beautify the Project area. The area of green trees is planned to be about 20% of the site's total area.

7.2.5. Hygiene, Labor Safety and Risk Prevention

When coming into operation, the project will establish proper and comprehensive safety regulations. All teachers and pupils must be properly educated, trained and equipped to follow the regulations on working safety and risk prevention. This will include the following:

- Regular medical examinations for workers' health.
- Electric safety - obeying regulations about proper installation of electrical systems.
- Fire and lightning prevention: The project will install fire and lightning prevention systems according to standard GOV regulations.
- Proper alarm systems will be installed and regularly checked, and personnel must be trained in their proper use.

7.3. Program on Management and Monitoring

7.3.1. Environmental Management Program

a. Construction Phase

During construction, the contractors are responsible for ensuring that:

- Work activities are reasonably organizing and properly and safely carried out;
- Transportation companies involved in construction use only properly registered safe vehicles, all drivers must have current driving licenses, and that trucks do not exceed standard limits for overloading.
- Essential personal protective equipment is supplied to and used by all relevant staff.
- Workers are properly trained and experienced, and obey all relevant regulations on work safety and risk prevention.
- No transportation or heavy equipment movement, or mechanical digging is used at night.
- No set up concrete or asphalt mixers are used anywhere near architectural or religious.

b. Operating Phase

- Regulations on environmental protection, safety, hygiene are fully complied with in all phase of the school construction.
- Teachers / pupils are fully protected and isolated from any construction related activities.
- All involved people workers are aware of, and trained in, standard environmental protection requirements, and as well as the local regulations for pupils.

- Set up stipulating, controlling boards in the school's area.
- Monitoring the area's environment and notifying the proper authorities in any improper activities or damage is noticed.

7.3.2. Environmental Monitoring Program

a. Monitoring Air and Micro-climate Environment

- Location:
  - One sample at the office
  - One sample in the class
  - One sample at the area of wastewater discharged
  - Parameters: Dust, SO_2, NO_2, CO, NH_3 and noise

b. Monitoring Water Environment:

- Location:
  - One sample at the end discharged to Dak Coi River.
  - One sample water used to living
- Parameters:
  - Water: pH, turbidity, TSS, BOD5, COD, oil and grease, N total, P total.
  - Coliform and Arsenic

c. Monitoring of Solid Waste

Monitoring of collection, classification, storage and treatment at the school is normally.

d. Frequency of Monitoring

- Monitoring in construction phase (from July to October, 2007)
- Usual monitoring: every 6 months.
- Unusual monitoring: When environmental risks/ideas are reported by local authorities / residents.

e. Estimated Cost of Monitoring:

- Expenditure for construction phase (paid by the project) is about 15.000.000 VND.
- Expenditure for usual monitoring (paid by the School, after ownership is formally transferred to the local authorities, and the school is certified as being fully operational) is about another 15.000.000 VND/time.
- Expenditure for unusual monitoring is based on the contract and actual situation.

7.4. Summary Environmental Impacts, Mitigation and Monitoring Measures

The table below summarizes all anticipated environmental impacts, proposed mitigation measures, environmental monitoring activities, and responsibility for carrying out those responsibilities.

Summary of Impacts and Proposed Mitigation Measures (according to project phase)				
Impact Area	**Potential Impact**	**Mitigating Action**	**Monitoring**	**Responsibility**
Pre-Construction Phase				
Land use	Site currently used for low value agriculture. Upgrading will significantly increase value. Value of land bordering school property will increase because of potential for small retail use.	None required.	None required.	None required.
Surface water	Development of the property will result in increased runoff to adjacent surface water bodies.	A site drainage design will be provided by construction contractor with building plans. Design will include appropriate features to mitigate flood impacts. As the site is neither steeply sloped, heavily wooded, prone to flooding nor landslide, adverse impact will be small.	Design review & construction oversight.	EMW
Ground Water	As surface water and rainwater catchment will be water source, no impact is anticipated.	None required.	None required.	None required.
Rainwater	Utilizing rainwater as a supplemental water source will reduce surface water runoff and	None required.	None	None required.

Catchment	the consequent need for expanded drainage.		required.	
ADA Compliance	ADA compliance will facilitate access to the school and its facilities by disabled students, teachers and admin staff.	None required.	None required.	None required.
Construction Phase (See detailed mitigation measures in Section 9.1)				
Air Quality	Construction vehicle and equipment exhaust, and dust from vehicles and grading.	Spray water on material to be transported and covering truck beds to reduce dust. Require transport vehicles owners to only use properly registered vehicles with mufflers to mitigate noise and emissions.	Check trucks entering construction site to confirm licensing.	Construction Supervisor, USAID
Noise	Noise and vibration from transport vehicles, large / small equipment (e.g., generators, cement mixers).	Vehicle operators will be required to minimize use of horns on the site, and avoid using concrete mixers in proximity of religious sites. Workers at distances less than 5 m from construction equipment must wear ear protection to minimize noise impacts. Machinery and vehicles will be maintained in good working condition to minimize noise levels.	Visually inspect safety equipment use, observe vehicle noise levels.	Construction Supervisor
Soil	Erosion from site grading, change of use from agricultural to school.	Minimize grading, plant trees, bushes and grass to minimize runoff and channel rainwater runoff. Liquid and solid waste, fuel and chemicals will be properly stored above ground to avoid spills and leaks. Storage tanks	Periodic check for any uncontrolled	Construction Supervisor, USAID

		frequently inspected for leaks/damage.	drainage.	
Flora and Fauna	Negligible impact, as site use is currently for low value agriculture.	Additional trees and gardens will be planted on school grounds.	Confirm that landscape architecture conforms to plan.	Construction Supervisor
Increased Population	After construction there will be an additional 300 persons living on site. During construction there will be up to 100 workers.	Maximize the use of the local labor, in part to minimize the need for temporary camps, and also to ensure socioeconomic equity for the local population.	Confirm source(s) of construction labor.	EMW
Wastewater	Rainwater runoff will wash away residues, garbage, leaves, grease, thereby polluting nearby surface water.	Proper site grading, planting of trees, bushes, and gardens will reduce surface water runoff. A rainwater catchment system to supplement the water supply will further reduce runoff.	Periodic visual confirmation of run-off drainage sites.	EMW, USAID
Solid Waste	Construction materials (wood, steel bar, waste cement, etc.), paper, packing and domestic and human waste from workers	Paper, resin, iron and steel sold to other enterprises to recycle. Inorganic solid waste (concrete, bricks, etc.) will be disposed of properly. Unrecyclable domestic waste regularly collected/disposed in proper places.	Monitor waste stream to ensure maximum waste stream recycling.	Construction Supervisor, USAID
Human Waste	From construction workers and later students and staff	Temporary water supplies (trucked in) and portable toilets will be provided on-site during construction. Sanitary latrines and a septic system will be constructed for long term use of all students and school staff.	Ensure that workers utilize temporary latrines.	Construction Supervisor, USAID
Electrical	Low voltage power and suitable transformer are available within	Extension of low voltage electrical line to school will have	None	Construction

Power Supply	two hundred meters of the site.	negligible impact.	required.	Supervisor
Employment	About 100 skilled and unskilled laborers will be needed for site clearance and construction.	Use of local skilled and unskilled labor will be one of the important contractor proposal evaluation criteria.	Survey workers as to their origin.	EMW
Transport and Rural Road Improvement	Current road is in poor condition. Dirt road will be upgraded to tarmac or concrete road, and traffic to school and beyond will increase. Could cause erosion, provide access for illegal land clearing, logging or poaching.	Roads improvements and demand for retail support services for school will bring more traffic. Since site is relatively remote, it is unlikely to have significant impact. Construction trucks hauling equipment and materials will only operate during the day, and will be required to have fully licensed vehicles and operators. Follow guidance on design, construction, and operation and maintenance described in "Rural Roads" and resources listed there	Check licenses of vehicles and drivers regularly.	Construction Supervisor, EMW Project Manager, USAID
Local Labor Demand for Agriculture	Potential conflicting allocation of local labor required for planting and harvesting periods.	Planned construction period does not conflict with local manioc and cassava crop planting or harvesting period.	None required	None required
Social Evils	Construction crews seeking diversion may generate increased undesirable demand for prostitution, illegal drugs, gambling, etc.	Provide alternative diversions, e.g., provide football field, movie hall for showing DVDs (not uncommon in rural areas). Maximize use of local laborers who will live at home during construction.	None required	Construction Supervisor and EMW
HIV and other Infectious diseases	Irresponsible participation in social evils may well increase infection rate of sexually transmitted diseases.	Provision of public education materials, and behavioral change promotion programs	Periodical inspection	Local Authorities

Post-Construction Phase (See detailed mitigation measures in Section 9.2)				
Groundwater	Water system will use ground water spring as primary source.	As spring is currently unused, no other potential users are affected. Water is slow sand filtered, and chlorinated before use.	Periodic WQ tests will be carried out.	EMW, USAID
Fauna	Negligible, as site use is now currently low value agriculture.	None required.	None	None
Water Access	People near site use untreated water in deep dugwells. They could use school water system and improve community health.	Negotiate limited access of nearby houses to improved water system from school, possibly through public taps.	Confirm access to water system.	EMW, USAID
Water Supply & Wastewater Management	A treated (filtered, chlorinated), piped water system, possibly supplemented by rainwater catchment, will be built.	Wastewater (greywater) will be largely reused in gardens and watering landscape. Excess water (if any) from proposed rainwater catchment will be diverted to natural drainage.	Periodic visual confirmation of wastewater reuse.	EMW, USAID
Sanitation	People now defecate in fields or pits. Sanitary latrines with septic drainage field will be built.	Septic system will be periodically de-sludged and treated effluent will be properly dissipated to the environment through a septic field.	Periodic sniff and visually confirm septic system O&M.	EMW, USAID

Appendix One – Contact Information for EA Study Participants

Organization in Charge: East Meets West Foundation in Vietnam

Address: 32 Pasteur St., Hai Chau District, Danang City

Telephone: 0511-829-110

Organization Carrying out Environmental Assessment: Danang Environmental Protection Center

The environmental assessment report of vocational training center project in Kon Tum's province is implemented by D/EPC.

Address: 408/18 Hoang Dieu St. Danang.

Telephone: 0511-550-977

Appendix Two – Agenda and Participants in Consultation Meetings in Kon Tum

MEETING AGENDA: ENVIRONMENTAL ASSESSMENT

Wednesday, November 16, 2006, 2:00 pm

Donor Agency: USAID. This project is a gift of the American people.

Ref: Award Number 486-A-00-05-00009-00

Project Title: Kon Ray Ethnic Minority Boarding School

Project Description: A boarding school and vocational training center for 250 ethnic minority students in grades 6-9, located in the Central Highland province of Kon Tum, Vietnam

Strategic Objective: Offer educational and vocational opportunities to ethnic minorities to enhance their ability to succeed in Vietnam's rapidly-changing economy and society.

Sponsoring USAID Office: Hanoi, Vietnam

- Environmental Assessment is to provide the Donor and End Users with discussion and full understanding regarding the significant environmental effects of their decisions. It includes alternatives that should be avoided or minimize adverse affects, prevent or enhance the quality of environment. It requires collaboration in the assessment, examine, investigation, obtaining data, suggestion and investigation of alternatives, to promote better understanding of the environment and the effect of the decisions.
- In the construction of the boarding school campus in Kon Ray, the following are the items could impact the environment and need assessment:
    - housing, school, dormitory, farm, livestock, sanitation, water supply, roads
- The potential adverse effects in the construction of these facilities:
    - Damage to ecosystems
    - Sedimentation of ground water, surface water, stream, river, lake and prevention of surface drainage
    - Noise pollution, ground contamination, and dust
    - Spread of disease
    - Damage of aesthetics of area
- Potential adverse effects in the construction of water well and septic tank:
    - Destroying fresh water (ground, surface and aquifer), contamination of the Dak Coi River.
    - Chemical contamination of water source
    - Spread of disease from the well and septic tank
    - Increase in turbidity of river and stream
- The scoping statement must:
    - Identify key issues to be treated in the full EA.
        - identify key issues
        - timing and preparation of analysis
        - variations required in format
        - Planning, discussion of options, and decisions.
    - Details and standard methods of analysis.

Scope Statement:

Participants in the Meeting in Kon Tum with East Meets West and Provincial / District / Commune Officials (Thursday November 16, 2006)

Pasteur Institute in Danang	-	Nguyen H. Nam
Danang Environmental Protection Center	-	Nguyen Chi Kim Ha
Department of Construction	-	Thai Van Toan
Department of Planning and Investment	-	Hong T. M. Toan
Department of Planning and Investment	-	Le Cong Dinh
Dept of Natural Resources and Environment	-	Nguyen Minh Tuan
Department of International Cooperation	-	Tran Tam Au
Science and Investment	-	Luu Cong Cuung, Nguyen Dinh Bac
District PC head	-	Nguyen Trung Mai
Vice Director of Education	-	Nguyen Phuc Phan
East Meets West		

Appendix Three - Relevant Government of Vietnam Environmental Policies

GOV environmental policies relevant to this Environmental Assessment include the following:

- Constitution of Socialist Republish of Vietnam on Environment: "National organizations, enterprises, co-operatives, public army units have to implement policies of natural resource's protection, improvement and regeneration, living environmental protection;
- Law of Environmental Protection (dated November 29, 2005)
- Decree 80/ND-CP dated August 09, 2006 of Prime Ministry regarding detailed stipulation and guide on applicating Law of environmental protection;
- Circular No.08/2006/TT-BTNMT date September 08, 2006 of Ministry of Natural Resources and Environment regarding guide on strategic environmental assessment, environmental impact assessment and commitment of environmental protection;
- Decision No. 13/2006/QD-BTNMT dated Septemper 08, 2006 of Ministry of Natural resources and Environment regarding Stipulation of organization and operation of assessment board for reports on strategic environmental assesment and EIA.
    - TCVNs of environment approved in Decision No. 35/2002/QD- BKHCNMT dated June 25, 2002 of Ministry of Science, Technology and Environment:
    - TCVN 5937-1995: Quality of air - Ambient air quality standards.
    - TCVN 5938-1995: Quality of air - Allowable maximum concentration of toxic substances in the ambient environment.
    - Standard 12: Temporary standards of Ministry of Science, Technology and Environment - Allowable level of noise in operation area.
    - TCVN 5942-1995: Water quality – Standard of surface water quality.
    - TCVN 5944 - 1995: Standards for underground water quality - Ministry of Science, Technology and Environment.
    - TCVN 6772-2000: Wastewater from living – permitted levels
    - TCVN 5941-1995: Soil quality – permitted level of residue pesticides in soil.
    - TCVN 6962:2001 – Vibration – vibrating of constructional and industrial activities – permitted level in resident and public areas.

1. Morris P, and Therivel R, Methods of Environmental Impact Assessment, UBC Press, Vancouver, 1995.
2. Environmental Impact Assessment - Methodology and Practice Experiences, Le Thac Can and Co., 1993.
3. TCVN of environment, part I and II, Ministry of science, technology and environment.
4. Tran Hieu Nhue, Water Supply, Science and Engineering Publishing house, 1996.
5. Air Pollution Control Engineering, McGraw Hill.
6. Assessment of source of air, water and land pollution - WHO, Geneva, 1993.
7. Methods for environmental monitoring and treatment - Le Trinh, Phung Chi Sy, Nguyen Quoc Binh, 1996.
8. Regulations on environmental protection, part I, National political publisher.
9. Professional diseases, Pr. Le Trung, Technology and Science publisher, Hanoi 1992.
10. Circular No. 08/2006/TT- BTNMT dated September 18, 2006 regarding guide on strategic environmental assessment, environmental impact assessment and commitment of environmental protection.
11. Selections from the 31-volume Vietnamese Obligatory Environmental Standards (According to Decision No. 35/2002/QĐ-BKHCNMT dated on 25/6/2002 of Ministry of Science, Technology and Environment)

II. Other Data Sources Used

1. Environmental review form packet (17 January 2005)
2. Statistical data of Hydrography, Socioeconomics of the Area.
3. Report of Kon Tum's province environmental status in 2005.
4. Report of Dak To Lung Commune Socioeconomic Situation in 2005.
5. Report of Kon Tum's province urban environmental treatment subject in 2005
6. Analyzed data of air, water environmental status in the area.
7. Statistical yearbook of Vietnam, Statistical Publishing House (2005)
8. Results of the Survey on Household Living Standards, Statistical Publishing House, (2002)

(This is based on the agreed scoping statement at the joint meeting/workshop held on November 16, 2006, 2:00 pm with all local stakeholders).

Donor Agency: USAID. This project is a gift of the American people.

Ref: Award Number 486-A-00-05-00009-00

Project Title: Kon Ray Ethnic Minority Boarding School

Project Description: A boarding school and vocational training center for 250 ethnic minority students in grades 6-9, located in the Central Highland province of Kon Tum, Vietnam

Strategic Objective: Offer educational and vocational opportunities to ethnic minorities to enhance their ability to succeed in Vietnam's rapidly-changing economy and society.

Sponsoring USAID Office: Hanoi, Vietnam

This environmental assessment documents existing conditions, collect data, analyze, and present results for decision making as directly related to a propose construction of a small scale secondary boarding school supporting up to 250 student in Kon Ray District, Kon Tum Province.

Specific data to be collected and analyzed includes:

- Surface water, underground water qualities of the Dak Coi River and two abutting streams in according to TCVN 5942-1995.
- Air quality and noise pollution according to TCVN 5937-1995 and TCVN 5949-1998.
- Geotechnical characteristic and quality, including sedimentation and turbidity according to TCVN 5941-1995, and
- Solid waste management practices for the Kon Ray District in according with Decisions 155/1999/QĐ –TTg.

Lead by EMWF with guidance, input and approval from USAID (RDM Asia/REO officers), the report is a collaboration of the Danang and Kon Tum Department of Natural Resources and Environmental Protection, Public Works Construction of Kon Tum and Kon Ray, Kon Tum Department of Planning and Investment, the Department of Education and Training of Kon Tum and Kon Ray, the Kon Tum Foreign Relation Department, and the leadership of the people committee of Kon Tum and Kon Ray District.

The first draft was submitted to USAID RDM Asia/REO officers review by December 15, 2006 and revisions and final report is to be April 30, 2007. All comments provided by USAID after a review of the draft Scoping Statement have been appropriately addressed in this EA.

In addition, data shall be collected and presented in the Appendices of the report to establish benchmarks of pre-project conditions and for post-project evaluating and monitoring purposes. The data shall includes but not limited to: climates, general demographics including minorities and ethnics, general economic, agricultures practices including farm use, live stocks, fertilizers and pesticides, natural resources including river, stream, and general biology, general education and health statistic.

Appendix 6 – Community Consultation Questionnaire

ENVIRONMENTAL PROTECTION CENTER **DANANG CITY**	**SOCIALIST REPUBLIC OF VIETNAM** **Independence -Freedom - Happiness**

QUESTIONAIRE

(For staff of Dak To Lung commune PC – The project of Kon Ray Ethnic Minority Boarding School- at Dak To Lung commune, Kon Ray District, Kon Tum province)

I. GENERAL INFORMATION

- Commune:.....District:.....Project Address: .....
- Population of the whole commune:.....people. Population at the project area:.....people.

II. SOCIO-ECONOMIC INFORMATION

- Ethnic group: Kinh:.....people, Other Minority Groups…….....
- Religions:…….....
- Main profession: .....
- Average income: ....VND/person/month. Rate of poor family: .....%
- Average.....%, Fair.....%. Other classification: .....
- Raw material resources in the area .....

.....

- Cultural resources (communal house, Church, museum...):

.....

- Development plan (industry, agriculture, forestry, power, etc.):

.....

III. INVESTIGATION OF THE LOCAL ENVIRONMENT:

1. How your assessment is about the environmental quality in the area?

Good ☐ Have polluted but un significant ☐ Polluted ☐

If polluted, what are the following problems?

Wastewater ☐ Emission ☐ Solid waste ☐ Other ☐

Detail:.....

2. Did y know about the project will be invested in the area?

Yes: [ ] No [ ] Unclear [ ].

3. According to your comment, what advantage will be brought from the project?

Đóng góp ngân sách địa phương ☐ Tạo công việc làm ☐

Tạo vùng nguyên liệu ổn đinh ☐ Cải thiện môi trường ☐

Others:.....…

4. According to your comment, what difficulties should be caused from the project?

Move resident to another ☐ Profession will be changed ☐

Other:.....…

5. According to your comment, will environmental problems come when the project begins?

Yes [ ]; No[ ], if any, what following problems are:

Wastewater ☐ Emission ☐ Solid waste ☐ Other ☐

What pollution levels will be assessed?

Strictly pollution ☐ Pollution ☐ Have not polluted yet ☐ No pollution ☐

Other:.....…

6. What is your opinion about the success of investment projects in the surrounding areas?

Very comfortable ☐ Comfortable ☐ Normal ☐ Ineffective ☐

7. According to your idea, what are the following facilities should be invested by the investor to satisfy environment for the area?

Wastewater treatment ☐ Emission treatment ☐ Solid waste treatment ☐

Other:.....…

8. What are your comments for improving the environmental quality in the area?

Kon Tum, date .....month year2006

Investigator(s)

Appendix 7 – Summary Results of the Public Consultation Questionnaires

This investigation and consultation with all major project stakeholders aims to supply a wide range of technical, environmental, socioeconomic, health, and other information needed for a proper environmental assessment of the project "Building the Kon Ray Ethnic Minority Boarding School. Base on the responses of the local authorities and community members in and around the proposed project site, the questionnaire focused on three main consultative groups, and included thirteen questions relating to environmental status, water resources and water quality used by residents in the vicinity the project area. The consultation investigation was carried out by Danang EPC.

1. Investigative Content

In discussions on the proposed project with the local authorities (Dak To Lung CPC), the advantages and disadvantages of the project were identified and assessed. In addition, the socioeconomic and environmental impacts were discussed. (Ref: Appendix 6 on Questionnaire for Dak To Lung commune's PC official). Investigate the ideas of the resident around the project how about the effect to living in the project area (Appendix 6: Questionnaire for Dak To Lung commune residents).

2. Target

This consultation focused on:

- Leaders in Đăk Tơ Lung commune, Kon Ray District, and Kon Tum Province

- The residents living around the proposed project site.

3. Approach

3.1. Form of the questionnaire

The questionaire has three parts as follows:

- General information from each family, main production in the commune, water resources and its using in living (Questions 3 to 7)

- Information of environmental quality assessment before and after the project going on. (Questions 8 to 11)

- Examine and recommend from residents for the project going on (last one)

3.2. Organize investigation

Process: Investigating directly at each family living around the project area.

4. Result of investigation

4.1. General assessment

Investigation on resident situation at the area, the result shows that:

<u>General result of investigation</u>

	Nationality		***Knowledge level***		***Main professional***	
	Kinh	Other	12/12	Other	Agriculture	Other
Rate (%)	16	84	13	67	68	32

In the area, ethnic people make up 84%, cultural standard is low, and the primary income generating activity is agriculture (68%). General, the living standard was being very low, with the resultant negative impact on school attendance and drop-out rates.

Integrating productive activities and water resources

	Productive Activities			***Water resources for using***			
	Agriculture	Forestry	Other	Pool	River, stream	Lake	other
Rate (%)	68	25	7	12	76	0	12

Agriculture is the primary income generating activity in the proposed project area, with forestry (generating of 25% of family income) the second. River and streams is the water sources for resident's area (made up 76%). There have not systems of water supply and drainage, have not supplied for demand of the area's socioeconomic. The water sources only supply in the rainy season and waterless in dry, the water quality has not reach the permit standard for living.

Integrating of purpose using water in the area

	Purpose			
	For living	Industry	Forestry	Agriculture
Rate (%)	65	0	2	33

Water resources from river and streams supplied for living mainly,made up (65%), last ones used for agricultural activities. This is correctly with the production in the area. The primary sources of income in the communities around the proposed project area are forestry and (average income is about 700kg rice per year).

4.2. Considering environmental pollution from the project

The investigation shows that:

Summary of environmental assessment and resources of pollution

	Environmental quality			**Resources of pollution**					
	Good	Average	Polutive	Living	Agriculture	Forestry	Service	The project	Unclear

Rate (%)	46	25	29	2	36	12	2	5	43

According to the investigation, environmental quality in the area is good, (made up 46%), there is 29% said that environment was polluted by agricultural and forestry activities. 5 % said that pollution will be caused by the project, because in the building, there will many people who come from another and affect to the area environment. The overall project evaluation results are:

	Evaluating level on environment		
	Effect	No effect	Effect, but unsignificant
Rate (%)	16	71	12

4.3. Considering Project Activities

According to investigation, residents in the area require the project could do measures for environmental protection as well as the wastes should be treated before discharging to environment (99%). Transferring professional structure is new trend for development, such as using the land with higher productivity, improving infrastructure, ensuring environmental hygiene and improving living standard.

5. General Assessment

General, cultural standards of the resident around the project is relatively low, the main activities in the area are agriculture and forestry, the resident living isn't stable (*why?).

Water resources from river and streams in the area have been using in their living. It only supply sufficient in rainy season and waterless in the dry. The water quality have not gained Health Ministry's living standard.

Residents of the project area strongly supported the proposed investment project because of its many direct and indirect project advantages for the local people. The project will have significant socioeconomic impact, by virtue of helping to significantly improve educational status, and thereby improving living standards over time. The people will be organized, trained on useful vocational skills. According to the planning of Kon Ray district, when going on, the area will attract and develop many activities, solve the resident's employment. The area will benefit from improved rural infrastructure, education, transportation and information systems, and contribute to improving the living and cultural standards in the area.