

QUANG NGAI RURAL DEVELOPMENT PROGRAM (RUDEP) - PHASE 2

Environmental Specialist Report - Second Input



VIETNAM-AUSTRALIA

Prepared for

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Acronyms

AEZ	Agro-Ecological Zones
AusAID	Australian Agency for International Development
ASAS	Australian Small Assistance Scheme
ATL	Australian Team Leader
CCG	Commune Contact Group
CPC	Commune Peoples Committee
CPO	Communications and Promotions Officer
DCG	District Contact Group
DDOs	District Development Officers
DNRE	Department of Natural Resources and Environment
DPC	District Peoples Committee
DPI	Department of Planning and Investment
EAP	Environmental Action Plan
EIAC	Environmental Impact Assessment Checklist
EMG	Environmental Management Guideline
EPBC Act	Environment Protection and Biodiversity Conservation Act, 1999
EPL	Environmental Protection Law
GOA	Government of Australia
GOV	Government of Viet Nam
IEO	Infrastructure and Environment Officer
IPM	Integrated Pest Management
MEGO	M&E and GIS Officer
O&M	Operation and Maintenance
PCBs	Poly Chlorinated Biphenyls
PCPAPS	Problem Census/Problem Analysis/Problem Solving
PCBs	Poly chlorinated Biphenyls
PEMM	Program Environmental Management Manual
PMB	Commune Program Management Board
PDA	Participatory Development Adviser
PMS	Program Management System
PMU	Program Management Unit
PPC	Provincial People's Committee
QN	Quang Ngai
QNRDP	Quang Ngai Rural Development Program (former Program name)
RUDEP	Rural Development Program (new Program name)
SC	Supervision Consultant
TOR	Terms of Reference
UNICEF	United Nations International Children's and Environmental Fund
VAT	Value Added Tax
VTL	Vietnamese Team Leader

1 Introduction

This report details the findings of the second Environmental Audit (the 'Audit') of RUDEP Program activities (the 'Program') by the Environmental Specialist in December 2003. The aim of the input was to enhance the ability of the Program via Program, Commune, district and provincial staff to implement a range of agricultural activities and small-scale infrastructure works that cause minimum adverse effect on the environment. This was achieved by undertaking an Audit of Program activities, including those new activities resulting from the Program's work with 6 new communes.

The Terms of Reference (TOR) for the Environmental Specialist input into the Program required a review and update of the Program Environmental Management Manual (PEMM), the Environmental Impact Assessment Checklist (EIAC), and the Environmental Management Guidelines (EMG) to ensure their adequacy in mitigating any adverse environmental impacts arising from an increased scope of Program activities.

The principal output of the Audit is therefore this report and a PEMM document covering all Cycle 1 and Cycle 2 Commune activities with the potential to cause environmental impact, (and comments relating to the well construction activity that has occurred to date in one Cycle 3 commune). (The Cycles refer to the staggered approach the Program is taking to working with an increased number of communes). Updates to the EIAC and EMGs for the Program have been made in line with the increased scope of activities being undertaken by the Program in the communes and are contained within the updated PEMM.

In order to fulfil the TOR, the Environmental Specialist undertook a range of activities during the period 8-19 December 2003, including Audit visits, desk top reviews of activities, and discussions with Program personnel. Furthermore, a review of the adequacy of the PEMM, EIAC and EMGs to manage the scope of activities being undertaken by the Program was made and a workshop/training program conducted to train the Infrastructure and Environment Officer (IEO) and Program Management Unit (PMU) staff in the use of the updated EIAC, EMGs and PEMM and to provide general environmental awareness training.

2 Scope of Environmental Audit

This report describes the second Environmental Audit of Program activities and subprojects conducted and was undertaken to ensure that the Program is in compliance with AusAID's requirements as specified in the following information sources:

- The Environmental Management Guide for Australia's Aid Program 2003 that describes AusAID's environmental management system (EMS), and outlines the steps to be followed in environmental assessment of Program activities, as well as the procedures for managing potential environmental impacts.
- AusAID obligations under the Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act).
- AusAID publication, 'Australian Aid: Investing in Growth, Stability and Prosperity', 2002.
- Applicable Vietnamese laws and regulations, and good environmental practice, including good practice relating to Program activities with the potential to result in environmental health issues.
- The PEMM, EMGs, and EIA Checklist prepared by the Program in response to the above obligations originally set out in *The Environmental Impact and Management Issues Scoping Study, December 2001 ('The Environmental Scoping Study')* and modified for use by the Program by the Environmental Specialist during the first input in March 2003.

In accordance with the aims of the Environmental Audit as set out in the *Environmental Scoping Study*, it should "if warranted, undertake remedial action, including changes to operational procedures and/or revision of the PEMM if required". Following the Audit, final EMGs are then to be prepared and adopted.

The Program is now working with a total of 9 Communes, namely the first 3 'Cycle 1' Communes that were reviewed in the Preliminary Environmental Audit Report prepared by the Environmental Specialist in March 2003. Further to this the Program is working with 3 additional 'Cycle 2' Communes and discussions have commenced with three 'Cycle 3 Communes'. This report reviews the adequacy of measures to manage activities in the Cycle 1 and 2 Communes, including a review of the measures in place, and the extent to which they are being followed.

The Audit was undertaken by an Environmental Specialist, working with, and providing on-the-job training to, the IEO. This Audit took place after initial infrastructure work had been completed in the three 'Cycle 1 Communes', commenced in the three Cycle 2 Communes and where initial discussions have taken place with the three Cycle 3 Communes.

3 Methodology

3.1 Program of Work

Site visits were conducted by the Environmental Specialist accompanied by the IEO to each of the three Cycle 2 Communes working with the Program. The Audit visits were carried out in order to assess the potential for environmental impact arising from Program activities, and to assess the adequacy and scope of the EIAC and EMGs in mitigating these impacts via a combination of planning, implementation and operation based controls.

A visit was also made to the Cycle 1 Commune of Duc Phong in order to assess the best way of managing a pocket of localised pesticide contamination discovered on a site proposed for redevelopment to a kindergarten. The activities being conducted in the other two Cycle 1 Communes were assessed via a desk top review and discussions with Program personnel.

Furthermore, advice has also been provided relating to the Australian Small Assistance Scheme (ASAS) wells being installed at the Cycle 3 Commune of Son Giang. To date this is the only activity taking place at any of the Cycle 3 Communes.

The Audit of Program activities consisted of the following:

- A desk top review of whether recommendations made in the Preliminary Audit in March 2003 in relation to the three Cycle 1 Communes were acted upon; and a review of Cycle 2 activities being conducted in these original three Communes.
- Site visits to each of the three Cycle 2 Communes that the Program has engaged with since the Preliminary Audit in March 2003, and the Cycle 1 Commune of Duc Phong to investigate the pesticide contamination issue at the kindergarten site.
- Discussions with key Program personnel, including the Infrastructure and Environment Officer (IEO), Participatory Development Advisers (PDAs), District Development Officers (DDOs), the Communications and Promotions Officer (CPO), and the Australian Team Leader (ATL).
- A review of the Environmental Impact Assessment (EIA) Checklist against Program activities. This includes an assessment of their adequacy in terms of the increased scope of activities currently being undertaken by the Program and additions to the EIAC as required.
- A review of the adequacy and scope of activities covered by the Environmental Management Guidelines (EMG) component of the PEMM in terms of their relevance to current and proposed program operations and from the point of view of their being usable by members of the program team, in particular the IEO.
- A review of the extent to which Program staff are applying environmental measures contained within the EIAC, EMGs and PEMM.
- A review of the Program activities against the requirements of AusAID, applicable Vietnamese laws and regulations, and good environmental practice.

3.2 Reporting

The audit divides up findings into four main sections, namely Sections 5, 6 and 7 and Annex 1. Recommended actions are listed as bullet points in Sections 5, 6 and 7. In addition summary tables in these sections list all recommended actions for Cycle 1, 2, and 3 Commune activities.

Sections 5 & 6 look at environmental issues associated with Infrastructure works and Income Generation activities respectively, and includes the status of recommendations made in the Preliminary Audit in March 2003 relating to the three Cycle 1 Communes. *The status of these Cycle 1 recommendations are listed in italics. This includes whether any further actions are still required.*

Section 7 looks at the adequacy of procedures in place to manage program activities and is divided into two parts. Section 7.1 sets out those revisions to the PEMM required to cover the new scope of Program activities; and Section 7.2 comments on the level to which the IEO, PDA's and DDO's are using the PEMM on a day to day basis when working on the Program, including areas where improvements to uptake and knowledge can be made. *The status of recommendations made in the Preliminary Audit Report are listed in italics, including whether any further actions are still required.*

Annex 1

The updated PEMM for the Program is contained in Annex 1 to this report. The PEMM includes an updated EIAC, EMGs and an addition in the form of an 'Environmental Action Plan' (EAP). The EAP lists the status of environmental issues being dealt with by the Program on a Commune by Commune basis and is a table in the PEMM for use by the IEO to track all the management of environmental issues.

4 Background to AEZs

Quang Ngai Province is divided into three AEZs (coastal, lowland and upland) reflecting the three broad bands of topographical and land use features, although the boundaries of the AEZs are diffuse and cannot be definitively plotted *Quang Ngai Rural Infrastructure and Services Feasibility & Design Mission* (Project Design Document; June 2000).

Since the preliminary environmental audit conducted in March 2003, relating to Program activities in the three 'Cycle 1' Communes, the Program has started working with a further six Communes. This includes the three 'Cycle 2' Communes of Nghia Tho, Hanh Phuoc, and Pho Chau; and the three 'Cycle 3' Communes of Son Trung, Son Giang, and Binh Minh. A brief description of each of the Cycle 2 Communes is outlined below. A description of the characteristics of each of the AEZs is set out in the *Quang Ngai Rural Infrastructure and Services Feasibility & Design Mission* (Project Design Document; June 2000) and in the *Environmental Specialist Report* (11 April 2003).

Pho Chau - Coastal AEZ

Pho Chau Commune is located in the coastal AEZ approximately 60km south of Quang Ngai in the Duc Pho District and has a population of 7,706. Fishing, animal husbandry and rice growing are the main activities and there are a number of industries based there, including bakeries, ice production and cuttle fish processing. Information on the Commune (the Commune profile held by the Program) identified the following as the principal problems facing Pho Chau: Credit and technology assistance for fishing, animal husbandry, and cultivation, the requirement for a road linking the Commune more directly with the Highway and upgrades to the school, kindergarten and health centre.

Hanh Phuoc - Lowland AEZ

Hanh Phuoc is located in the lowland AEZ approximately 15km south of Quang Ngai in the Nghia Hanh District and has a population of 13,897. Rice, forestry, fruit trees, vegetables, peanuts, maize, and sugar cane are the main agricultural crops grown here, and buffalo, cattle pigs and chickens are reared. The Commune profile held by the Program identified the following as the principal problems facing Hanh Phuoc: The requirement for irrigation advice, breeding and cultivation technology, a school, rural road, and livestock raising fund.

Nghia Tho - Upland AEZ

Nghia Tho is located in the upland AEZ approximately 20km south-west of Quang Ngai in the Tu Nghia District and has a population of 1,015. Rice, cassava, sweet potato, peanut, maize, beans and sugar cane are the main agricultural crops grown here, and buffalo, cattle pigs and chickens are reared. The Commune profile held by the Program identified the following as the principal problems facing Nghia Tho: Access to clean water and medicine, technology for livestock and farming, credit and road access.

5 Audit Findings - Infrastructure Activities

5.1 Wells, Bathrooms/Toilets & Water Filters

The wells being built by the Program are designed to reduce contamination, which involves them being concrete lined. The use of the more expensive wells in preference to bores is limited to those areas where rock makes bore construction impractical. The well design features a concrete surface slab and lining and barricade wall to reduce contamination, and a sand/gravel filter at the base of the well.

The Program has been actively encouraging the uptake of good practices with respect to the situation of wells and potential contamination sources since the Preliminary Audit. In addition, it has been conducting a water quality testing program for existing wells and water filters. Change although not easy to bring about is occurring as a result of Program efforts.

Cycle 1 Communes - (Son Hai and Duc Phong)

The Preliminary Audit made the following recommendations relating to well, bathroom and toilet construction activities in Son Hai and Duc Phong:

- Make the contractor and supervisor responsible for adequate clean out of the wells before commissioning the remaining 3 wells and the next allocation of 15 wells in Son Hai. *The 3 remaining wells were commissioned, however the next allocation of 15 wells have not yet been completed. Contract documents should specify that these wells are cleaned out before commissioning.*
- Advise households within Duc Phong Commune that have dug their own wells to erect fencing around them to prevent animals from drinking from them and to safeguard against ingress of faecal matter. *Advice should be offered on an ongoing basis by the DDO and PDA.*
- Take additional samples in the dry season from those wells in Son Hai where elevated levels of Coliforms and E coli were found to be present. Test the samples for E Coli and Coliforms and compare with the Vietnamese and International standards for drinking water, (Refer Table 25, Environmental Scoping Study). *Samples have been taken. In wells where elevated levels remain, the Program should encourage the relocation of any potential sources of contamination away from locations immediately adjacent and upslope of the wells. This will include animal pens, buffalo wallows and human toilets. Make further tests under similar conditions when these changes to practices have occurred.*
- Make the contractor pump out and re-sample the wells in Son Hai that were not adequately cleaned out following installation, where elevated E Coli and Coliform levels have been recorded. *This is due to be carried out in the dry season.*
- The bathroom/toilet buildings in Duc Phong and the bathrooms in Son Hai have roofs constructed of asbestos cement sheets. Although very unlikely to be fibre releasing, asbestos fibres can cause serious respiratory ailments if inhaled in a dust form. *The interior surfaces of these existing roofs should be painted. Tin or other safe material should be used for roofing as an alternative to asbestos in all Program funded buildings.*

Cycle 2 Communes (Nghia Tho)

To date 30 wells have been installed, funded by the Australian Small Assistance Scheme (ASAS) and put in place by the Program. Testing has not yet taken place within these wells as the Program are waiting for them to stabilise prior to taking samples.

- In accordance with the Program's well sampling program, samples should be taken and compared with the Vietnamese standard for drinking water, as set out in Ministry of Health Decision 505/BYT/QD (1992) and the Vietnamese environmental standards relating to water quality, published by MOSTE.
- During the visit to Nghia Tho it was noted furthermore that a number of these new ASAS wells were situated adjacent to existing wells that were for some reason not fit for purpose. (Normally due to the fact that the old wells were not reliable in the dry season). Due to the proximity to the new ASAS wells these old wells should be covered to prevent of contaminants entering them and contaminating the new wells.

Cycle 3 Communes (Son Giang)

A total of 51 wells are intended to be installed in Son Giang, funded by the Australian Small Assistance Scheme (ASAS) and put in place by the Program.

- In accordance with the Program's well sampling program, water samples should be taken from these wells in the dry season and tested against the Vietnamese standard for drinking water, as set out in Ministry of Health Decision 505/BYT/QD (1992) and the Vietnamese environmental standards relating to water quality, published by MOSTE.
- Any new wells should be situated away from sanitation facilities and animals. The rule of thumb as reported in the engineering assessment report, 2003 is at least 20 metres distance from latrines, animal pens and buffalo wallows where possible. Once the wells are established, any potential sources of well contamination should be located away from locations immediately adjacent and upslope of the wells where possible.

Table 1: Summary & Recommendations - Wells/bathrooms/Toilets & Water Filters

Activity	Status/Action required
CYCLE 1 Issues	
Make the contractor and supervisor responsible for adequate clean out of the wells before commissioning the remaining 3 wells and the next allocation of 15 wells in Son Hai.	<i>The 3 remaining wells were commissioned, however the next allocation of 15 wells have not yet been completed. The IEO should ensure that contract documents specify that these wells are cleaned out before commissioning.</i>
Advise households within Duc Phong Commune that have dug their own wells to erect fencing around them to prevent animals from drinking from them and to safeguard against ingress of faecal matter.	<i>Advice should be offered on an ongoing basis by DDOs and the IEO.</i>
Take additional samples in the dry season from those wells in Son Hai where elevated levels of Coliforms and E coli were found to be present. Test the samples for E Coli and Coliforms and compare with the Vietnamese and International standards for drinking water, (Refer Table 25, Environmental Scoping Study).	<i>Samples have been taken. In wells where elevated levels remain, the Program should encourage the relocation of any potential sources of contamination away from locations immediately adjacent and upslope of the wells. This will include animal pens, buffalo wallows and human toilets. Make further tests under similar conditions when these changes to practices have occurred.</i>

Activity	Status/Action required
Make the contractor pump out and re-sample the wells in Son Hai that were not adequately cleaned out following installation, where elevated E Coli and Coliform levels were recorded.	<i>This is due to be carried out in the dry season.</i>
The bathroom/toilet buildings in Duc Phong and the bathrooms in Son Hai have roofs constructed of asbestos cement sheets. Although very unlikely to be fibre releasing, asbestos fibres can cause serious respiratory ailments if inhaled in a dust form.	<i>The interior surfaces of these existing roofs should be painted. Tin or other safe material should be used for roofing as an alternative to asbestos in all Program funded buildings.</i>
CYCLE 2 Issues	
To date 30 wells have been installed, funded by the ASAS and put in place by the Program. Testing has not yet taken place within these wells as the Program are waiting for them to stabilise prior to sampling them. During the visit to Nghia Tho it was noted that a number of these new ASAS wells were situated adjacent to existing wells that were for some reason not fit for purpose. This was normally due to the fact that the old wells were not reliable in the dry season.	In accordance with the Program's well sampling program, water samples should be taken from these wells in the dry season once they have stabilised and tested against the Vietnamese standard for drinking water. Due to the proximity to the new ASAS wells these old wells should be covered to prevent of contaminants entering them and cross-contaminating the new wells.
CYCLE 3 Issues	
A total of 51 wells are intended to be installed in Son Giang, funded by the ASAS and put in place by the Program.	As has occurred to date, all wells installed by the Program, should use the EIA checklist to ensure that the following are applied as a minimum: New wells in Son Giang should be situated away from sanitation facilities and animals. The rule of thumb is at least 20 metres distance from uphill latrines, animal pens and buffalo wallows where possible. All construction wastes are appropriately disposed of and cement residues from washing tools etc are not permitted to enter watercourses Water samples should be taken from these wells in the dry season in accordance with the Program well sampling program and tested against the Vietnamese standard for drinking water.

5.2 Kindergartens and Health Centres

As a result of the community consultation process three kindergartens and two health centres have been proposed for support by the Program. These include:

Cycle 1 Communes - (Son Hai, Tinh Tho and Duc Phong)

The Preliminary Audit made the following recommendations relating to three kindergartens, and two health centres being built/upgraded in Son Hai, Tinh Tho and Duc Phong:

The environmental health issues associated with the construction of rural health centres and kindergartens relate their design and siting, the kinds of materials used in their construction, and the practices followed when constructing them in terms of noise, dust and waste management.

- Avoid construction of buildings where there is possible disturbance of areas of primary forest or valued habitat. *Not applicable in these Communes.*

- Avoid the use of asbestos and use tin or tiles as roofing material to avoid possible serious respiratory ailments. *No asbestos is being used in any of these buildings.*
- Do not use lead based paints on internal walls, surfaces etc, particularly given that young children put toys and food etc into their mouths that may have come into contact with painted surfaces. *No lead based paint is being used in any of these buildings.*
- Ensure that during construction cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials such as cement bags are appropriately disposed of. *The IEO specified in contractor documents that approved Program practices be followed. It is not known as to the frequency with which the IEO supervised or reviewed practices being followed. The IEO should undertake visits to review practices being followed to ensure they comply with contractor documents.*
- Use rainwater collection systems as a means of supplying clean water for communal buildings such as health centres and kindergartens in the event that problems exist with respect to groundwater quality in the vicinity of such buildings. This is due to the relative susceptibility of children and sick people to issues relating to poor water quality and the relative ease of constructing such a rainwater collection tank on a single communal building. *This advice is being offered.*

Duc Phong Kindergarten Contamination Issue

Workers digging the foundations for the proposed kindergarten in Duc Phong Commune apparently noticed a visually contaminated area of soil in the middle of the foundation area being dug. In addition to the white staining observed, they noticed an odour and apparently experienced headaches and dizziness when in close proximity to it for an extended period. As a result work was suspended, with approximately 5m³ of soil having already been excavated and stockpiled adjacent to the void, some of which had the potential to contain some of this ‘contaminated’ material.

To determine what this contaminated material was likely to be, discussions took place between Program personnel, representatives from the Agricultural Cooperative, and remotely with a chemist and contaminated land expert from URS Ltd. This process revealed that the storage building formerly situated on the site had been used for storing rice. The Commune also confirmed that pesticides/insecticides were used on the site to protect the rice against pest and insect infestation and that bulk storage of these materials had also occurred here.

Representatives from the Commune recalled it was ‘BHC’ powder that had been used and that there had been a localised spillage of BHC powder in part of the building in the past. At this time the floor of the building was compacted natural ground.

Based on the risk of health effects of BHC, soil samples were taken from the 2m² area where visual contamination and odour appeared to be present (the ‘hot spot’) and sent to a laboratory in Da Nang for analysis for a range of organophosphate and organochlorine contaminants. The results of the analysis indicated that the levels of BHC present were well within limits specified in the National Environment Protection (Assessment of Site Contamination) Measure (National Environment Protection Council, 1999) – the current best practice document for environmental site assessment in Australia.

Ambiguity existed with the results however. This arose from the fact that the samples taken were taken vertically, (to a depth of 50cm), whereas the visual contamination was present in a thin horizontal layer within 10cm of the ground surface in the hot spot. Furthermore there were doubts about the order of magnitude of the units used to report

the results by the laboratory. It was therefore felt prudent to take a further 2 soil samples and send these to another laboratory in Hanoi for the same analysis.

These were subsequently taken from the top 10cm of soil in the hot spot to ensure a representative concentration of contamination. These second samples duly recorded levels above the acceptable limits for direct contact or ingestion for DDT as set out in the NEPM guidelines.

Given the elevated levels recorded in the second set of samples taken, soil from the hotspot was removed and disposed of to a local landfill. Despite this however, representatives from the Commune still felt that residual discolouration and odour is present, meriting further investigation given the sensitive use intended for the site.

Summary

At the time of the site visit on 11 December 2003, the site was lying vacant, having been excavated originally for the purposes of laying the foundations of the kindergarten building and further excavated to remove some of the contaminated soil. As a result, the site consisted of a rectangular void of approximately 12 metres long, 7 metres wide and up to 70 centimetres deep.

Apparently given heavy rainfall over the weeks preceding the site visit, the whole of the void was filled with rain water. As a result it was feared that any residual contamination if present may have spread throughout it. Some puddles of water were still present in the void at the time of the site visit. Some minor soil discolouration was noted in the former hot spot area but this could be attributable to natural variations in soil colour.

Down gradient of the void approximately 10 metres from the original hot spot of contamination is a drinking water bore, and beyond this, a further 5 metres away are rice paddy fields.

BHC is an organophosphate insecticide containing dichlorodiphenyltrichloroethane (DDT). DDT is of relatively low toxicity to mammals but has a high toxicity in fish. It is not however metabolised quickly by animals; and can accumulate in the fatty tissues, building up over time dependent on consumption rates. It has been known to cause effects on birds including causing reproduction problems, and thinning of eggshells.

Given that DDT is highly persistent in the environment, but is immobile in most soils, and not taken up by vegetation, any DDT present is likely to eventually be mitigated in situ via biodegradation and through its volatility, or evaporation to the air. It is likely to remain in situ at the Duc Phong site due to the fact that it was originally spilt as a solid powder on a compacted soil floor, in a roofed building where it was covered from the rain. Moreover, the low mobility of DDT in soil means that it is likely to remain close to the ground surface where much of it is likely to have now evaporated off. It is unlikely that it will have moved significantly either horizontally or vertically in the soil.

Any DDT still on the site is also unlikely to be present in significant concentrations in off-site surface water, or in puddles in the void. This is due to the effects of dilution by recent heavy rainfall, high rates of biodegradation due to warm temperatures, its natural volatility and its low water solubility. For these reasons it is not likely to have cross-contaminated the soil in the void, (assuming it was not originally present beyond the original hot spot) even if it had moved as a thin coating on some of the rice seeds present. At the time of the site visit mosquito larvae were observed in the puddles of water present in the void further indicating that levels of DDT are extremely low in this water.

Due to its high persistence in the environment; despite being very immobile, over very long periods of time residual DDT may be able to eventually leach into groundwater. Samples taken for analysis from the nearby bore however recorded extremely low levels of DDT, organophosphates or organochlorines in the grab sample taken.

Recommendations

- The hot spot is situated in an area that will be encapsulated within the concrete foundations of the kindergarten. Given the sensitivity of the proposed end use of the site however, it is suggested that additional soil from the former hot spot and to a distance of a metre all round it is taken for disposal to landfill. It is recommended that excavation occur to a depth of 30cm below the existing level of the base of the void to ensure that any residual contamination is removed. Excavating beyond this point is not felt to be necessary given the lack of evidence of any contamination beyond this area.
- The area where soil was formerly stockpiled should be scraped and backfilled into the void such that it is encapsulated within the area of the deepest foundations for the kindergarten building. This is a precautionary measure only given that the area will in future be situated under a concrete apron to the rear of the building.
- A further grab sample should be taken from the nearby bore and analysed in 12 months time to ensure that any residual material is not seeping into the bore.

Cycle 2 Communes - (Hanh Phuoc)

Three kindergartens are being constructed/upgraded in the Hanh Phuoc Commune. environmental health issues associated with the construction of rural health centres and kindergartens relate their design and siting, the kinds of materials used in their construction, and the practices followed when constructing them in terms of noise, dust and waste management.

There are no significant issues associated with the development of either the new kindergarten in Hanh Phuoc Commune or the upgrades to the two existing kindergartens. The new kindergarten is being built on a Greenfield site, and none of the upgrades involve the use of materials such as lead based paints or asbestos in their construction.

- The IEO should ensure that cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials such as cement bags are appropriately disposed of. The IEO should specify in contractor documents that these improved practices be followed. The IEO should undertake visits to review practices being followed to ensure they comply with contract requirements.
- Rainwater collection should be considered when constructing these buildings to provide clean drinking water during the dry season. This is due to the relative susceptibility of children to issues relating to poor water quality and the relative ease of constructing such a rainwater collection tank at a kindergarten site.

Table 2: Summary & Recommendations - Kindergartens & Health Centres

Activity	Status/Action required
CYCLE 1 Issues	
Ensure that during construction cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials such as cement bags are appropriately disposed of.	<i>The IEO specified in contractor documents that approved Program practices be followed. The IEO should continue to undertake visits to review practices being followed to ensure they comply with contractor documents.</i>
A localised area of BHC (DDT based) pesticide contamination is present on the proposed site of the Duc Phong kindergarten, some of which has been removed of to a landfill.	Given the sensitive end use of the site as a kindergarten, additional soil from the former hot spot and to a distance of a metre all round where it was visually observed should be taken for disposal to landfill to a depth of 30cm below the existing level of the base of the void to ensure that any residual contamination is removed.

Activity	Status/Action required
	The area where soil was formerly stockpiled should be scraped and backfilled into the void such that it is encapsulated beneath the foundations for the kindergarten. A further grab sample should be taken from the nearby bore and analysed in 12 months time to ensure that no residual DDT is seeping into it.
CYCLE 2 Issues	
Ensure that during construction cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials such as cement bags are appropriately disposed of.	The IEO specified in contractor documents that improved practices be undertaken. It is not known as to the frequency with which the IEO supervised or reviewed practices being followed. The IEO should undertake visits to review practices being followed to ensure they comply with contractor documents.
The EIAC did not include a procedure for assessing the potential for pre-existing contamination on sites.	Refer to Section 7.1 (Adequacy of the PEMM, EIAC and EMGs) Additions to the EIAC have been made to include potentially contaminating activities and a procedure for disposal of contaminated material.

5.3 Road and Bridge Construction

Cycle 1 Communes - (Son Hai, Duc Phong, Tinh Tho)

The Preliminary Audit made a series of recommendations relating to road and bridge infrastructure in Son Hai, Duc Phong and Tinh Tho Communes. Recommendations principally related to their design and that construction practices minimised the potential for pollution of watercourses, and required noise, dust and waste management.

A number of environmental issues exist with roads and bridges. These relate principally to the requirement to clear native vegetation and habitat for their construction, and the possibility of bridge sites or road routes encroaching on historically or culturally significant sites. Bridges furthermore have the potential to result in disruption of natural river flows following placement of foundations in or adjacent to river bed/banks, and also significant potential to result in increased erosion of soil and cement into rivers and streams during the construction phase. The following recommendations were made:

- There is potential for construction related impacts associated with cement and hydrocarbon residues reaching rivers from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues during construction. *The IEO specified in contractor documents that approved Program practices should be followed. The IEO should continue to undertake visits to review practices being followed to ensure they comply with contractor documents.*
- The road in Son Hai was badly damaged due to recent heavy rain resulting in erosion and gulleying. *Following repair, where steeper or longer sloped sections are unavoidable, cross drains and catch banks should be put in place to reduce the flow of water down the track. The sides of the road should furthermore be stabilised using either mechanical means such as wooden stakes and a mulch cover, or via the establishment of vegetation cover to prevent erosion.*
- The bridge at Tinh Tho required repair to structural cracking that appeared shortly after commissioning. The Preliminary Audit recommended that practices ensured no ingress of sand, cement residues or fuel occurred into the watercourse, that slope stabilisation work be carried out and that rubbish including empty hessian and plastic bags (that are likely to have previously contained sand and cement) were removed from the river bed. *The repairs were carried out by the original contractor under the original contract, not enabling environmental requirements to be written into a new contract, but according to the IEO these instructions were followed.*

Cycle 2 Communes - (Pho Chau and Hanh Phuoc)

Roads are being built in two of the Cycle 2 Communes – Pho Chau and Hanh Phuoc.

Pho Chau

The Pho Chau road will be approximately 2km long, joining an existing dirt road that runs through the Commune to another dirt road that is in turn connected to the nearby highway. The linking together of these two dirt roads will provide faster and more reliable access to the main highway (situated approximately 1.5km west of the Commune) for produce.

A number of potential environmental issues exist with the road relating principally to the requirement to clear native vegetation and habitat for its construction, and the fact that the route of the road is very hilly, giving significant potential for erosion to occur.

- At the time of the visit it was noted that the existing dirt road nearest to the highway was extremely badly eroded with gulleys up to a metre deep running lengthways down it. Repairs need to be made to this section as well as ensuring that toe drains, cross drains and catch banks are put in place across both this and the new road to reduce erosion risk.
- It was noted at the time of the site visit that some replanting of trees had occurred on the hills adjacent to the highway and the location of the proposed new road. Mature trees should where possible be avoided when clearing the route of the road, and any mature shrubs or saplings needing to be moved should be replanted adjacent to the route of the road to assist soil stabilisation.
- The potential also exists for construction related impacts associated with cement and hydrocarbon residues reaching rivers from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues during construction. The IEO must specify in contractor documents that approved Program practices are followed. This includes periodic review/supervision of practices being followed by both the IEO and DDO to ensure they comply with contractor documents.

Hanh Phuoc

The Hanh Phuoc road will involve the widening of approximately a 500m long section of track that currently runs through the Commune. The improvement of this dirt road will provide easier access to agricultural land for people in the Commune.

- The only issue needing to be addressed is the fact that the road starts on the banks of a major river and that this point is slightly down gradient from the commune. Any material eroded from the road during construction or heavy rainfall events will therefore enter the river. Care should be taken during construction of the road to ensure that construction materials are not able to enter the river. The IEO must specify in contractor documents that approved Program practices are followed. This includes periodic review/supervision of practices being followed by both the IEO and DDO to ensure they comply with contractor documents.
- At the time of the visit it was noted that the existing dirt road has some gullying present on the banks of the river. Toe drains and cross drains should be put in place across the new road to reduce the potential for erosion to occur.

Table 3: Summary & Recommendations - Road and Bridge Construction

Activity	Status/Action required
CYCLE 1 Issues	
The potential exists for construction related impacts associated with cement and hydrocarbon residues reaching rivers from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues during construction.	<i>The IEO specified in contractor documents that approved Program practices should be followed. The IEO should continue to undertake visits to review practices being followed to ensure they comply with contractor documents.</i>
The road in Son Hai was badly damaged due to recent heavy rain resulting in erosion and gulleying.	<i>Following repair, where steeper or longer sloped sections are unavoidable, cross drains and catch banks should be put in place to reduce the flow of water down the track. The sides of the road should furthermore be stabilised using either mechanical means such as wooden stakes and a mulch cover, or via the establishment of vegetation cover.</i>
CYCLE 2 Issues	
Ensure that during construction cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials such as cement bags are appropriately disposed of.	The IEO specified in contractor documents that improved practices be undertaken. The IEO should continue to undertake visits to review practices being followed to ensure they comply with contractor documents.
At the time of the visit it was noted that the existing dirt road nearest to the highway was extremely badly eroded with gulleys up to a metre deep running lengthways down it.	Repairs need to be made to this section as well as ensuring that toe drains, cross drains and catch banks are put in place across both this and the new road to reduce erosion risk.
It was noted at the time of the site visit that some replanting of trees had occurred on the hills adjacent to the highway and the location of the proposed new road.	Mature trees should where possible be avoided when clearing the route of the road, and any mature shrubs or saplings needing to be moved should be replanted adjacent to the route of the road to assist soil stabilisation.

5.4 Dams and Irrigation Channels

Dams and Irrigation Channels have the potential to result in major disruption of natural river flows affecting stream ecology, impacting upon existing populations of vegetation and fish. Furthermore there is potential for construction related impacts associated with cement and hydrocarbon residues reaching rivers from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues during construction.

Cycle 2 Communes - (Pho Chau and Hanh Phuoc)

A dam is planned for Pho Chau commune and a new irrigation channel for Nghia Tho commune.

Pho Chau

The Pho Chau dam will involve cement foundation walls being keyed into the banks and bed of one of the streams in the commune. Removable wooden slats will then be slotted into the walls to restrict the flow of water.

- Care should be taken during construction of the dam to ensure that cement residues and rubbish such as cement bags are not allowed to enter the stream where they have the potential to smother plants and fish. The dam should not furthermore prevent fish

from passing downstream of it. This will be possible if sufficient flows are allowed to pass over the top of the dam wall. If people in the commune put nets onto the dam spillway to catch fish, the diameter of the mesh should be sufficient to allow immature fish to pass through.

Nghia Tho

Nghia Tho commune is intending to re-route a small river to reclaim some agricultural land currently occupied by the river. This will involve digging out an old channel adjacent to the main channel and re-routing the river into it via the construction of a concrete retaining wall/diversion channel.

Diverting the course of a river channel can give rise to a number of potential environmental issues, not least of all the disruption of plant and fish communities in the existing channel. Commune personnel and the IEO however stated that the intended diversion channel will only serve to re-route the river back to its original course that was altered following a recent flood event.

- Care should be taken to minimise construction related impacts associated with cement and hydrocarbon residues reaching the river from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues. Furthermore, care should be taken to restrict the movement of soil into the river channel where it can smother fish and plants.

Table 4: Summary & Recommendations - Dams & Irrigation Channels

Activity	Status/Action required
CYCLE 2 Issues	
The Pho Chau dam will involve cement foundation walls being keyed into the banks and bed of one of the streams in the commune. Removable wooden slats will then be slotted into the walls to restrict the flow of water.	Care should be taken during construction of the dam to ensure that cement residues and rubbish such as cement bags are not allowed to enter the stream where they have the potential to smother plants and fish. The dam should not furthermore prevent fish from passing downstream of it. If nets are put on the dam overflow to catch fish, the diameter of the mesh should be sufficient to allow immature fish to pass through.
Re-routing of a small river to reclaim some agricultural land currently occupied by the river will involve digging out an old channel adjacent to the main channel and re-routing the river into it via the construction of a concrete retaining wall/diversion channel.	Care should be taken to minimise construction related impacts associated with cement and hydrocarbon residues reaching the river from washing of tools, use of plant and equipment, and for associated noise, dust and waste management issues. Furthermore, care should be taken to restrict the movement of soil into the river channel where it can smother fish and plants.

6 Audit Findings - Income Generation Activities

6.1 Introduction

The Program is involved in the following income generation activities:

- Investment in training and support for alternative agricultural activities, including cattle, pig, and chicken rearing and cattle fattening;
- An Integrated Pest Management (IPM) Program to help reduce pesticide use, reducing cost of pesticide use and achieving a positive environmental outcome; and
- Provision of electricity supply for household and irrigation use (the Tinh Tho electricity substation).

Improving the livelihoods of communes is one of the principal aims of the Program. It remains important however to ensure that income generation activities undertaken to help achieve this do not result in damage to the environment from changed land use. Section 7 outlines a suggested approach when considering proposals from communes and when introducing new activities. It is suggested that all Program activities involving changes to land use, consider this stepped approach.

6.2 Alternative Agriculture Activities

Cycle 1 Communes (Son Hai - Cassava Growing)

An area of mixed forest/secondary vegetation was burnt by individuals from the Son Hai CPC to make way for planting of a commercial cassava crop. This occurred in response to a GOV initiative to construct a cassava mill in Son Hai and was not a Program initiative. The only Program involvement was in the construction of the road linking the cleared area at Mang Hien with the mill facility.

Although neither the clearing of the cassava area at Mang Hien or the mill were Program initiatives, the fact that the road linking the two is Program funded means that the Program is a stakeholder in this development. The Preliminary Audit made the following recommendations:

- It will be important to ensure that fertilisers and pesticides applied to the Mang Hien area do not percolate into ground water, run off to surface water, or accumulate in the soil where they may change its composition. This will be of added importance when people start to access the groundwater in this area for consumption. Furthermore, given the relative steepness of the slopes in this area, appropriate ground cover or erosion control measures such as small contour bunds, grass strips or vegetation barriers may need to be put in place to safeguard against erosion. *As cassava has a natural inbuilt resistance to pests, the Program should ensure that any advice to the Son Hai commune stresses the principles of IPM, involving targeted, small amounts of pesticide use (refer below).*
- There are several hills adjacent to the cleared area that are naturally forested. Although CPC members stated at the time of the site visit that they had no plans to clear these areas, the Program should ensure that it is involved in any consultation process that occurs relating to the potential development of these areas. *No attempts to clear any additional land have taken place since the last audit.*

Cyanide Presence in Cassava

The land cleared in Mang Hien has been cleared for cassava production. Cassava is one of the major staple foods in the diet of many communes. It is successful because it is highly resistant to pests, is hardy, can remain in the ground for a number of years and can handle large seasonal variation in water inputs. An accepted hazard associated with cassava however is that it maintains its resistance to pests by producing a cyanide based substance called linamarin, mainly in the leaves of the plant.

As linamarin is converted to cyanide when eaten, repeated exposure of low doses of cyanide over time can lead to health problems. Furthermore, linamarin is volatile and is released into the air, rather than remaining in the processed plant. Cassava processing can therefore result in the inhalation of cyanide gas and potential health issues associated with this.

The cyanide does not pose a problem in the broader environment other than the possibility of localised air quality issues based on its volatility.

Chronic, low-level cyanide exposure is associated with the development of goiter and severe cyanide poisoning can result in paralysis. People who get little or no protein in their diets are particularly susceptible to cyanide poisoning, as they lack the proper amino acids necessary to help detoxify the poison, making poorer communities with lower nutritional levels at greater risk.

Summary and Recommendations

- In order to safeguard against any issues resulting from the incorrect processing of cassava, that can lead to chronic health problems and in some cases paralysis and even death, cassava requires careful, quick processing. Although not a Program funded activity or responsibility, the cassava production facility in Son Hai should adhere to the correct techniques when processing cassava.
- The processing of the cassava should therefore be conducted in a well ventilated area and drying, soaking in water, rinsing or baking of the cassava plant take place to reduce linamarin content to safe levels.
- An addition should also be made to the Environmental Checklist to ensure that communities intending to produce cassava as a result of Program involvement are made aware of these potential health issues resulting from incorrect processing.

Table 5: Summary & Recommendations - Cassava (Son Hai)

Activity	Status/Action required
CYCLE 1 Issues	
Neither the clearing of the cassava area at Mang Hien or the mill were Program initiatives, however the fact that the road linking the two is Program funded means that the Program is a stakeholder in this development.	<p><i>It is important that fertilisers and pesticides applied to the Mang Hien area do not percolate into ground water, run off to surface water, or accumulate in the soil where they may change its composition. As cassava has a natural inbuilt resistance to pests, the Program should stress the principles of IPM, involving targeted, small amounts of pesticide use in this area (refer IPM Section below).</i></p> <p><i>Although no attempts to clear any naturally forested areas adjacent to Mang Hien have occurred, the Program should ensure that it is involved in any consultation process that occurs relating to the potential development of these areas.</i></p>

Activity	Status/Action required
<p>A hazard associated with cassava production is that it maintains its resistance to pests by producing a cyanide based substance called linamarin, mainly in the leaves of the plant. As linamarin is converted to cyanide when eaten, repeated exposure of low doses of cyanide over time can lead to health problems. Furthermore, linamarin is volatile and is released into the air, rather than remaining in the processed plant. Cassava processing can therefore result in the inhalation of cyanide gas and potentially serious health issues.</p>	<p>Cassava requires careful, quick processing in order to safeguard against chronic health problems. Although not a Program responsibility, the cassava production facility in Son Hai should adhere to the correct techniques when processing cassava.</p> <p>The processing of the cassava should be carried out in a well ventilated area with drying, soaking, rinsing or baking of the cassava to reduce linamarin content to safe levels.</p> <p>An addition has been made to the Environmental Checklist to ensure that communities intending to produce cassava as a result of Program involvement are made aware of these potential health issues resulting from incorrect processing.</p>

Cycle 1 & 2 Communes - Livestock Rearing

Livestock rearing has been extended to include chicken rearing in addition to cattle and pig demonstrations and cattle fattening as far as the program is concerned. To date, demonstrations have been undertaken in most of the Cycle 1 and Cycle 2 communes, with cattle fattening having been determined as the optimal activity in terms of relative ease of learning the activity and deriving an income from it. The Preliminary Audit made the following recommendations:

- Livestock rearing, including cattle and pigs can give rise to increased erosion on the land due to the cloven hooved nature of the animals. Grazing animals such as cattle will also significantly alter the nature of the vegetation in the area that they graze. Situation of cattle and pigs away from source of drinking water is also an important consideration with respect to the keeping of such animals. Attention should also be paid to the spreading of manure of these animals on land as there are naturally occurring higher levels of metals within pig faeces for example. *This advice is being provided by the Program on an ongoing basis.*

Table 6: Summary & Recommendations - Livestock Rearing

Activity	Status/Action required
CYCLE 1 & 2 Issues	
<p>Livestock rearing, including cattle and pigs can give rise to increased erosion on the land due to the cloven hooved nature of the animals. Grazing animals such as cattle will also significantly alter the nature of the vegetation in the area that they graze. Spreading of pig manure can furthermore result in elevated metal levels give the naturally high levels present in pig manure. Animal manure ingress into wells can cause disease.</p>	<p><i>Advice relating to the situation of cattle and pig pens and wallows more than 10 metres away from locations upslope of wells to prevent ingress of faecal matter is being provided by the Program on an ongoing basis.</i></p>

6.3 Pesticide & Fertiliser Management

The Program has recently launched an Integrated Pest Management (IPM) training program, targeting in the first instance rice growing. This is an excellent initiative given the high levels of pesticides applied by many farmers in Vietnam. A well conducted IPM program providing advice on maximising yields and reduced pesticide use can have major positive financial and environmental outcomes.

The use of large amounts of pesticides can result in accumulation in ground and surface water causing impacts upon plants and animals and people, (particularly as boiling will not render pesticide contaminated water safe for human consumption). Furthermore, excessive use of pesticides over time will also result in a build up of resistance in pest populations.

Pest insect populations can be kept low via heavy amounts of pesticide use, however this suppresses populations of animals and birds that might naturally predate on them. In the event of insects building up a resistance to pesticides being used, which periodically occurs, their numbers can bounce back extremely quickly and certainly far more quickly than bird or animal populations that feed on them. This can cause major crop damage in the short term (as occurred in Myanmar in the last decade).

An IPM typically includes consideration of the following:

- A greatly improved understanding of the ecology and biology of pests and the crop itself.
- Monitoring the increase in insect pest numbers. This, combined with an understanding of their life cycles, allows pesticide spraying at the most effective times, reducing the quantities of pesticides required.
- Using different types of insecticides to reduce the likelihood of resistance to any one chemical building up.
- Increasing the numbers of natural predators. One of the side effects of high rates of pesticide use is that insects and other small animals that might otherwise feed on pests are killed. As application rates decline, more of these beneficial animals survive and are able to play a more active role in suppressing insect pests.

The RUDEP IPM program appears to be exhaustive based on the training outline detailed in Table 7 below.

Table 7: Program IPM Training Outline

Week Number	Topics
Week 1	Observations of rice field ecology
Week 2	Investigate rice field ecology; Start insect raising activities
Week 3	Investigate and analyse the rice field ecology; Physiology of young rice
Week 4	Investigate and analyse the rice field ecology; Experiments on cutting rice leaves; Experiments on the impact of pesticides to human health
Week 5	Investigate and analyse the rice field ecology; Development of a mice population; Investigate the insect raising activities
Week 6	Investigate and analyse the rice field ecology; Experiments on the impact of pesticides to roots and capillaries
Week 7	Investigate and analyse the rice field ecology; Physiology of rice at the current stage of the production cycle
Week 8	Investigate and analyse the rice field ecology; Evaluate the risks and consequences of people's farming practices to rice crops; Check the results of the insect raising activities
Week 9	Investigate and analyse the rice field ecology; Main diseases of rice; Check the results of the insect raising activities
Week 10	Investigate and analyse the rice field ecology; Physiology of rice in blossoming and seeding stage of production; Check the results of the insect raising activities
Week 11	Investigate and analyse the rice field ecology; Investigate the life cycle of worms and the feed chain; Check the results of the insect raising activities

Week Number	Topics
Week 12	Investigate and analyse the rice field ecology; Finalise the results of the insect raising activities; Recommend and plan for the final Review Workshop
Week 13	Analyse the reports from farmers for the Review Workshop; Reviewing the IPM activities at the field site
Week 14	Harvest of the demonstration site; Prepare all final reports and review results Make final preparations for the Review Workshop

Table 8: Summary & Recommendations - Pesticide & Fertiliser Management

Activity	Status/Action required
All communes	
<p>High levels of pesticides are applied by many farmers in Vietnam causing ground and surface water quality issues and impacts upon plants, animals and people (particularly as boiling will not render pesticide contaminated water safe for human consumption). Excessive use of pesticides over time will result in a build up of resistance in pest populations. Pesticides also form one of the major costs born by farmers.</p>	<p>The Program has recently launched an Integrated Pest Management (IPM) training program, targeting in the first instance rice growing. The program is an excellent initiative and based on the training outline detailed in Table 7 appears to be exhaustive. Care should be taken to ensure that it is successful amongst the initial group trialling the scheme to promote uptake by other groups. This is important as IPM requires good attention to detail such as monitoring animal, bird and insect numbers as pesticide use is reduced in order to be successful. The IPM program could be extended to considering the effects of excessive fertiliser application. Excess fertiliser can migrate to deeper strata of soil and reach ground water and rivers and cause 'eutrophication' in rivers (increased aquatic plant growth and reduced amounts of Dissolved Oxygen (DO) being available for fish). Fertilisers such as nitrate and phosphate can accumulate in soils, altering its physical and chemical composition, causing it to become more acid, compact, and porous.</p>

6.4 Power Lines and Electrical Transformers

The Program has constructed a 1.1 km long, 15kV overhead power line and transformer in Tinh Tho commune. The power line distributes electricity to hamlets that were previously without power, with the transformer enabling the 15kV power to be stepped down to 0.4kV voltage suitable for domestic use. It is understood that the main reason for the power supply is to provide households with electricity for domestic use.

The route of the power line is across irrigated fields, and required little or no vegetation clearance. The supports for the pylons were furthermore constructed from prefabricated concrete sections, avoiding the requirement for any concrete mixing in the field. The proposed location for the transformer is in an area currently under cultivation that according to commune personnel does not flood during the wet season.

It is understood that the transformer oils with the transformer unit do not contain Poly chlorinated Biphenyls (PCBs). PCBs are a carcinogen and tend to bio-accumulate in the environment, and for this reason their use has been phased out in transformers and electrical switchgear in most developed countries. The transformer in the Tinh Tho commune had a concrete wall and concrete floor around it, safeguarding against any oils that might escape from leaks reaching ground or water receptors.

Power Lines and Electrical Transformers

A number of environmental issues exist with respect to infrastructure items such as power lines and transformers. These relate principally to the requirement to clear small amounts of native vegetation and habitat for their construction, safety issues associated with relatively high voltage electricity, construction related issues to do with the potential for soil and cement residues to enter watercourses, and the potential for leakage of transformer oils with corrosion of transformer units over time.

Table 9: Summary & Recommendations - Power Lines & Electrical Transformers

Activity	Status/Action required
All communes	
<p>Installation of power lines may involve vegetation clearance. Supports for the pylons are furthermore constructed from concrete and concrete mixing in the field can give rise to residues reaching water and causing localised impacts on fish and plants.</p> <p>Transformer oils can contain Poly chlorinated Biphenyls (PCBs). PCBs are a carcinogen that bio-accumulates in the environment, causing harm to animals and humans. For this reason their use has been phased out in transformers and electrical switchgear in most developed countries.</p>	<p>The Program should ensure that vegetation clearance is minimised when installing power lines and electrical transformers. Prefabricated concrete should be used where possible to avoid the need to mix concrete in the field.</p> <p>Concrete walls and concrete floors should be constructed around transformers to safeguard against any oils that might escape from leaks reaching ground or water receptors.</p> <p>The Program should ensure that transformer oils do not contain PCBs.</p>

7 Program Environmental Management Procedures

7.1 Adequacy of Environmental Management Procedures

PEMM, EMGs and EIAC

The Preliminary Audit resulted in an update to the PEMM, the EMG's and EIAC to make them relevant to Program activities at the time. As the Program is now working with an increased number of communes however, the PEMM, EIAC and EMGs required update. The following additions have been made:

- A Program Environmental Planning Process has been prepared that provides a four step approach to the assessment and ongoing management of all proposed Program activities. (Refer 7.1.2 - Program Environmental Planning Process).
- Given the discovery of pesticide contamination at the Duc Phong kindergarten site, a new EMG - EMG 13 has been prepared outlining the steps to follow regarding potentially contaminated sites, including advice on sampling and waste disposal/remediation as applicable.
- The title of EMG 6 has been changed from 'Dust control' to 'Air quality' and advice regarding asbestos and cyanide risk associated with cassava production added to it.
- Integrated Pest Management has been referenced in EMGs 4,7,8 and 11.
- An Action Plan document has been prepared set out on a Commune by Commune basis to make it easier for the IEO to use to keep track of status of environmental issues.

Table 10: Summary & Recommendations - PEMM, EMGs and EIAC

Activity	Action required
Program Issues	
Requirement for a clearly coordinated process of environmental planning for all Program activities.	A Program Environmental Planning Process has been prepared that provides a four-step approach to the assessment and management of Program activities. (Refer 7.1.2 - Program Environmental Planning Process).
The Program does not have an Environment Policy setting out those activities that it regards as acceptable.	A Program Environmental Policy needs to be generated by the PMU with guidance from the Environmental Specialist and will then form part of the Program Environmental Planning Process (Section 7.1.2).
The possibility exists for communes to wish to redevelop a contaminated site to a new use (eg a site formerly used for storing pesticides to a kindergarten).	Sites historically used for storage of chemicals, fuels and pesticides should be avoided when choosing suitable sites for sensitive uses such as a kindergarten, health centre or well. (Refer to updated EIAC and new EMG 13 for guidance on managing contamination).
Requirement to not use asbestos containing products and highlight risks associated with cassava production.	The title of EMG 6 has been changed from 'Dust control' to 'Air quality' and advice regarding asbestos and cyanide risk associated with cassava production added to it.
It is not easy currently to track the status of environmental work being carried out at the communes.	An Action Plan document has been prepared. This is set out on a Commune by Commune basis to make it easier for the IEO to use for planning activities required and keeping track of status. The IEO should send a copy of the Action Plan to show progress to the Australian Team leader and the Environmental Specialist as required.
A number of EMGs need to reference the new IPM program.	IPM has been referenced in EMGs 4,7,8 and 11.

Program Environmental Planning Process

Improving the livelihoods of communes is one of the principal aims of the Program. It remains important however to ensure that activities designed to bring this about do not result in significant adverse impact on the environment. The way the Program considers communes proposals could be improved by formalising the Environmental Planning Process.

A suggested approach when considering proposals from communes and when introducing new activities is outlined in Table 10. Of foremost importance is ensuring that income generation or infrastructure activities do not give rise to clearance of 'valued habitats' (*Refer Section 2.4, Environmental Scoping Study for definition of these*). It is suggested therefore that all Program activities, but most specifically those involving widespread agricultural land use change consider the four key steps set out in Table 10.

Table 10 refers to the process when a development is acceptable to the Program and receives approval. (In the event that a proposal did not meet with Program approval, the Draft Plan would be rejected at Stage 1. Stages 2, 3 and 4 would not therefore be required).

The EIAC can be consulted for further information on likely issues associated with a proposed development or activity. (Steps 2, 3 and 4 in Table 10 furthermore correspond to the Planning, Implementation and Operational phases as set out in the EIAC).

Table 11: Program Environmental Planning Process

Steps	Step breakdown	Important considerations
All communes		
1. Draft Plan submitted by commune for consideration by PMU (eg. a parcel of land is designated for change/development)	<ul style="list-style-type: none"> PMU review Draft Plan Problem Census/Problem Analysis/Problem Solving carried out PMU decides whether Draft Plan of activity meets RUDEP environmental (& economic/social) objectives as set out in the PEMM, Program Environment Policy & <i>Environmental Impact and Management Issues Scoping Study, Dec 2001</i> Draft Plan if approved is then implemented by the activity groups 	Does it result in the destruction or loss of any valued habitats? If valued habitat is to be impacted upon then, where practical, alternative locations for the activity should be sought. 'Valued habitats' are defined in <i>Section 2.4, Environmental Scoping Study</i>)
2. Environmental Impact Assessment - 'Planning' Phase	<ul style="list-style-type: none"> PMU looks at issues associated with the new activity and decides best way to design/plan activity to minimise environmental impact using EIAC 	Examples: <ul style="list-style-type: none"> The route of a road should involve minimum disturbance of valued habitats such as forest Health centres, or kindergartens should where possible avoid locations formerly used for storage of chemicals, fuels or pesticides Establishment of a new agricultural activity should avoid the most steeply sloping land adjacent to watercourses
3. 'Implementation' Phase	Once a decision has been made to develop or change the use of a piece of land, appropriate practices need to be followed when establishing the land for its new use	Examples: <ul style="list-style-type: none"> Where possible retain mature trees. When burning off, fires should allow animals to escape Mulch, ground cover or contour bunding should be established on steeply sloping land to safeguard against erosion

Steps	Step breakdown	Important considerations
		<ul style="list-style-type: none"> Remediation/removal of any contamination present should be undertaken if site being redeveloped to a sensitive end use (eg kindergarten)
<p>4. 'Operational' Phase</p>	<p>Once the land is established for its new use, appropriate practices need to be followed to maintain the fertility of the land and safeguard the health of people and the broader environment over time</p>	<p>Examples:</p> <p>Fertilisers: Appropriate amounts of fertiliser for the crop being grown should be applied so that it is absorbed by crops. (<i>Refer Tables 21 & 22, Environmental Scoping Study for appropriate fertiliser application rates</i>)</p> <p>Pesticides: Reduced pesticide use should be encouraged as part of an IPM program of This will prevent insects building up resistance to pesticides and safeguard human and animal health whilst reducing pesticide costs to farmers. (See Table 8 for Pesticide & Fertiliser Management)</p>

7.2 Uptake and Use of Environmental Management Procedures

Further to the adequacy of those environmental procedures in place, a number of improvements could be made to improve understanding and use of environmental procedures by Program personnel. These include the following:

- The IEO is using the correct EMGs for items of infrastructure activity being undertaken by the Program, however recommendations within them need to be acted upon. Construction related activities should for example be put into contract documents for contractors as requirements for them to adhere to.
- The IEO should establish more contact with representatives from the DNRE and maintain regular email communication with the Environment Specialist, on say a monthly basis. The Environmental Action Plan template prepared as part of the new PEMM would be a useful means of keeping the Environment Specialist up to date with Program environmental management without adding to the IEO's time.
- Currently the environment role is the principal responsibility of the IEO. This was based on the fact that most environmental issues were thought to be associated with infrastructure works when the post was created. The main environmental issues associated with Program activities however lie beyond the construction based impacts of infrastructure works that the IEO currently tends to review. Instead they relate to landscape change via new income generation opportunities that infrastructure works allow for, such as a new road making establishment of a new crop viable in a particular area for example. The IEO does not currently review these more far-reaching effects and is not assessing Program income generation activities at all.

Ensuring that the environmental impacts associated with infrastructure works and income generation activities are taken into account when deciding on the viability of a Draft Plan does not require a background in engineering. Rather it relies on having a good understanding of what the communes propose to use a new road for, or what the impacts of a new crop will be on a particular area. On this basis, and given the high workload of the IEO, it is recommended that the environment role be given to the DDOs. Greater involvement of the DDOs in the process of decision making regarding

Draft Plans would mean they took greater ownership of the process and were in a better position to give feedback to the CPC regarding Draft Plans. It would also mean that they were available to review route selection for roads, construction practices being followed by contractors etc on the ground, which is difficult for the IEO to do given the distance of many of the communes from Quang Ngai town. This situation will only become more difficult as the number of communes the Program works with increases.

- If this recommendation is accepted, the next input from the Environment Specialist should involve the delivery of a training package to the DDOs. This would include but not be restricted to learning the principles of environmental management, applicable Vietnamese laws, Program procedures, including the Environment Policy, knowledge of endangered species in Quang Ngai province for input into the Program Environmental Planning Process and the details of regulatory authorities that the DDOs should liaise with. (The DDOs would need to work closely with DPI for example to ensure that land use planning minimises primary forest clearance for agricultural use; and that crops selected take into account land capability).

The course could also usefully be combined with a refresher course on IPM, extended to include information on suitable fertiliser application rates for given crops to safeguard against environmental impact.

Table 12: Summary & Recommendations Uptake & Use of Environmental Management Procedures

Activity	Action required
Program Issues	
The IEO is using the correct EMGs for items of infrastructure activity being undertaken by the Program, however checks are not occurring as to whether these are being acted upon by contractors etc.	Construction and maintenance related activities should for example be put into contract documents for contractors as requirements that they adhere to.
The IEO is concentrating on assessing the potential impact of infrastructure activities on the environment and not to be assessing the potential of income generation aspects of the program to cause environmental impacts.	All Program activities should be assessed for their potential to cause impacts on the environment at the planning, implementation and operational phases. IEO should submit an Environmental Action Plan on a monthly basis to the Environmental Specialist for assistance/review.
Currently the environment role is the principal responsibility of the IEO. The main issues associated with infrastructure works however lie beyond the immediate construction based impacts of such works. Instead they relate to the opportunity for income generation that infrastructure works provide, such as road access making establishment of a new crop viable in a particular area.	It is recommended that the environment role be given to the DDOs. Greater involvement of the DDOs in the process of decision making regarding Draft Plans would mean they took greater ownership of the process and were in a better position to give feedback to the CPC regarding successful or unsuccessful Draft Plans. It would also mean that they were more easily able to review route selection for roads, construction practices being followed by contractors etc. This is difficult for the IEO to do given the increasing number of communes being worked with.
Given the time constraints and location if the IEO in Quang Ngai town, the environment role would be better handled by the DDOs.	The DDOs should attend an environmental training course, including: Environmental management, Vietnamese laws, Program procedures, knowledge of endangered species in Quang Ngai, contacts within the regulatory authorities, land capability, fertiliser application rates and IPM.

8 Conclusions and Recommendations

8.1 Background

This report sets out the findings of the second Environmental Audit (the 'Audit') of RUDEP Program activities (the 'Program') by the Environmental Specialist in over the period 8-19 December 2003.

The Program is now working with a total of 9 communes, (as compared with 3 communes at the time of the Preliminary Environmental Audit in March 2003). Furthermore, the Program intends to assist an increasing number of communes, taking on new communes in a series of 'Cycles' comprising 3 communes per Cycle. To date the Program has undertaken work at three Cycle 1 communes, (referring to the first communes worked with), and three Cycle 2 communes. To date no activity has taken place at the three Cycle 3 communes other than the Program supervising the construction of a number of ASAS wells at one Cycle 3 commune.

Audit visits were conducted by the Environmental Specialist accompanied by the IEO to each of the three Cycle 2 Communes working with the Program as well as the Cycle 1 commune of Duc Phong to assess a pocket of localised pesticide contamination discovered there. The Audit visits were carried out to assess the potential for environmental impact arising from Program activities, and to determine the adequacy and scope of the EIAC and EMGs in mitigating these impacts via a combination of planning, implementation and operation based controls.

Further to the Audit visits, desk top reviews of Cycle 1 Commune activities, and discussions with Program personnel also took place.

As a result of the Audit, recommendations have been made relating to Program activities and advice concerning any new issues has been incorporated into revised EIAC and EMGs. These have been added to an updated PEMM contained in Annex 1 to this report.

8.2 Overall Program Performance

The Program has performed well since the last Audit in terms of adherence to the range of environmental procedures in place and the recommendations made in the Preliminary Audit report. Furthermore, it has introduced positive initiatives such as the Integrated Pesticide Management program that will have major environmental benefits for agricultural activity.

There are however several areas where further improvements can be made. These include:

- Recommendations made during the Preliminary Audit that still require follow up;
- Additional recommendations as a result of the second environmental Audit; and
- Suggested changes to improve the uptake and use of Program environmental management procedures.

Furthermore, this report contains suggested improvements to the adequacy of environmental management procedures in place to cover the increased scope of Program activities. The Program will be audited against these at the time of the next Environmental Specialist input.

8.3 Outstanding Preliminary Audit Recommendations

- *In accordance with the Program's well sampling program, all new wells are to be sampled in the dry season and tested against the Vietnamese standard for drinking water, as set out in Ministry of Health Decision 505/BYT/QD (1992) and the Vietnamese water quality standards, published by MOSTE.*
- *Any new wells should be situated away from sanitation facilities and animals. The rule of thumb is at least 20 metres distance from latrines, animal pens and buffalo wallows where possible.*
- *The interior surfaces of asbestos roofs should be painted. Tin or other safe material should be used for roofing in all Program funded buildings.*
- *The IEO specified in contractor documents that approved Program practices be followed. The IEO or DDOs should undertake visits to review practices being followed by contractors to ensure they comply with Program requirements.*
- *A number of roads have experienced major erosion since the Preliminary Audit. Erosion control measures must be put in place in all roads, including cross drains and catch banks to reduce flows down steep sections of road, culverts to allow cross flows to take place and roadside stabilisation involving the use of wooden stakes, mulch cover, and establishment of vegetation.*

8.4 Second Audit Recommendations

Commune Specific Recommendations

- During the visit to Nghia Tho commune it was noted that a number of new ASAS wells were situated adjacent to existing wells (that were apparently unreliable in the dry season). Due to the proximity to the new ASAS wells, these old wells should be covered to prevent potential cross-contamination of the new wells.
- Water samples are to be taken from all new wells established (taken in the dry season and tested against the Vietnamese standard for drinking water).
- The proposed road linking Pho Chau commune with the highway requires clearance of native vegetation for its construction. The fact that it is steeply sloping however gives rise to the potential for erosion. Mature trees should where possible be avoided when clearing the route of the road, and any mature shrubs or saplings needing to be moved should be replanted on adjacent land. Toe drains, cross drains and catch banks should be put in place on the new road and the feeder road it links with to reduce erosion risk.
- Construction practices for the proposed dam in Pho Chau should ensure that rubbish such as cement bags are not allowed to enter the stream where they have the potential to smother plants and fish. If nets are put on the dam overflow to catch fish, the diameter of the mesh should be sufficient to allow immature fish to pass through.
- Construction practices for the proposed diversion channel at Nghia Tho should ensure that cement and hydrocarbon residues are not allowed to reach the river from washing of tools, plant and equipment. Care should be taken to restrict the movement of soil into the river channel where it can smother fish and plants.
- A localised area of BHC (DDT based) residual pesticide contamination is present on the proposed site of the Duc Phong kindergarten. Given the sensitive end use of the site, soil from the hot spot (to a depth of 30cm below the existing level of the base of the void and to a distance of a metre around where it was seen) should be taken for disposal to landfill to ensure that any remaining contamination is removed. The area where soil was formerly stockpiled when digging the foundations for the building

should be scraped and backfilled into the void such that it is encapsulated beneath the building foundations. A grab sample should be taken from the nearby bore and analysed in 12 months time to ensure that no residual DDT is seeping into it.

- The cassava production facility in Son Hai although not a Program responsibility should adhere to the correct techniques when processing cassava. Cassava requires careful, quick processing in order to safeguard against chronic health problems associated with naturally occurring cyanide. Processing should occur in a well ventilated area with drying, soaking, rinsing or baking of the cassava to reduce cyanide containing linamarin levels.
- As cassava has a natural inbuilt resistance to pests, the Program should ensure that any advice to the Son Hai commune stresses the principles of IPM, involving targeted, small amounts of pesticide use.
- The Program has recently launched an Integrated Pest Management (IPM) training program, targeting in the first instance rice growing. The training program is an excellent initiative and based on the training outline (detailed in Table 7) appears to be exhaustive. A successful IPM program can prevent insects building up resistance to pesticides, save farmers money and has a range of other environment and human health benefits. The IPM program could usefully be extended at some stage to include the effects of excessive fertiliser application. Excess fertiliser can cause 'eutrophication' in rivers killing fish and alter the physical and chemical composition of soil causing it to become more acid and porous.

Environmental Management Procedure Recommendations

- A Program Environmental Planning Process has been prepared that provides a four-step approach to the assessment and ongoing management of all proposed Program activities. (Refer 7.1.2 - Program Environmental Planning Process).
- A Program Environmental Policy needs to be generated by the PMU. This will then form part of the Program Environmental Planning Process (Section 7.1.2).
- Given the discovery of pesticide contamination at the Duc Phong kindergarten site, a new EMG - EMG 13 has been prepared outlining the steps to follow regarding potentially contaminated sites, including advice on sampling and waste disposal/remediation as applicable.
- The title of EMG 6 has been changed from 'Dust control' to 'Air quality' and advice regarding asbestos and cyanide risk associated with cassava production added to it.
- Integrated Pest Management has been referenced in EMGs 4, 7, 8 and 11.
- An Action Plan document has been prepared set out on a Commune by Commune basis to make it easier for the IEO or DDOs to use to keep track of status of environmental issues. The IEO should submit an Environmental Action Plan on a monthly basis to the Environmental Specialist for assistance/review.
- Longer term it is recommended that the environment role be given to the DDOs. Greater involvement of the DDOs in the process of decision making regarding Draft Plans would mean they took greater ownership of the process and were in a better position to give feedback to the CPC regarding successful or unsuccessful Draft Plans. It would also mean that they were more easily able to review route selection for roads, construction practices being followed by contractors etc. This is difficult for the IEO to do given the increasing number of communes being worked with.
- If the principal on-ground environment role is to be given to the DDOs, the next input from the Environment Specialist should involve the delivery of a training package to

them. This would include but not be restricted to learning the principles of environmental management, land capability, applicable Vietnamese laws, Program procedures, including the Environment Policy, knowledge of endangered species in Quang Ngai province for input into the Program Environmental Planning Process, details of regulatory authorities that the DDOs should liaise with, suitable fertiliser application rates and IPM.

Annex 1

Program Environmental Management Manual

QUANG NGAI RURAL DEVELOPMENT PROGRAM (RUDEP) - PHASE 2

Program Environmental Management Manual
January 2004



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Limitations Statement

URS Australia Pty Ltd (URS) has prepared this report for the use of Australian Agency for International Development (AusAID) in accordance with the scope of work and for the purpose outlined in the Quang Ngai Rural Development Program (RUDEP) – Phase 2 Contract between URS and AusAID.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

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Annex 1: Environmental Action Plan (EAP)

Acronyms

AEZs	Agro-Ecological Zones
ATL	Australian Team Leader
AusAID	Australian Agency for International Development
CCG	Commune Contact Group
CPC	Commune People's Committee
DARD	Department of Agricultural and Rural Development
DCG	District Contact Group
DDO	District Development Officer
DOSTE	Department of Science, Technology and Environment
DPI	Department of Planning and Investment
DPC	District People's Committee
EAP	Environmental Action Plan
EIA	Environmental Impact Assessment
EIAC	Environmental Impact Assessment Checklist
EI&MI	Environmental Impact and Management Issues (for RUDEP)
EMGs	Environmental Management Guidelines
EMP	Environmental Management Plan
E&NRM	Environmental & Natural Resource Management
EPA	GOA - Environment Protection Act, 1974
EPBC	Environment Protection and Biodiversity Conservation Act, 1999
EPL	GOV - Law of Environmental Protection 1993
GOA	Government of Australia
GOV	Government of Viet Nam
IEO	Infrastructure and Environment Officer
IPM	Integrated Pesticide Management
LUC	Land use certificate
MOSTE	Ministry of Science, Technology and Environment
NGOs	Non-Governmental Organizations
PDA	Participatory Development Adviser
PEMM	Program Environmental Management Manual
PEPP	Program Environmental Planning Process
PMU	Program Management Unit
PPC	Provincial People's Committee
PCPAPS	Problem Census/Problem Analysis/Problem Solving
RUDEP	Quang Ngai Rural Development Program
SS	Scoping study (for RUDEP)
VTL	Vietnamese Team Leader

1 Introduction

The objective of the Program Environmental Management Manual (PEMM) is to promote awareness of the principles of environmental management and sustainable development within the Quang Ngai Rural Development program (RUDEP) by setting out the way in which Program activities are to be managed.

Its overriding objective therefore is to provide a framework for the management and protection of the environment of Quang Ngai with regard to the activities and subprojects that are implemented under the Program and to assist Program staff, (particularly the Program Management Unit [PMU]) to avoid and mitigate any negative environmental impacts that Program activities and subprojects might otherwise have.

It is designed to be used as guidance for Program activities and subprojects that require changes in land use or construction of infrastructure. In some cases this may mean that activities require approval through Government of Vietnam (GOV)'s formal environmental impact assessment (EIA) and approvals process. It will provide a straightforward process by which PMU and Infrastructure & Environment Officer (IEO) can assess the environmental impact of activities and subprojects, identify mechanisms to minimise or avoid negative impacts and to develop an environmental management plan (EMP) to implement and monitor these mechanisms.

The PEMM sets out the environmental procedures to be followed when planning and carrying out all Program activities. These ensure compliance with the guiding principles of the Program which are to comply with the Government of Australia's (GOA) environmental obligations. These are principally set out in the following sources:

- The Environment Protection and Biodiversity Conservation Act, (EPBC Act), 1999.
- AusAID publication, 'Australian Aid: Investing in Growth, Stability and Prosperity', 2002.
- AusAID's obligations under its *Ecologically Sustainable Development Policy* and the raft of Government of Viet Nam (GOV) laws, regulations and decrees that comprise the Environmental Protection Law (EPL).
- Other applicable Vietnamese laws and regulations, and good environmental practice, including good practice relating to Program activities with the potential to result in environmental health issues.

1.1 Structure of the PEMM

The PEMM outlines the way in which all Program activities are to be assessed and carried out. The process contained in the PEMM assists in identifying environmental issues, and includes guidance on how to address them, as well as providing recommendations as to where further action may be required. By following this set process, the Program aims to safeguard against significant environmental harm occurring either directly or indirectly as a result of any Program activities. The structure of the PEMM is as follows:

- **Section 2 Environmental Management** – Provides background on the purpose of environmental management, including an introduction to the principal environmental issues facing the Program.
- **Section 3 The Program Environmental Planning Process (PEPP)**. The PEPP is a 4 phase process for assessing and managing the impacts of all Draft Plans and Program activities. The process includes review of Draft Plans for compliance with the Program

Environment Policy; designing the best way to plan and implement approved activities to minimise environmental impact via use of the environmental impact assessment checklist (EIAC), and the Environmental Management guidelines (EMGs) that it references; and appropriate practices to be followed to maintain the suitability of the land for its new purpose once new activities have been established.

- **Section 4 The Program Environment Policy** – This sets out the Environmental Vision, Objectives and Principles of RUDEP. All proposals/Draft Plans requesting Program assistance must be comply with the requirements of the Environment Policy as a minimum requirement.
- **Section 5 Environmental Impact Assessment Checklist (EIAC)** – The EIAC tables provide guidance on the likely impacts of a range of current Program activities at the Planning, Implementation and Operational Phases. Further information/guidance relating to the range of activities are set out in Environmental Management Guidelines (EMGs).
- **Section 6 Environmental Management Guidelines (EMGs)** – Provide additional information relating to the range of activities set out in the EIAC. The EIAC references the relevant EMG to use to manage a given issue.
- **Section 7 Environmental Management Plan (EMP)** – An EMP is a project-specific activity plan designed to minimise the negative impacts associated with a sub-project or activity identified in the EIA process. Normally the EMP will simply reference relevant recommendations made in the EIAC and EMGs and how these apply to the management of any environmental issues associated with the sub-project or activity.
- **Annex 1 Environmental Action Plan (EAP)** – The EAP is a listing of all Program environmental issues as identified during the Preliminary and Second Environmental Audit visits by the Environmental Specialist. The EAP is simply a table listing these issues and their status and is listed as an Annex as will require constant update.

2 Environmental Management

2.1 Background

All developments and related activities, including rural development programs, will have some negative impacts on the environment, and it is not possible to avoid all these impacts. The purpose of reviewing a Draft Plan against the RUDEP Environment Policy and carrying out an EIA in advance of any proposed development is to ensure that any potential negative impacts are identified. Impacts must be identified before they can be managed.

There are many reasons for undertaking environmental management, including the legal requirements for environmental protection in Viet Nam, however the main reason is that if proper management negative impacts can be minimised, mitigated or avoided.

Most infrastructure developments are designed to alter existing social conditions (especially in areas of poverty or poor health), and to have positive environmental impacts. Upgrading of existing commune and district facilities or construction of facilities may have positive social and cultural impacts but may also incur some negative environmental impacts if measures to reduce environmental effects are not incorporated into the designs. Aspects such as better control of drainage, sewage disposal, erosion and sediment control fall into this category. Such positive impacts should also be taken into account during an environmental assessment in the planning stage of a development.

Similarly the main environmental issues associated with Program activities lie beyond the construction based impacts of infrastructure works. Instead they relate to landscape change via new income generation opportunities that infrastructure works allow for, such as a new road making establishment of a new crop viable in a particular area for example.

2.2 Potential Impacts of Program Activities

One of the main aims of the Program is to introduce means by which communes can generate additional income from changing and improving current agricultural practices and introducing or improving infrastructure. In general terms, the biggest long term environmental effects that encouraging these activities is likely to have relate to the following possible scenarios:

- That people are likely to farm larger areas due to increased access to resources, technology, improved infrastructure and markets.
- That those areas they do farm are likely to be more intensively farmed due to improvements in access to resources, technology, infrastructure and markets, which is likely to place a greater emphasis on additional pesticide and fertiliser inputs.

In order to ensure that these potential impacts are mitigated, alternative agricultural practices and crops better suited to the capability of the land and natural environment need to be encouraged to generate greater incomes for less net environmental impact.

This will represent the best outcome from an environmental standpoint, especially if it can be achieved without the requirement for large, potentially damaging fertiliser and pesticide inputs. The reality however is more likely to represent a combination of these scenarios and it will therefore be important to ensure that Program support of all Income Generation and Infrastructure activities uses the process set out in the PEMM.

RUDEP will therefore involve activities that generally incur small-scale and localised impacts. However, it will be important that RUDEP meet some basic criteria in order to minimise impacts. For example:

- RUDEP will generally exclude activities and subprojects that will require relocation of existing housing.
- RUDEP will require clear land use rights (and LUCs) over any land on which any new infrastructure is to be constructed. Uncertainty in land or infrastructure ownership will exclude a commune from participation in the Program.
- Other environmental impacts normally associated with land use change and infrastructure development include:
 - accelerated erosion and sediment mobilisation due to clearing vegetation;
 - damage to vegetation due to extraction of local timber for building purposes;
 - contamination of ground water or stream catchments due to inadequately designed septic tanks or inappropriately located pit toilets, and pollutants from construction sites;
 - development disrupting local drainage flows; and
 - impacts of quarry/materials extraction sites.

Environmental impacts, including those identified above, will be identified for each activity and subproject through the environmental management process i.e. EIAC and EMP. EMGs will be incorporated into activities and works to avoid or minimise these impacts.

These impacts can be identified and managed effectively with appropriate environment management planning. RUDEP has facilitated this planning process by:

- Raising awareness of environmental issues by incorporating environmental management planning processes into RUDEP activities and training of communes.
- Encouraging communes to anticipate and mitigate the adverse effects, and to plan for maximising the opportunities for environmental betterment.
- By developing a straightforward process by which PMU and RUDEP can meet their environmental planning responsibilities, including:
 - Development of a standard RUDEP EIA Checklist for use on sites identified for construction of new or upgrading of existing infrastructure or any marked/significant change or intensification of land use. The RUDEP would carry out a rapid environmental assessment of the subproject by completing this checklist during the project planning phase.
 - Development of generic environmental management guidelines addressing environmental issues highlighted by the EI&MI Scoping Study.
 - Preparation of simple guidelines to prepare the project EMP and incorporation of EMPs into project documentation.
 - Delegating RUDEP the responsibility of monitoring the compliance of contractors with, and effectiveness of, environmental requirements.

Awareness of Environmental Sensitivity

Some landscapes or ecosystems are more fragile, or vulnerable to damage than others, and require special or active protection to avoid damage by activities. Such landscape elements are commonly described as being environmentally (ecologically or culturally) sensitive. A few such areas in Viet Nam have been set aside as conservation areas (national parks,

biodiversity areas or wildlife management areas) but many other sensitive areas have no such protection. These include:

- Habitats abundant with wildlife, or habitats of endangered species (undisturbed or only slightly disturbed forests, wetlands or swamps, coastal systems including mangroves or other coastal forests, wetlands and swamps, sandy beaches, small low islands, coral reefs, shallow near shore marine areas of coral, sand or seagrasses).
- Volcanic areas, areas of limestone karst.
- Places of great scenic beauty.
- Archaeological sites (whether recorded or not).
- Sites of cultural significance to local people (particularly ethnic minorities).
- Catchments of rivers supplying drinking water, and areas contributing to groundwater or groundwater lens recharge - mainly limestone areas in the mountainous AEZ and sandy surfaces on lowland AEZ.

Environmentally (ecologically or culturally) sensitive areas, including those identified above, will be identified through the environmental management process i.e. EIAC and EMP. EMGs will be incorporated into activities and works to avoid or minimise damage to these environments.

2.3 Description of RUDEP's Environmental Responsibilities

GOV and AusAID environment policy aims to ensure that its activities are designed to promote sustainable development and environmental protection by mitigating possible adverse impacts on the environment. A number of components of RUDEP have the potential to cause local environmental impacts. For example, intensification of land use (or marked changes in land use practices), the construction of roads and buildings, provision of a water supply and sanitation systems, and extraction/quarrying/harvesting of materials.

Vietnamese Requirements

A large number of laws and regulations make up GOV environmental policy. 29L/CTN - Law on Environmental Protection [EPL] (January 1994) provides the basic framework for environmental management and protection in Viet Nam. This is supported by a number of other decrees:

- Decree N^o. 175-CP - guidelines for implementation of EPL.
- Circular No. 490-TT-BK - guidelines on preparation and appraisal of environmental impact assessment (EIA).
- Directive N^o. 36-CT/TW - environmental protection.
- Decree N^o. 26/CP - enforcement and punishment.

All projects must follow the process established under the EPL:

- *Application for investment license* - for No. 1 type projects this includes the submission of documentation that sets out the potential impacts of the project (to be appraised by relevant state agencies), and for No. 2 type projects requires the submission of the registration form and technical and economic feasibility report. On approval, an investment license is issued.
- *Design stage* - No. 1 type projects prepare and submit the EIA report and technical and economic feasibility report.
- *Completion stage* - prior to operation relevant agencies coordinate regarding the issuance of construction licenses, inspections and stipulation of environmental standards, and approvals and certifications by the environmental standards registration board. Once all of these processes have been completed the relevant environmental license is issued.

Australian Requirements

AusAID has a legislative requirement under the *Environmental Protection Biodiversity Conservation Act 1999* (EPA) to ensure that all matters affecting the environment to a significant extent are fully examined and taken into account. 'Significant' in the context of the Act is defined as *an important or notable effect on the environment*. The Act is administered by the Environmental Protection Agency.

Sustainability is at the heart of AusAID's goal of reducing poverty and it requires the integration of economic, environmental and social considerations in the delivery of the development cooperation program.

Thus, the Program must be designed in such a way as to prevent or mitigate possible adverse impacts on the environment. The publication *Environment Assessment Guidelines for Australia's Aid Program* sets out AusAID's mechanism for ensuring that environmental screening and assessment occurs in every project, and these Guidelines have been taken into account in preparation of the PEMM and EMGs, which have also been based on previous AusAID projects for similar development for example Papua New Guinea's Basic Education & Curriculum Materials Program (1999).

Overall Program Responsibilities

Under the Program it is proposed that activities and subprojects are planned and implemented by the PMU with assistance (as required from Department of planning and investment (DPI), Department of Science, Technology and Environment (DOSTE) and other line agencies for example, PDOT for road subprojects and DARD for agriculture projects), and carried out by the Commune People's Committees (CPCs), local contractors under the supervision of the PMU with advice from the RUDEP and DDOs.

Within this context it is the responsibility of the PMU and RUDEP to:

- Carry out environmental assessment as part of the PEPP using the EIAC and EMGs.
- Submit the appropriate documentation for obtaining the necessary approvals, permits, licences and environmental standards registration.
- Produce an EMP referencing appropriate guidance documents such as EMGs designed to minimise negative environmental impacts.
- Monitor the effectiveness of the EMP and RUDEP's compliance with the environmental management framework.

It is the responsibility of the DOSTE to:

- Consider sub-project EMPs, and any recommendations, in determining whether to approve the development, and in setting conditions on the approval to avoid or minimise environmental damage.
- Undertake checks during implementation and enforce any conditions of approval.

The responsibility of DPI in the environmental planning process is to advise PMU/IEO, and DOSTE as requested, in responding to the proposed environmental planning guidelines and PEMM.

3 Program Environmental Planning Process

The Program Environmental Planning Process (PEPP), consists of 4 phases. These 4 phases apply to all sites and all types and sizes of activity within the Program. The PEPP involves the following phases are followed:

1. **Review of Draft Plans for compliance with Program Environment Policy.** This phase involves the PMU deciding whether a Draft Plan of activity submitted by a CPC meets RUDEP environmental (& economic/social) objectives as set out in Program Environment Policy. If the Draft Plan is approved it is then implemented by the activity groups and proceeds to the next Planning Phase.
2. **Environmental Impact Assessment (EIA)/‘Planning’ phase.** The PMU looks at issues associated with the new activity and decides best way to design/plan activity to minimise environmental impact using the EIAC.
3. **‘Implementation’ Phase.** Once a decision has been made to develop or change the use of a piece of land, appropriate practices need to be followed when establishing the land for its new use. These are outlined in the EIAC and more detail is provided in relevant EMGs. An EMP is prepared outlining means of mitigating any environmental issues associated with the proposed development.
4. **‘Operational’ Phase.** Once the land is established for its new use, appropriate practices need to be followed to maintain the suitability of the land for its new purpose and safeguard the health of people and the broader environment over time.

Table 1: Program Environmental Planning Process

Phase	Step breakdown	Important considerations
All communes		
1. Draft Plan submitted by commune for consideration by PMU (eg. a parcel of land is designated for change/development)	<p>(a) PMU review Draft Plan</p> <p>(b) Problem Census/Problem Analysis/ Problem Solving carried out</p> <p>(c) PMU decides whether Draft Plan of activity meets RUDEP environmental (& economic/social) objectives as set out in The Program Environment Policy & Environmental Impact and Management Issues Scoping Study, Dec 2001</p> <p>(d) Draft Plan if approved is then implemented by the activity groups</p>	Does it result in the destruction or loss of any valued habitats? If valued habitat is to be impacted upon then, where practical, alternative locations for the activity should be sought. ‘Valued habitats’ are defined in <i>Section 2.4, Environmental Scoping Study</i>)
2. Environmental Impact Assessment - ‘Planning’ Phase	<p>(a) PMU looks at issues associated with the new activity and decides best way to design/plan activity to minimise environmental impact using EIAC</p> <p>(b) The IEO and DOSTE will highlight major environmental issues using the EIAC. IEO to carry out any action items identified</p>	<p>Examples:</p> <ul style="list-style-type: none"> • The route of a road should involve minimum disturbance of valued habitats such as forest • Health centres, or kindergartens should where possible avoid locations formerly used for storage of chemicals, fuels or pesticides • Establishment of a new agricultural activity should avoid the most steeply sloping land adjacent to watercourses

Phase	Step breakdown	Important considerations
<p>3. 'Implementation' Phase</p>	<p>(a) Once a decision has been made to develop or change the use of a piece of land, appropriate practices need to be followed when establishing the land for its new use.</p> <p>(b) Using the EIA Checklist the IEO will collate any generic environmental management guidelines that correspond to the issues identified during the EIA process. These guidelines along with an EMP summary sheet will form the RUDEP EMP</p> <p>(c) Recommendations within the EMP should be put into project documentation and the EMP attached to all requisite documents. The EMP should state the level of monitoring to be carried out, the responsibility for monitoring, and the remedial activities, which will be carried out if there are any failures of, or non adherence to, the EMP</p>	<p>Examples:</p> <ul style="list-style-type: none"> • Where possible retain mature trees. When burning off, fires should allow animals to escape • Mulch, ground cover or contour bunding should be established on steeply sloping land to safeguard against erosion. • Remediation/removal of any contamination present should be undertaken if site being redeveloped to a sensitive end use (eg kindergarten)
<p>4. 'Operational' Phase</p>	<p>(a) Once the land is established for its new use, appropriate practices need to be followed to maintain the fertility of the land and safeguard the health of people and the broader environment over time</p> <p>(b) IEO to brief relevant personnel (commune participants, contractors etc) on EMGs at initial meetings. IEO to monitor compliance and the effectiveness of environmental protection measures. At subsequent meetings PMU to check and assist IEO in monitoring responsibilities. PMU to report any serious deficiencies to DPI and AusAID</p>	<p>Examples:</p> <p>Fertilisers: Appropriate amounts of fertiliser for the crop being grown should be applied so that it is absorbed by crops. (<i>Refer Tables 21 & 22, Environmental Scoping Study for appropriate fertiliser application rates</i>)</p> <p>Pesticides: Reduced pesticide use should be encouraged as part of an IPM program of This will prevent insects building up resistance to pesticides and safeguard human and animal health whilst reducing pesticide costs to farmers. (<i>Refer RUDEP IPM program</i>)</p>

4 Environmental Policy

The Environmental Policy of the Program is detailed below. The Policy sets out the minimum requirements of the Program.

RUDEP's Environmental Vision

To improve the livelihoods of people in the Quang Ngai District via the provision of assistance that promotes sustainability and that does not result in increased environmental impact.

RUDEP's Environmental Objectives

- To improve the livelihoods of people in the Quang Ngai District via the provision of infrastructure assistance and advice on income generation activities that promote sustainability and do not result in increased environmental impact; and
- To improve the understanding of how important it is to promote sustainable development in the Quang Ngai District, both at a general level and as a result of Program activities to Program staff, counterparts and commune partners alike.

RUDEP's Environmental Principles

To achieve these vision and objectives, the Program has prepared a Program Environmental Management Manual setting out the environmental procedures to be followed when planning and carrying out all Program activities. These ensure compliance with the guiding principles of the Program which are to comply with the following:

- AusAID publication, 'The Environmental Management Guide for Australia's Aid Program', 2003 (outlining steps to be followed in the environmental assessment of Program activities and procedures for managing environmental impacts).
- AusAID publication 'Australian Aid: Investing in Growth, Stability and Prosperity', 2002.
- AusAID obligations under the Environment Protection and Biodiversity Conservation Act, 1999.
- Applicable Vietnamese laws and regulations, and good environmental practice, including good practice relating to Program activities with the potential to result in environmental health issues.

5 Environmental Impact Assessment Checklist

5.1 Introduction

Without proper assessment during the planning phases of a project, it is not possible to take into account the likely environmental consequences of development. EIA requires thinking in advance of any development activity, what the effects on the environment are likely to be, both during the construction phase and in the longer term.

In order to ensure that a proposed development will be sustainable in the long term, it is necessary to carry out EIA procedures as early as possible during the planning phase. Although all developments have some negative environmental impacts, it is usually possible to take steps to minimise these impacts, both in the immediate project area and in the wider area. The steps proposed form the basis of a project EMP.

5.2 Objectives of Environmental Impact Assessment

The aim of the EIA process is to alert the PMU/IEO to consider environmental issues and to keep the negative impacts to an acceptable level, so development under RUDEP is sustainable. This means ensuring there is minimal damage to sensitive environments such as forests, food gardens, rivers, wetlands, karst areas, mangroves, coral reefs, seagrass beds and other coastal and marine areas, to protect landforms and soil cover, and reduce sedimentation of streams, to minimise damage to habitats, to avoid unnecessary damage to archaeological sites and other sites of cultural significance, and to cause minimal social disruption.

There are common principles that guide all EIA policies and methods:

- All beneficiaries (in this case commune and district level), through the wider RUDEP participatory program and IEO, should be involved in the decision-making process;
- The decision-making process should be simple, clear and open, so the reasons for the decision are apparent to all participants; and
- The system should be cost-effective and time-effective. This is achieved by incorporating the EIA process into the preliminary planning phase of activities and subprojects.

5.3 Scope of The EIAC

The EIAC is one of the primary tools in RUDEP's Environmental Planning Process. It has been developed to allow IEO to carry out a rapid local environmental assessment of activities and subprojects, it will draw attention, during the early stages of development planning, to issues or areas where the negative impacts of activities are likely to occur. The information provided by the EIAC will be sufficient for RUDEP, PMU and DOSTE to develop RUDEP *Environmental Management Plan (EMP)*.

5.4 Use of The EIAC

The EIAC directs the attention of IEO towards environmental impacts normally associated with infrastructure and development projects of the type likely to be carried out under RUDEP.

The Checklist requires a simple **'yes'** or **'no'** answer in the **'Applicable?'** Column of the table. A **'no'** answer indicates that the issue is not applicable and there will be no negative impact arising and therefore no further action is required. A **'yes'** answer indicates that an environmentally sensitive site or a negative impact has been identified and that measures to avoid or minimise these impacts must be carried out. A **'yes'** answer will direct DPI to an appropriate action (usually by referring the issue back to the IEO and PMU) or a reference to generic EMGs that will explain the steps necessary to avoid or minimise the negative impacts.

The EIA Checklist, EMGs together form the project EMP. The generic EIA Checklist is set out in Table 2 and the EMGs are set out in Section 6.

Table 2: Environmental Impact Assessment Checklist

This Checklist should be used after the Problem Census/Problem Analysis/Problem Solving phase has been conducted. The identified problems from this process are what inform the draft plan that is considered by the PMU. Once accepted by the PMU, the draft plan is then implemented by the activity groups. The acceptance of the draft plan by the PMU involves an assessment of the proposed income generation or infrastructure activity to ensure that it is consistent with the environmental policy and goals of RUDEP as set out in the PEMM and *The Environmental Impact and Management Issues Scoping Study, December 2001*.

Road & Bridge Construction

Activity Affecting Environment	Impacts on the Environment	Applicable? Yes/No	Main Environmental Issue	Recommended Action	EMG References
Planning Phase					
New track, road or bridge or widening of existing track, road or bridge	Clearance of native vegetation and habitat		Loss of biodiversity	Select alignments and site to avoid areas of undisturbed forest vegetation or areas of known environmental value	3
	Encroachment on historically or culturally significant sites		Cultural impacts for community	Consult with community to avoid these areas. Select alignments to avoid them.	1, 2, 3
	Creation of pathways for disease vectors		Disease spread to humans and animals and plants	Consult with community to safeguard against this if disease is known to be present in a particular area	2, 6
New track/road or widening of existing track/road	Disruption of natural course of river		Affects water communities such as fish, plants and birds	Select alignments to avoid these areas, or ensure that culverts are put in place to allow natural flows	11
	Isolation of communities of plants, animals and fish		Isolation can cause communities to deteriorate and die out	Select alignments to avoid the most valued natural habitats eg undisturbed forest areas	11
	Creation of opportunity for further illegal land clearing activity		Loss of biodiversity	Consult with community to safeguard against this	2, 3
Implementation Phase					
Track/road/bridge construction activity	Increased erosion during construction that enters rivers and streams		Soil and other materials can affect plant, fish and bird communities, via smothering and altering river pH	Ensure that sand and cement is covered or contained and cannot escape into rivers	4, 9

Activity Affecting Environment	Impacts on the Environment	Applicable? Yes/No	Main Environmental Issue	Recommended Action	EMG References
	Noise and dust during construction period		Nuisance to community	Provide safety protection for workers. Limit days and time of construction	2, 4, 5, 6
Bridge construction activity	Temporary disruption of natural flow of river during placement of foundations in or adjacent to river bed/banks		Affects water communities such as fish, plants and birds	Ensure river flow is maintained	4
Storage of road, track or bridge building materials	Soil, sand and cement may enter rivers due to rain or wind		Soil and other materials can affect plant, fish and bird communities, via smothering them and altering river pH	Ensure that sand and cement is covered or contained and cannot escape into rivers	4, 7, 8, 9, 10
Digging of borrow pits for a track, road or bridge	If borrow pits are located in sensitive areas eg steeply sloping areas or near rivers, erosion can occur with borrow entering river		This can cause impacts upon water quality in rivers, making it dirty and smothering plants and fish	Select suitable borrow pits or ensure that erosion control measures are in place Eg earth contour bunds	4, 7, 8, 9, 10
Construction waste generated from track, road, bridge construction	Waste such as cement bags, plastic etc may enter rivers etc. and cause an impact on the environment		They can cause blockages in the river and small amounts of cement etc to enter the river, affecting water quality for humans and fish and birds	Appropriately dispose of wastes	4
Use of heavy plant and machinery	Potential for hydrocarbons to reach river		Impacts on water quality making it bad unsafe to drink and impacts upon fish	Appropriate practices to ensure no wash down of plant in rivers and that fuels and oils are adequately contained	4, 7
Operational Phase					
Track/road use	Noise and dust pollution		Nuisance to certain households in community	Site track/bridge away from sensitive community facilities eg kindergartens if possible	2, 3, 4, 5, 6
Track/road operation	Erosion of soil from roadsides if not revegetated		Soil can wash into local rivers and streams	Maintenance of road and stabilise sides with structures or vegetation	4, 8

Agricultural Activities Changing Land Use

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main environmental issue	Recommended action	EMG References
Planning Phase					
Clearance of natural forest areas for agricultural use	Destruction of native vegetation and habitat		Loss of biodiversity	Try to avoid areas of undisturbed forest vegetation or areas of known environmental value and suggest alternatives	1, 2, 3,12
	Isolation of plant and animal communities either side of cleared areas		Isolation can cause communities to deteriorate and die out	Leave corridors to prevent animals and plants becoming isolated	1, 2, 3,11,12
Clearance of natural vegetation in protected area for agricultural use	Destruction of native vegetation and habitat		Against the Vietnam GOV and AusAid laws and guidelines	Consult with Vietnam regulatory authorities to ensure area being cleared is not protected	3,12
Clearance of natural forest areas for housing associated with newly cultivated area	Destruction of native vegetation and habitat		Loss of biodiversity	Minimise clearance of primary forest vegetation when constructing buildings	3,12
Housing associated with newly cultivated area	Potential for activities associated with housing eg waste and effluent generation to impact upon river and groundwater		Potential impacts on water quality causing impacts on fish communities and potential human health issues	New housing should construct appropriate wells and toilets to safeguard against health and environmental issues	2, 7
Introduction of livestock grazing	Cloven hooped animals can cause accelerated erosion, and change habitat of an area		Reduction in soil fertility and vegetation and fish smothering due to erosion	Selection of appropriate stocking levels on appropriate land units	7, 8, 11
	Potential for ingress of faecal matter to water sources		Potential impacts on water quality from human consumption point of view	House animals at least 20m away from wells and preferably not upslope of them	2, 7
Implementation Phase					
Clearing of natural vegetation areas	Increased erosion once clearance has occurred that may enter rivers		Soil and other material can smother plants and fish and affect bird communities	Make earth contour bunds on steep slopes and leave cleared vegetation as mulch to reduce erosion and encourage regrowth. Clear during dry season	4, 8

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main environmental issue	Recommended action	EMG References
Operational Phase					
Establishment of new crop	Increased erosion of soil if chosen crop is not able to bind soil together or provide sufficient cover. (ie not well suited to the land capability)		Soil may enter rivers, smothering plants and fish and affecting birds	Select appropriate crop for the particular land being cleared	4, 7, 8, 11
	Requirement for additional/high fertiliser application due to loss of fertility through erosion and other means if poor crop selection made		High fertiliser application can cause algal growth in rivers and death of fish and plants through oxygen depletion ('Eutrophication')		
Potential for introducing disease with animals into an area eg cattle and pigs	Potential for introducing disease into local animal populations		Potential for disease into local populations to have adverse effect on health and livelihoods of people	Ensure introduced animals are vaccinated	2
Potential for genetic deterioration of introduced animals if kept within same village	Increased likelihood of disease amongst animals			Inter-village trade of animals to prevent genetic deterioration	2
High pesticide/herbicide application	Impacts upon river quality and deaths of non-pest animals eg insects and birds		Loss of biodiversity and destruction of local habitats. Potential human health issue	Provision of advice on suitable application rates in accordance with IPM program	7, 8, 11
Fertiliser application	Incorrect fertiliser application can change soil composition causing acidity and hardness, and high nutrient levels in rivers		Loss of soil fertility causing loss of income, and potential damage to river ecosystems	Provision of advice on suitable application rates	7, 8, 11
Track/road use to new area	Noise and dust pollution		Nuisance to community	Site track away from sensitive community facilities eg kindergartens if possible	2, 4, 6, 7

Buildings & Minor Infrastructure

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main Environmental issue	Recommended action	EMG References
Planning Phase					
Potential for pesticide, fuel or chemical contamination on site due to previous use	Environmental health issue if site redeveloped to a sensitive end use eg a kindergarten or health centre		Health issue for people and potential impact on birds and fish	Avoid use of site previously used for storing pesticides or chemicals for sensitive use If no option, refer to EMG 13 for appropriate action	13
Clearance of natural forest areas for buildings or electrical infrastructure	Destruction of native vegetation and habitat		Loss of biodiversity	Try to avoid areas of undisturbed forest vegetation or areas of known environmental value and suggest alternatives	2, 3, 12
Construction of a new village or satellite community with new housing	Potential for activities associated with housing eg general waste and effluent generation to impact upon river and groundwater		Potential impacts on water quality causing impacts on fish communities and potential human health issues	New housing should construct appropriate wells and toilets to safeguard against health and environmental issues	2, 3, 12
Construction of facility for cassava processing	Potential human health issue of processing area not adequately ventilated		Poorly ventilated processing area can lead to serious human health issues due to inhalation of 'linamarin' from cassava	Ensure facilities are adequately ventilated and that cassava is baked and rinsed during processing	6
Implementation Phase					
Situation of well downstream and near to source of human or animal effluent eg. buffalo wallow or toilet	Potential for water quality to be impacted upon by elevated E coli and other micro organisms		Principally a human health issue. Potential for sickness amongst people	Try to ensure that wells are located a significant distance away from buffalo wallows if downslope of them, or that buffalo wallows are relocated	4, 7
Location of toilet adjacent to watercourse or source of water eg. A pre-existing unlined well				Try to ensure that toilets are not constructed adjacent to pre-existing wells taking groundwater from a similar depth, or install appropriately lines and filtered well	4, 7

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main Environmental issue	Recommended action	EMG References
Use of asbestos sheeting for roofs in buildings eg. toilets and bathrooms	Although unlikely, the potential exists for asbestos to be damaged and release fibres		A human health issue. Asbestos fibres can cause serious respiratory ailments if inhaled in a dust form	Alternative roofing materials should be utilised where practical. Eg Tin	4
				Existing asbestos roofs should be painted to extend life and safeguard against fibre release	4
Storage of construction materials	Soil, sand and cement may enter rivers due to rain or wind		Soil and other material can affect plant, fish and bird communities by smothering them and altering river pH	Ensure that sand and cement is covered or contained and cannot escape into rivers. Washing of tools should take place over natural ground away from watercourses	4, 7, 8, 9, 10
Construction waste generated	Waste such as cement bags, plastic etc and some residues of materials may enter rivers etc. and cause an impact on the environment		They can cause blockages in the river affecting water quality for humans, fish and birds. Can be ingested by animals	Appropriately dispose of wastes	4, 7
Transformer construction	Potential over time for leakages of oils from transformers that can cause impacts on water quality, particularly if oils contain Poly chlorinated Biphenyls (PCBs)		Oil in water supply will cause issues for human consumption. PCBs are a carcinogen (cancer causing) and bio-accumulate	Ensure that transformers put in place are banded ie they are situated on a concrete base with concrete retaining wells to safeguard any spill from reaching the environment	7, 8
Operational Phase					
Use of pesticides/herbicides around buildings	Impacts upon rivers and deaths of non-pest animals eg insects and birds		Loss of biodiversity and potential human health issue if children ingest pesticides/herbicides	Control use of pesticides and herbicides. Use in accordance with IPM program advice	2, 7, 8
Lead based paints in kindergarten buildings			Potential human health issue if children come into contact with our ingest lead based paint from surfaces	Site track away from sensitive community facilities eg kindergartens if possible	4

Irrigation Activities

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main environmental issue	Recommended action	EMG References
Planning Phase					
Establishment of new irrigated area	Clearance of native vegetation and habitat		Loss of biodiversity	Select sites that avoid the requirement to clear areas of undisturbed forest vegetation or areas of known environmental value	2, 3, 11, 12
	Encroachment on historically or culturally significant sites		Cultural impacts for community	Consult with community to avoid use of these areas	2, 3
	Disruption of natural course of river		Affects water communities such as fish, plants and birds	Select alignments to avoid these areas, or ensure that culverts are put in place to allow natural flow rates	3, 11
	Isolation of communities of plants, animals and fish		Isolation can cause communities either side of area to deteriorate and die out	Select alignments to avoid the most valued natural habitats eg undisturbed forest areas	3, 11
	Reduced flow in river due to water being diverted		Affects water communities such as fish, birds and plants by reducing available habitat and nutrients	Ensure that diversion into irrigated area is not too great so as to disrupt natural river flow	3, 11
	Potential for drawdown if groundwater being used as source of irrigation water		Can result in lowering of water table and drying of wells impacting upon peoples health	Ensure that an assessment of the suitability of the source of irrigation water is made prior to implementation	11
Implementation Phase					
Construction of new irrigated area	Increased erosion during construction of bunds that may enter rivers and streams		Soil can smother plants and fish and affect bird communities	Ensure that sand, cement and soil is covered or contained and cannot escape into rivers	4, 7, 8, 9
	Noise and dust during construction period		Nuisance to community	Provide safety protection for workers. Limit days and time of construction	4, 5, 6

Activity affecting environment	Impacts on the environment	Applicable? Yes/No	Main environmental issue	Recommended action	EMG References
Storage of building materials for construction of irrigated area	Soil, sand and cement may enter rivers due to rain or wind		Soil and other material can affect plant, fish and bird communities by smothering them and altering river pH	Ensure that sand and cement is covered or contained and cannot escape into rivers	4, 7, 8, 9
Waste generated from construction of irrigated area eg concrete channels etc	Waste such as cement bags, plastic etc may enter rivers and cause an impact on the environment		They can cause blockages in the river and small amounts of cement etc to enter the river, affecting water quality for humans, fish and birds	Appropriately dispose of wastes	4, 7, 11
Operational Phase					
The newly established irrigation area will be subject to herbicide and pesticide application	Impacts upon river water quality and deaths of non-pest animals eg insects and birds		Loss of biodiversity and potential human health issue	Control use of pesticides and herbicides	2, 7, 8
The newly established irrigation area will be subject to fertiliser application	Impacts upon river water quality through elevated levels of nutrients		High fertiliser application can cause algal growth in rivers and death of fish and plants through oxygen depletion ('Eutrophication')	Use appropriate quantities and types of fertilisers, such as natural fertilisers like buffalo manure where practical	2, 7, 8
Petrol or diesel pumps in use on irrigation system	Diesel or petrol residues may escape to river		Hydrocarbons such as petrol and diesel can cause fish deaths and affect quality of water for human consumption	Ensure petrol and diesel is appropriately stored away from sensitive receptors such as rivers	2, 4, 7
	Noise pollution		Nuisance to certain households in community	Site pump away from houses where possible or restrict hours of use	2, 5

6 Environmental Management Guidelines

Summary Sheet

District:	
Commune:	
Village:	
Date:	

USER NOTES: The following Summary Sheet is to be completed by RUDEP Program Management Unit (PMU) and Infrastructure and Environment Officer (IEO) once the various environmental control guidelines required for Program activities and subprojects have been identified. This document and the environmental management guidelines (EMGs) it nominates will become the RUDEP Environmental Management Plan (EMP) and should be attached to the documents submitted for Department of Science, Technology and Environment (DOSTE) approvals and licenses, tender documentation and the final contract documentation. **Further information can be obtained from the *Environmental Impact and Management Issues Scoping Study, URS, December 2001 ('Environmental Scoping Study')* and references are made within the EMGs to information contained within this report.**

Tick the EMGs required for this activity or subproject and attach the EMG to the back of the Summary Sheet.

EMG 1 - Cultural Heritage

EMG 2 - Social and Community Concerns

EMG 3 - Protection of Sensitive Areas

EMG 4 - Construction Management

EMG 5 - Noise Control

EMG 6 - Dust Control

EMG 7 - Water Quality

EMG 8 - Soil and Nutrient Management

EMG 9 - Controlling Sediment

EMG 10 - Management of Stockpiles & Spoil heaps

EMG 11 - Water Management

EMG 12 - Vegetation Clearance

EMG 13 Assessment & Management of Contamination

Signed and Dated:

RUDEP Infrastructure and Environment Officer

PEMM Environmental Management Guideline No. EMG 1

CULTURAL HERITAGE

Policy/Objective

To ensure that the works have only acceptable impact on the cultural heritage of the local population.

Control Measures

1. The Contractor will liaise with the local community to identify sites of cultural importance.
 2. The Contractor shall ensure that all such areas, trees, structures or sites of cultural importance are protected, if necessary by barriers.
 3. The Contractor shall ensure that all construction workers are aware of the significance of such sites.
 4. Local community to appoint a watchperson to ensure that such sites are not damaged or violated.
-

Monitoring

The IEO will liaise with local community to ensure that sites of cultural importance are/have been adequately protected.

Corrective Action

If any damage occurs, discuss with the local community and implement any remedial actions requested by them.

PEMM Environmental Management Guideline No. EMG 2

SOCIAL AND COMMUNITY CONCERNS

Policy/Objective	To minimise social disturbance and maximise community benefits from RUDEP activities and subprojects.
Control Measures	<ol style="list-style-type: none">1. The PMU will advise the local community of RUDEP plans in advance of any works, construction or activities, and through RUDEP participatory framework involve them in planning and implementation.2. The Contractor will liaise with the local community to identify culturally sensitive areas and avoid disturbing them (refer to EMG 1).3. The Contractor to negotiate access to and use of local resources with the local community and DOSTE.4. The contractor to negotiate with the local community and DOSTE regarding the location of disposal areas and stockpiles (refer EMG 10).5. The Contractor to avoid disturbances near residential areas where possible.6. The Contractor shall control runoff and manage sediments near gardens, fishponds and water bodies (refer EMG 11).7. The Contractor shall arrange for local people to be employed and trained on aspects of the activity or subproject.8. Women's Union and other commune groups to be included in subproject activities.9. The community should be consulted to establish whether diseases are present in an adjacent area that could be spread by the establishment of a road or planting of a particular crop type.10 The community should be consulted to establish whether establishment of road or bridge infrastructure is likely to give rise to added pressure to degrade local natural resources, such as via logging activity etc.
Monitoring	The IEO will liaise with local community to ensure that the local community is fully informed and that any areas of concern are acted upon.
Corrective Action	Any problems or complaints to be recorded and actions taken to resolve concerns undertaken immediately and also recorded.

PEMM Environmental Management Guideline No. EMG 3

PROTECTION OF SENSITIVE AREAS

Policy/Objective	To minimise negative impacts on sensitive ecosystems, culturally sensitive areas and the natural environment. (Refer Section 2.4, Environmental Scoping Study)
Control Measures	<ol style="list-style-type: none">1. The PMU will advise the local community of RUDEP plans in advance of any works, construction or activities, and through RUDEP participatory framework involve them in planning and implementation.2. The Contractor will liaise with the local community to identify culturally sensitive areas and avoid disturbing them (refer to EMG 1).3. The PMU shall locate all construction sites/activities away from sensitive areas.4. The PMU shall ensure that the Contractor is aware of locations of sensitive areas and avoids them.5. The Contractor shall ensure that all construction workers are aware of the significance of such sites and the need to avoid impacts on any such sites.6. Ensure that Program activities/infrastructure do not result in isolation of communities of plants, animals and fish, or disrupt watercourses. Ensure that culverts etc are in place to allow natural flow lines to be maintained.7. Ensure that Program infrastructure such as roads and bridges do not contribute to increased exploitation of natural resources e.g. by providing improved access for illegal logging activity.
Monitoring	The IEO will liaise with communes to ensure that environmentally sensitive sites are protected.
Corrective Action	If any damage occurs, discuss with the communes and DOSTE and implement any remedial actions requested by them.

PEMM Environmental Management Guideline No. EMG 4

CONSTRUCTION MANAGEMENT

Policy/Objective	To minimise inconvenience and to ensure that construction workers, school students, RUDEP staff and local residents are not endangered during the implementation of activities and subprojects and that appropriate construction materials are used and wastes are appropriately disposed of (particularly during construction works).
Control Measures	<p>The Contractor shall ensure that all health and safety requirements are in place on the construction site, and with the IEO shall conduct an awareness campaign for staff and local residents to ensure that all are aware of possible danger. Erect barriers to restrict access to work areas and ensure personnel are appointed to monitor movement around work sites. Control measure shall include:</p> <ol style="list-style-type: none">1. Erection of personnel barriers to limit access to unauthorised personnel.2. Construct and maintain alternative routes around work sites.3. Employ local residents to facilitate awareness and monitor the movement of residents around work sites so they are not endangered in any way.4. Clearly signpost alternate routes and detours.5. Store all materials and equipment on site so as to prevent damage to the site and minimise hazards to persons, materials, equipment and the environment.6. Hazardous goods (including fuel and oil) shall be stored and handled only within an area set aside for that purpose and was down of vehicles should occur in a contained area away from watercourses.7. Ensure that activities do not significantly disrupt the natural flows of rivers during construction.8. Ensure that asbestos containing materials are not used in building construction. Where asbestos roofing materials have been used, these should be painted to safeguard against deterioration and prevent fibre release.9. Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. Use Filter/gross sediment traps where applicable: These consist of a mesh or grid near the outlet drain from a quarry or construction site, to trap items of waste such as plastic bags, cans, bottles, paper. Such traps should be cleaned regularly and the waste disposed of appropriately.10. Ensure that all transformers are underlain by concrete and banded to contain any leakages of oils that could potentially occur via leakage.
Monitoring	IEO to conduct regulare inspections during construction activities, check on safety measures and waste management issues. Contractor and IEO to liaise with local CPU leaders regarding appropriate locations for work sites and alternate routes and detours if required.
Corrective Action	Any problems to be acted upon immediately and recorded by IEO.

PEMM Environmental Management Guideline No. EMG 5

NOISE CONTROL

Policy/Objective To minimise the impact of noise on residents and commune facilities (schools, health clinics, halls etc).

The IEO shall ensure that the Contractor prevent noise levels that are likely to an annoyance to the commune. All noise generating plant and equipment and processes shall be controlled to minimise noise. Control measure shall include:

1. Use of modern and well maintained equipment.

Control Measures

2. Use of noise screens or mounds near residential areas.

3. Advise commune leaders, school and health clinic staff etc when there will be unavoidable noise.

4. Generally carry out all noisy construction activities during normal working hours. Contractor and IEO to negotiate with commune leaders, school and health clinic staff to identify any 'noise free' requirements and ensure that noisy activities are avoided at these times.

Monitoring Weekly inspection of all noise producing sources on activities and subprojects. Discuss any problems with representatives of the commune.

Corrective Action Any machines, plant or processes producing excessive noise shall cease operation and remedial action taken to the satisfaction of the IEO.

PEMM Environmental Management Guideline No. EMG 6

AIR QUALITY

Policy/Objective	<ol style="list-style-type: none">1. To ensure there is no health risk, inconvenience or nuisance due to dust production.2. Environmental health issues relating to inhalation of gases arising from cassava production.
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Control Measures	<p>The Contractor shall control construction activities to prevent excessive dust generation and ensure that all facilities constructed for the purposes of processing cassava are adequately ventilated. Control measures shall include:</p> <p>For Dust Suppression</p> <ol style="list-style-type: none">1. Spray water on exposed surfaces.2. Install wind breaks, dust screens or fences between exposed surfaces, concrete or tar batching areas and commune facilities and houses.3. Wet roads and tracks and fill being carried in open trucks.4. The principles of Integrated Pest Management should be adopted where possible to reduce the amounts of pesticides and fertilisers required to be applied. This will have a positive impact on water, soil and air quality (during spray application). <p>For Cassava Production</p> <ol style="list-style-type: none">1. Ensure that cassava is processed quickly after harvesting.2. Processing of the cassava must be conducted in a well ventilated area.3. Cassava must be dried, soaked in water, rinsed or baked to reduce linamarin content.
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Monitoring	<p>Dust Suppression - Weekly inspection of all dust producing sources on activities and subprojects. Discuss any problems with representatives of the commune.</p> <p>Cassava Production – Ensure that any cassava processing facilities supported by the Program are well ventilated in any areas where processing takes place to safeguard human health.</p>
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Corrective Action	Any problems or complaints to be acted upon immediately.
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PEMM Environmental Management Guideline No. EMG 7

WATER QUALITY

Policy/Objective	To avoid contamination of potable water sources from solid waste, sewerage and construction activities. (Refer Table 25, Environmental Scoping Study for Vietnam Drinking Water Quality Guidelines)
Control Measures	<p>The Contractor shall ensure that all construction activities and disposal of waste products are managed to minimise their impact on local water sources. Control measures shall include:</p> <ol style="list-style-type: none">1. Isolate construction plant, workshops, storage areas, concrete or tar batching areas etc from other surface runoff to prevent spillage entering local water sources. Clean and rehabilitate when activities are complete.2. Hazardous goods (including fuel and oil) shall be stored and handled only within an area set aside specifically for that purpose. This area shall be located away from drainage lines and bunded off from the remainder of the site.3. Direct runoff from the site and wash up operations into a settling basin.4. Contain all stored waste within the construction site.5. During site clean up dispose of contaminants in an approved manner: burn all spilled fuel oil etc; discharge gaseous contaminants - diluting with fresh air; chemical an other liquid contaminants shall be stored in appropriate containers and disposed of at an authorised toxic landfill site.6. Crush, burn and bury all inorganic waste in an approved area.7. Compost or use as animal food all green organic wastes.8. New toilet facilities shall be: located away from sources of potable water supply; of sufficient capacity to service the population using the facility; and, above waterable pit latrines or composting toilets.9. All wells installed should be situated a recommended 20 metres away from any upslope source of contaminants such as a water buffalo wallow, animal pen, or unlined toilet.10. Ensure septic tank outflows are not located near potable water supplies or drain into the natural watercourse catchments.11. The principles of Integrated Pest Management should be adopted where possible to reduce the amounts of pesticides and fertilisers required. This will have a positive impact on water quality.
Monitoring	Daily visual assessment of control measures and water quality together with consultation with CPC leaders.
Corrective Action	Any problems or complaints regarding water quality shall be addressed immediately by whatever measures are required to fix the problem.

PEMM Environmental Management Guideline No. EMG 8

SOIL & NUTRIENT MANAGEMENT

Policy/Objective	To control the severity and extent of erosion and prevent rivers and soil against deterioration via application of inappropriate amounts/rates of pesticides and fertilisers.
Control Measures	<p>The Contractor shall implement pre-construction, construction and post construction controls and management practices to minimise erosion. Control measures shall include:</p> <ol style="list-style-type: none"> 1. Construct necessary temporary/permanent control structures such as catch drains, slope drains and bunds to divert stormwater around activities and construction sites. This may include Site containment bunds: low mounds, high enough to trap surface runoff, surrounding the construction or storage site, and drained through a single filtered outlet. Site containment trench: a dug trench which is sufficiently wide and deep to contain all surface runoff from the site, surrounding the construction or storage site, and drained through a single filtered outlet. Silt trap, sediment basin or dam: a pit dug along a drain or watercourse, or a dam placed across a drain or watercourse which will slow and retain the flowing water for a sufficient time to allow sediment to settle. Sand grains are deposited rapidly and silt traps in sandy areas may be small. Finer silt and clay particles are deposited very slowly. In clayey areas, and areas of high rainfall silt traps must be large enough to retain water for at least 24 hours. Silt traps must be cleaned out regularly. 2. Earthworks to be completed in stages such that a minimal area of ground is open or clear or exposed at any one time. 3. Keep vegetation clearing to a minimum and avoid disturbance on steep slopes. 4. Keep construction vehicles, plant and equipment on defined tracks. 5. Ensure that borrow pits are located in areas not prone to erosion or that adequate erosion control measures are in place and encourage revegetation after construction activities have finished. 6. Ensure that pesticides and fertilisers are applied in accordance with GOV guidelines and that the principles of Integrated Pest Management are adopted where possible to reduce the amount of pesticide and fertiliser inputs. This will have a positive impact on water and soil quality. (refer Tables 21 & 22 in Environmental Scoping Study and Section 2).
Monitoring	<p>The Contractor shall; regularly inspect the site to ensure that erosion control measures are in place and working effectively; and, inspect the site after heavy rains to check for damage such as scour, soil erosion or sediment deposition. The IEO shall inspect the site regularly during construction and activities to ensure compliance with the guidelines.</p> <p>The IEO and DDOs should ensure that pesticides and fertilisers are applied in accordance with GOV guidelines and that the principles of Integrated Pest Management are adopted to reduce pesticide and fertiliser inputs.</p>
Corrective Action	Repairs to damaged areas, re-establishment of vegetation re-growth. Modify and improve drainage control strategies.

PEMM Environmental Management Guideline No. EMG 9

CONTROLLING SEDIMENT

Policy/Objective	To minimise the impact of stormwater containing sediment on streams and coastlines.
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Control Measures	<p>The Contractor shall implement pre-construction, construction and post construction controls and management practices to minimise sedimentation. Control measures shall include:</p> <ol style="list-style-type: none">1. Construct necessary temporary/permanent control structures at the outset of construction. These structures may include the installation of filter-sediment fences, hay bales, filter drains, filter strips, grass outlets and sediment transport basin traps around culverts, drains, soil stockpiles and all other areas which may have the potential to erode or be affected by sedimentation.2. All disturbed areas that are not to be paved or gravelled should be revegetated or prepared for natural revegetation after final landscaping.3. Ground disturbance should be staged so that it is limited to areas of a workable size.4. Construction and activities should be scheduled so that large areas of soil and earth are not exposed during the wet season.5. Isolate construction plant, workshops, storage areas, concrete or tar batching areas etc from other surface runoff.6. Avoid discharging water onto unstable slopes or old landslips.7. Encourage revegetation after construction activities have finished.
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Monitoring	The Contractor shall; regularly inspect the site to ensure that sedimentation control measures are in place and working efficiently; and, inspect the site after heavy rains to check for damage such as scour, soil erosion or sediment deposition. The IEO shall inspect the site regularly during construction and activities to ensure compliance with the guidelines.
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Corrective Action	Repairs to damaged areas, re-establishment of vegetation re-growth. Modify and improve drainage control strategies.
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PEMM Environmental Management Guideline No. EMG 10

MANAGEMENT OF STOCKPILES & SPOIL HEAPS

Policy/Objective	To manage these features so that dust and sediment runoff are minimised.
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Control Measures	<ol style="list-style-type: none">1. The Contractor shall negotiate with commune leaders about the location of dumping areas. If spoil is to be dumped in the local area, prepare a level site on which spoil can be dumped and piled.2. The stockpile or spoil heap location should be chosen so as to avoid blocking surface runoff or drainage lines. If this is not a ridge crest or flat plain site, the base should be levelled and contained.3. If the stockpile or spoil heap contains fine sediments, it should not be left bare for long periods and should be covered to prevent dust generation, erosion and sediment runoff in areas of high rainfall.4. Stockpiles and spoil heaps must be subject to stability calculations to safeguard against a major slip occurring.5. Where possible, spoil should be used to backfill quarry areas or waste disposal sites or pits before they are re-vegetated.6. Isolate construction plant, workshops, storage areas, concrete or tar batching areas etc from other surface runoff.7. Avoid discharging water onto unstable slopes or old landslips.8. Encourage revegetation after construction activities have finished.9. Use erosion techniques set out in EMGs 8 and 9 to control sediment movement and erosion.
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Monitoring	The Contractor shall regularly inspect stockpiles and spoil heaps, in particular after heavy rains to check for damage such as scour, soil erosion or sediment deposition. The IEO shall inspect the site regularly during construction and activities to ensure compliance with the guidelines.
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Corrective Action	Repairs to damaged areas, re-establishment of vegetation re-growth.
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PEMM Environmental Management Guideline No. EMG 11

WATER MANAGEMENT

Policy/Objective	To minimise the impact of contaminated runoff water and minimise the disruption to watercourses by infrastructure; and the selection of appropriate alignments for roads etc that avoid blocking lines of natural drainage where possible (<i>Refer Table 25 Environmental Scoping Study</i>)
Control Measures	<p>The Contractor shall implement pre-construction, construction and post construction controls and management practices to minimise sedimentation. Control measures shall include:</p> <ol style="list-style-type: none">1. Runoff from non-construction areas should be diverted (temporarily) around the construction site to keep natural flow separate from construction runoff.2. The Contractor shall liaise with commune leaders to ensure that in areas of intensive gardening, shrimp farming or sensitive agriculture, especially in areas of high rainfall, runoff from construction sites will not be directed onto garden plots or fish ponds etc.3. Stormwater runoff from construction sites should pass through a gross pollutant trap (to filter plastics, cans etc) and over a vegetated surface to remove petroleum-based organic pollutants before discharging into drainage systems.4. Drains and culverts should be designed to remove all runoff water without scour. On steep slopes culverts may need to be stepped using rock slabs or gravel in gabion baskets.5. Select appropriate alignments for roads and other linear features that may disrupt drainage lines and ensure measures such as culverts allow for natural flow regimes to be maintained.6. Any new irrigation activity should take into account the volume of water available from groundwater resources to safeguard against lowering of water levels in wells and impacts upon the community.7. Ensure that pesticides and fertilisers are applied in accordance with GOV guidelines and that the principles of Integrated Pest Management are adopted where possible to reduce the amount of pesticide and fertiliser inputs.
Monitoring	<p>The Contractor shall regularly inspect the site to ensure that stormwater control measures are in place and working effectively, in particular after heavy rains to check for damage such as scour, soil erosion or sediment deposition. The IEO shall inspect the site regularly during construction and activities to ensure compliance with the guidelines.</p> <p>The IEO and DDOs should ensure that pesticides and fertilisers are applied in accordance with GOV guidelines and that the principles of Integrated Pest Management are adopted to reduce pesticide and fertiliser inputs.</p>
Corrective Action	Repairs to damaged areas, re-establishment of vegetation re-growth.

PEMM Environmental Management Guideline No. EMG 12

VEGETATION CLEARANCE

Policy/Objective	To minimise the environmental impact of vegetation clearance on natural ecosystems, including flora and fauna.
Control Measures	<ol style="list-style-type: none">1. The Contractor shall liaise with DOSTE and commune leaders to identify vegetation areas that have significant value.2. Mature trees or trees of environmental significance must, where possible, be retained. Where trees in or near the construction site are to be retained they shall be protected throughout the construction period.3. Vegetation clearing shall be kept to a minimum.4. Encourage re-vegetation after construction activities have been completed.
Monitoring	The Contractor shall regularly inspect vegetation areas to ensure that trees and vegetation of significance are not damaged (Refer Section 2.4 Environmental Scoping Study). The IEO shall inspect the site regularly during construction and activities to ensure compliance with the guidelines.
Corrective Action	If significant vegetation or trees are cleared/damaged in the construction process, the need for rehabilitation works shall be discussed with DOSTE and commune leaders.

PEMM Environmental Management Guideline No. EMG 13

ASSESSMENT & MANAGEMENT OF CONTAMINATION

Policy/Objective	To avoid where possible the selection of contaminated sites for redevelopment to inappropriate end uses (eg sites formerly used for pesticide, chemical or fuel storage to kindergartens).
Control Measures	<ol style="list-style-type: none"> 1. The IEO/DDOs shall discuss with commune leaders the previous use of the site intended for redevelopment. 2. If the site was used for a known potentially contaminative end use such as fuel, chemical, pesticide or herbicide storage, and alternative site should be chosen for redevelopment. 3. If the site is still preferred despite evidence of a previously contaminative use, soil samples should be taken from the site to characterise the nature and extent of any contamination present once it is known what the site was used for. This should be carried out following consultation with the Environmental Specialist. 4. A sampling program will be supplied by the Environmental Specialist including how to take the samples, at what depth and what coverage is required to delineate the extent of the contamination. 5. The samples should be sent to an approved laboratory for analysis and a second laboratory to check results. The units in which measurements are to be made should be clearly stated by the IEO in accordance with instruction from the Environment Specialist. 6. The results should be reviewed by the IEO and Environmental Specialist against the requirements of appropriate soil, water and human health guidelines and a decision made as to whether to (a) continue development of the site, or select an alternative; or (b) what level of remediation (clean-up) is required. 7. The Environmental Specialist will submit a detailed report indicating what remediation or additional sampling needs to be carried out. 8. The IEO needs to select an appropriate contractor to remediate the site/remove contaminated material as required. The IEO or DDO should supervise this activity. All contaminated material should be disposed of in accordance with recommendations in the Environmental Specialists report. As a minimum contaminated soil should be sent to a clay lined landfill where it cannot escape to reach the broader environment. 9. Additional samples shall be taken to ensure that contamination has been removed sufficient for the safe use of the site for its new end use.
Monitoring	<ol style="list-style-type: none"> 1. Short term The IEO should supervise that contamination clean-up occurs in accordance with the guidelines set out in the 'remediation plan for the site. 2. Long Term If a formerly contaminated site has undergone redevelopment to a new use, the IEO shall undertake the required ongoing monitoring to ensure that contamination clean up has removed contaminants to safe levels commensurate with the new use of the site. This might for example include taking additional soil samples from the site or water samples from nearby wells.
Corrective Action	If contractors do not remediate (clean-up) contaminated material in accordance with instructions, the IEO should recommend use of an alternative contractor for future work.

7 Environmental Management Plans

7.1 Introduction

An EMP is a project-specific activity plan designed to minimise the negative impacts identified in the EIA process. It is not a formal legal document. An EMP can cover a whole program, or it may be a very simple plan to control specific subprojects or activities.

For most subprojects and activities under RUDEP the impacts are anticipated as being small-scale, restricted in extent, or limited in number, a formal environmental plan will not be necessary, but an EMP still needs to be produced.

The EMP might include site-specific recommendations to mitigate the projected negative impacts of sub-projects and activities. Normally this will involve taking the relevant recommendations made in the EIAC and EMGs and applying these to the management of any environmental issues associated with the sub-project or activity. These recommendations will be incorporated into any contract documents. Monitoring and evaluation will involve checking the progress and effectiveness of the recommendations in achieving the requirements of the EMP.

In the context of the Program the EMP will likely consist of an EMP summary sheet, and relevant EMGs identified by the EIAC.

7.2 Preparation of the EMP

Completion of the EIA Checklist will identify the site-specific environmental issues that need to be addressed. The checklist contains references to relevant EMGs (Section 6) that provide steps to avoid or minimise any negative impacts. The IEO will compile the selected guidelines and complete an EMP summary sheet. This summary sheet, with the selected guidelines attached, will form the project EMP.

The PMU will incorporate, where appropriate, the recommended control measures into RUDEP documentation, for example, locate site containment bunds, preferred stockpile area, filter fencing, etc. on any site plans and maps. The EMP will be attached to project documentation submitted to DOSTE for approval.

7.3 Monitoring Requirements

The EMP should state the level of monitoring to be carried out, the responsibility for monitoring, and the remedial activities, which will be carried out if there are any failures of, or non adherence to, the EMP.

Monitoring (*as described in Section 4.5 of the EI&MI Scoping Study*) should be carried out as part of the regular on-site supervision activities associated with project implementation. The frequency of the monitoring of particular elements will be dependent on the level of environmental risk or potential impact associated with a particular RUDEP component.

Construction contractors will be required to monitor all environmental measures incorporated within the project scope of works. The IEO will be responsible for monitoring compliance with, and the effectiveness of, the EMP. DOSTE and PMU will check and assist IEO carry out the monitoring responsibilities and report any serious deficiencies. At subsequent site meetings the PMU will check and assist the IEO carry out their monitoring responsibility and to report any serious deficiencies to DPI and AusAID.

Annex 1

Environmental Action Plan (EAP)

Annex 1: Environmental Action Plan (EAP)

The EAP is a listing of all Program environmental issues as identified during the Preliminary and Second Environmental Audit visits by the Environmental Specialist. The EAP table provides a means of listing all issues of environmental significance associated with Program supported activities and is set out by commune. It is also designed to provide the DDO with a current listing of the status of all environmental issues for his/her commune for monitoring/planning purposes.

It is the responsibility of the IEO to keep the EAP up to date and report periodically on the status of issues to the PMU, ATL, VTL and Environmental Specialist. The EAP table template is set out below, with some example entries for the IEO to follow. The IEO should take the recommendations from the Second Audit report and list these in the EAP table below, maintaining it as a record of the status of management of issues on a commune by commune basis, regularly updating it as required.

Table 1: Environmental Action Plan

Commune	Activity	Action Required	By whom	Date	Status
Duc Phong	Ongoing monitoring of remediated kindergarten site	Take further grab sample from the nearby bore and analyse in 12 months time to ensure that any residual material is not seeping into the bore	IEO/DDO	Dec 2004	Being managed
Son Hai	The road was badly damaged due to recent heavy rain resulting in erosion and gulleying.	Repair required by contractor, supervised by IEO. Where steeper or longer sloped sections are unavoidable, cross drains and catch banks should be put in place to reduce the flow of water down the track. The sides of the road should furthermore be stabilised using either mechanical means such as wooden stakes and a mulch cover, or via the establishment of vegetation cover to prevent erosion	Contractor with supervision by IEO	Eg. March 2004	Eg. Currently selecting best contractor. Decision to be made by end Feb 2004

Annex 2

Environment Policy



VIETNAM - AUSTRALIA

Quang Ngai Rural Development Program
Program Management Unit
No 4 Pham Van Dong
Quang Ngai Town
Quang Ngai Province
Vietnam

January 2004

ENVIRONMENT POLICY

1. RUDEP's Environmental Vision

- To improve the livelihoods of people in the Quang Ngai District via the provision of assistance that promotes sustainability and that does not result in increased environmental impact.

2. RUDEP's Environmental Objectives

- To improve the livelihoods of people in the Quang Ngai District via the provision of infrastructure assistance and advice on income generation activities that promote sustainability and do not result in increased environmental impact.
- To improve the understanding of how important it is to promote sustainable development in the Quang Ngai District, both at a general level and as a result of Program activities to Program staff, counterparts and commune partners alike.

3. RUDEP's Environmental Principles

To achieve these vision and objectives, the Program has prepared a Program Environmental Management Manual setting out the environmental procedures to be followed when planning and carrying out all Program activities. These ensure compliance with the guiding principles of the Program which are to comply with the following:

- AusAID publication, 'The Environmental Management Guide for Australia's Aid Program', 2003 (outlining steps to be followed in the environmental assessment of Program activities and procedures for managing environmental impacts).
- AusAID publication 'Australian Aid: Investing in Growth, Stability and Prosperity', 2002.
- AusAID obligations under the Environment Protection and Biodiversity Conservation Act, 1999.
- Applicable Vietnamese laws and regulations, and good environmental practice, including good practice relating to Program activities with the potential to result in environmental health issues.

Limitations

URS Australia Pty Ltd (URS) has prepared this report for the use of AusAID Quang Ngai Rural Development Program in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Program Design Document.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared during December 2003 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.