

QUANG NGAI RURAL DEVELOPMENT
PROGRAM (RUDEP) - PHASE 2

Environmental Specialist Report - Third Input



VIETNAM-AUSTRALIA

Prepared for

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ANNEXES

Annex 1: Program Environmental Management Manual

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
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
PPP	Participatory Planning Process
PRA	Participatory Rural Appraisal
QN	Quang Ngai
QNRDP	Quang Ngai Rural Development Program (former Program name)
RCAP	RUDEP Commune Annual Plan
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 third Environmental Audit (the 'Audit') of RUDEP Program activities (the 'Program') by the Environmental Specialist in October 2004. The aim of the environment inputs are 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 is achieved by undertaking Audits of Program activities against recommended procedures set out in the Program Environment Management Manual (PEMM). (The Cycles refer to the staggered approach the Program is taking to working with an increased number of communes).

Given that Program activities are increasing in scope however, the Terms of Reference (TOR) for the Environmental Specialist input into the Program require review and update of the PEMM, the Environmental Impact Assessment Checklist (EIAC), and the Environmental Management Guidelines (EMG). This ensures that they adequately mitigate any adverse environmental impacts arising from Program activities.

The principal output of the Audit are therefore as follows:

- This report containing recommendations relating to activities and proposed activities at the Cycle 1, 2 and 3 communes and ways in which Program environmental performance might be improved more generally.
- An updated PEMM document ensuring all activities with the potential to cause impact to the environment are being appropriately managed.
- Updates to the EIAC and EMGs for the Program made in line with the increased scope of activities being undertaken by the Program in the communes. These are contained within the updated PEMM.

2 Scope of Environmental Audit

In order to fulfil the TOR, the Environmental Specialist undertook a range of activities during the period 18-29 October 2004, 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.

This report describes the findings of the third 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, recommend "undertaking 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 working with a total of 9 Communes, namely the 3 'Cycle 1' Communes that were reviewed in the Preliminary Environmental Audit Report in March 2003, the 3 'Cycle 2' Communes reviewed in the Second Audit report in March 2004 and 3 additional 'Cycle 3' Communes – namely Binh Minh, Son Trung and Son Giang. 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 as well as looking at proposed activities in the 3 Cycle 3 Communes.

By the time of the next scheduled Environmental Audit by the Environmental Specialist, the Program will be working with a total of 18 Communes.

The Audit was undertaken by an Environmental Specialist, working with, and providing on-the-job training to, the IEO.

3 Methodology

3.1 Program of Work

Visits were conducted by the Environmental Specialist accompanied by the IEO to each of the new Cycle 3 Communes working with the Program to look at the sites of proposed activities in these Communes. No infrastructure or change to agriculture practices have however occurred yet in these Communes. Audit visits were carried out in order to assess the potential for environmental impact arising from proposed 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.

Visits were also made to selected Cycle 1 and 2 Communes based on the nature or scale of activities being undertaken. This was based on either a request made to the Environmental Specialist by Program personnel for advice on an activity, or where given the nature of Program activities being undertaken, the Environmental Specialist felt a visit was necessary. Activities being conducted in those Communes not visited were assessed via a desk top review and discussions with Program personnel.

The Audit of Program activities was made against the requirements of AusAID, applicable Vietnamese laws and regulations, and good environmental practice and consisted of the following:

- A desk top review of whether recommendations made in the Second Environmental Audit in March 2004 were being adequately carried out.
- Site visits to each of the Cycle 3 Communes and to Duc Phong and Pho Chau were undertaken to view activities/proposed Program activities and make recommendations/update the PEMM to cater for these.
- Discussions with key Program personnel, including the Infrastructure and Environment Officer (IEO), Participatory Development Advisers (PDAs), District Development Officers (DDOs), and the Australian Team Leader (ATL).
- Update of the PEMM, (and the EIAC and EMGs contained within it) to ensure it caters for the full range of Program activities and that the information contained within it is useable by Program personnel. (The IEO canvassed DDOs for their opinions on this and amendments to these documents have been made based on this).
- A review of the extent to which Program staff are using environmental controls set out in the PEMM, (and the EIAC and EMGs contained within it).
- Discussions with representatives from DPI and DNRE to assess how the Program and its environmental management approach (as set out in the PEMM) fits into to National, Provincial, District and Commune planning processes and the environmental controls in place within the organisations that administer these. This is important as Program activities often occur in response to decisions made by these organisations and in some cases are wholly reliant on them.

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 Provides tables listing all environmental issues associated with Infrastructure works and Income Generation activities respectively. New activities and recommendations in new or existing Communes are set out in normal text. *The status of all outstanding or ongoing issues from the Second Audit in March 2004 (and any outstanding issues from the Preliminary Audit) are set out in italics, including whether any further actions are required.*

Section 7 looks at suggested changes to the PEMM in terms of managing Program activities and is divided into two parts.

As per Sections 5 & 6, new recommendations are set out in normal text. *The status of all recommendations made in previous Audits in March 2003 and 2004 are set out in italics, including whether any further actions are required.*

Annex 1

The updated PEMM for the Program is contained in Annex 1 to this report. The PEMM includes an updated EIAC, and EMGs.

The EMGs have been completely reworked and are now activity-based instead of environmental issue-based. (ie they now set out environmental guidance under Program activity headings such as Bridges & Roads, Kindergartens & Health Centres etc). This was felt to be easier to follow than setting out guidance under the headings of environmental issues that assumed a prior knowledge of the environment.

The PEMM also contains 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 simply a listing 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 second Audit reported on in March 2004, the Program has undertaken additional work in the six Cycle 1 and 2 Communes and begun planning activities in the three 'Cycle 3' Communes of Son Trung, Son Giang, (upland AEZ) and Binh Minh (lowland AEZ).

A brief description of each of the Cycle 3 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). The Cycle 1 and 2 Communes are described in the Preliminary and Second Audit reports and are not repeated here.

Binh Minh Commune - Lowland AEZ

Binh Minh is located in the lowland AEZ approximately 20km west of highway 1 in the Binh Son District of Quang Nai Province. It is mainly involved in paddy rice cultivation, but also includes some cassava, sugar cane and rubber cultivation. The Program intends to fund three new projects in Binh Minh - the upgrade to two dirt roads in My Long and Duc An villages, and the construction of 8 new wells in Duc An village.

Son Trung - Upland AEZ

Son Trung is located in the upland AEZ approximately 6km from the District centre, 70km north-west of Quang Ngai in the Son Ha District. It is mainly involved in cassava, paddy rice cultivation, sugar cane and livestock rearing. The program intends to fund three new projects in Son Trung, including the construction of 20 new wells, two new above ground water tanks (involving collection of water from a spring), and construction of a new kindergarten including a classroom and a toilet.

Son Giang - Upland AEZ

Son Giang is located in the upland AEZ approximately 65km north-west of Quang Ngai in the Son Ha District. Like Son Trung, it is mainly involved in cassava, paddy rice cultivation, sugar cane and livestock rearing. The program intends to fund three new projects in Son Giang, including the construction of 17 new wells/bathrooms, an upgraded road, and a kindergarten. The Program has also overseen the construction of 51 wells/bathrooms by ASAS.

5 Audit Findings - Infrastructure Activities

5.1 Wells, Water Tanks, 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 water 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 bathrooms and other potential contamination sources since the Preliminary Audit. In addition, it has been conducting a water quality testing program for existing wells and water filters.

Table 1: Recommendations – Wells, Water Tanks, Bathrooms/Toilets & Water Filters

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 - Son Hai	1.	<p><i>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></p> <p><i>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></p>	<p><i>All wells are now complete in Son Hai. This includes 35 ASAS wells and 15 Program Wells. The IEO amended contractor documents to specify the requirement for clean-out before commissioning.</i></p> <p><i>Elevated E coli levels are present in 80-90% of all wells. Samples were taken immediately after construction (but not before people had commenced using them) 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, administered by DNRE. Contamination could be due to dirty buckets introducing faecal material into the well, proximity to sources of contamination, or groundwater cross-contamination.</i></p> <p><i>ACTION: Options available are (1) Sanitation training in importance of maintaining well cleanliness; (2) Putting measures in place to protect the wells such as capping and use of handpumps; relocating sources of potential contamination eg buffalo pens and toilets in accordance with PEMM guidelines; (3)Introducing some means of filtering water once it has been drawn. If (1) and (2) are introduced, limited sampling should be undertaken to see if practice change has improved the situation. If not contact CERWASS (Centre for Rural Water Supply and Sanitation in Hanoi).</i></p>	

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 - Duc Phong	2	<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>	<i>ACTION: Ongoing provision of advice by DDOs and the IEO.</i>	
CYCLE 1 - Son Hai	3	<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>	<i>One sample has been taken from each well and elevated E coli levels are present in approximately 80% of wells. Contamination could be due to dirty buckets introducing faecal material into the well, proximity to sources of contamination, or groundwater cross-contamination.</i> <i>ACTION: As per Issue No. 1</i>	
	4	<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>	<i>The interior surfaces of these existing roofs have been painted.</i> <i>ACTION: None required</i>	
	5	<i>Duc Phong 16 well upgrades have been completed but elevated E coli levels are present in 15 of these. Samples were taken immediately after construction but not before people had commenced using them. contamination is likely to be due to dirty buckets introducing faecal material into the well.</i>	<i>ACTION: As per Issue No. 1</i>	
CYCLE 2 Nghia Tho	6	<i>30 wells have been installed, funded by the Australian Small Assistance Scheme (ASAS) and put in place by the Program. 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 (normally because the old wells were not reliable in the dry season).</i>	<i>Samples were taken Elevated E coli levels are present in 24 of the 30 wells. Samples were taken immediately after construction but not before people had commenced using them. Contamination is therefore likely to be due to dirty buckets introducing matter into the well or cross contamination of groundwater due to proximity to toilets/animal enclosures.</i> <i>ACTION: As per Issue No. 1</i>	

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 3 Son Giang	7	<i>A total of 51 wells have been installed in Son Giang, funded by the ASAS and put in place by the Program.</i>	<i>Samples were taken Elevated E coli levels are present in most of the 51 wells. Samples were taken immediately after construction but not before people had commenced using them. Contamination is therefore likely to be due to dirty buckets introducing matter into the well or cross contamination of groundwater due to proximity to toilets/animal enclosures.</i> ACTION: As per Issue No. 1.	
CYCLE 2 & 3 Son Giang, Son Trung, Nghia Tho		17 more wells are soon to be constructed in Son Giang and 20 wells in Son Trung. Upgrades to wells in Nghia Tho.	ACTION: As per Issue No. 1.	
CYCLE 3 Son Trung	8	Construction of water source tanks ('spring boxes') and above ground water storage tanks. People will then take water from these central tanks.	Ensure no cement residues or washing of tools in stream during construction in accordance with PEMM guidelines.	
CYCLE 3 Binh Minh	9	8 wells are soon to be constructed in Binh Minh.	ACTION: As per Issue no. 1.	

5.2 Kindergartens, Health Centres and Markets

Kindergartens and health centres form a mainstay of Program activity, enabling communities to children to receive a better education and freeing up time for parents to become involved in income generation activities. The most far-reaching impacts associated with these items of infrastructure may therefore relate to the income generation activities that people involve themselves in. In addition there are 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.

Construction of markets is a new activity for the Program. Other than the requirement to not allow cement residues and wastes to enter watercourses, there are a couple of operational issues that could be considered. These include then possibility of composting green waste and the recommendation that gross pollutant traps be put on stormwater drains serving the market to prevent meat waste and non-biodegradable rubbish reaching watercourses.

Table 2: Recommendations – Kindergartens, Health Centres and Markets

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 & 2 Son Hai, Tinh Tho & Duc Phong	10	<i>Recommendation was that cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials eg cement bags are appropriately disposed of during construction of kindergartens.</i>	<i>The IEO specified in contractor documents that approved Program practices should be followed and continuing to undertake visits to review practices being followed to ensure they comply with contractor documents. ACTION: Ongoing review of contractor practices.</i>	<i>IEO</i>
CYCLE 1 & 2 Son Hai, Tinh Tho & Duc Phong	11	<i>Ensure no asbestos roofing materials or lead based paints are used in these buidlings.</i>	<i>No asbestos or lead based paints being used. ACTION: None required.</i>	
CYCLE 1 - Duc Phong	12	<i>A localised area of BHC (DDT based) pesticide contamination was present on the proposed site of the Duc Phong kindergarten. Soil from the former hot spot and to a distance of a metre all round where it was visually observed to a depth of 30cm below the base of the void presnet was to be taken for disposal to landfill. The area where soil was formerly stockpiled was to be scraped and encapsulated beneath the kindergarten foundations.</i>	<i>Remediation recommendations followed and kindergarten now constructed. A grab sample was also taken from the nearby bore and analysed to ensure that no residual DDT was seeping into it earlier this year. ACTION:One further sample should be taken to ensure that no residual DDT is migrating to this bore from the former hot spot.</i>	<i>IEO</i>
ALL CYCLES	13	<i>The PEMM did not include a procedure for assessing the potential for pre-existing contamination on sites intended for sensitive uses eg kindergartens or health centres.</i>	<i>Additions to the PEMM made to include potentially contaminating activities and a procedure for disposal of contaminated material. ACTION: None required.</i>	
CYCLE 1 & 2 Hanh Phuoc Duc Phong	14	<i>2 new kindergartens are due to be constructed in Hanh Phuoc and Duc Phong Communes.</i>	<i>No issues relating to siting of these buildings. ACTION:Follow construction practices in PEMM.</i>	<i>IEO</i>
CYCLE 2 Duc Phong	15	<i>Duc Phong commune has a new market in this year and another planned for construction. These will generate significant amounts of waste that needs to be managed appropriately.</i>	<i>No issues relating to siting of the markets. Gross pollutant traps should be installed on stormwater drains serving the markets to prevent meat wastes and non-biodegradable rubbish reaching watercourses. ACTION: As significant amounts of organic waste will be produced, composting may be an option worth exploring. Composting reduces volumes of waste organic material and has the potential to turn it into a reuseable/saleable resource. When applied to agricultural land it also improves soil structure and water retention. A new EMG for composting has been prepared – refer PEMM EMG no. 8.</i>	<i>IEO</i>

5.3 Roads and Bridges

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.

At a broader level, the reasons for putting bridges and roads in place needs also to be assessed from an environmental perspective. They may for example contribute to changes to land use or increased development of an area and these considerations need to be reviewed as part of the Program EIA planning process.

Table 3: Recommendations - Roads and Bridges

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 Son Hai	16	<i>The road to Mang Hien was badly damaged due to heavy rain resulting in erosion and gulleying at the time of the second Audit visit. This damage has occurred again.</i>	<i>ACTION: 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 and the placement of rocks in the drainage channel. These requirements should be put in contractor contracts.</i>	IEO
Son Hai	17	A new road has recently been constructed in Son Hai.	<i>ACTION: Deep rooted vegetation eg vegetable grasses should be established on the sides of the road and if the drains are unlined, rocks placed to reduce erosion risk/subsidence at the road edge. These requirements should be put in contractor contracts.</i>	IEO
CYCLE 2 Tinh Tho	18	<i>Bridge upgrade. Recommendation was made that during construction cement residues from washing tools etc are not permitted to enter watercourses and that all waste materials are appropriately disposed of.</i>	<i>This activity has been completed with the IEO having specified required contractor practices.</i> <i>ACTION: Bridge completed. No action required.</i>	
CYCLE 2 Pho Chau	19	<i>The upgrade of a pre-existing badly eroded dirt road nearest to the highway has occurred.</i>	<i>Repairs made to this section have improved it, however recent rainfall has already significantly damaged this section again.</i> <i>ACTION: Measures such as toe drains, cross drains and catch banks must be put in place across both section of the road to reduce erosion risk in accordance with Vietnamese road construction guidelines that highlights the need for these kinds of measures on roads of >10% steepness. Alternatively deep rooted vegetation eg vegetable grasses should be established on the sides of the road and if the drains are unlined, rocks placed to reduce erosion risk/subsidence at the road edge. These requirements should be put in contractor contracts.</i>	IEO

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
Pho Chau	20	<i>It was noted at the time of the Second Audit visit that some replanting of trees had occurred on the hills adjacent to the highway and the location of the proposed new road.</i>	<i>Clearance of mature trees were avoided when clearing the route of roads, and any mature shrubs or saplings needing to be moved were replanted adjacent to the route of the road to assist soil stabilisation.</i> ACTION: Replanting has occurred. No action required.	
Pho Chau	21	New road recently completed in Pho Chau. This is in good condition at present but the verges should be vegetated to safeguard against erosion which causes road damage and results in smothering of fish and aquatic communities.	Even though there are no steep gradients on this road, ensure that revegetation of the banks occurs. ACTION: Deep rooted vegetation eg vegetable grasses should be established on the sides of the road and if the drains are unlined, rocks placed to reduce erosion risk/subsidence at the road edge as per PEMM. These requirements should be put in contractor contracts.	IEO
Hanh Phuoc	22	<i>A road was extended approximately 500m through the commune.</i>	ACTION: Has been built in accordance with Program guidelines. No action required.	
CYCLE 2 Pho Chau & Hanh Phuoc	23	Another new road is soon to be built in Pho Chau to reduce travel time to the adjacent bay for fishing.	The route of this road is very steep and rocky and will be prone to erosion. ACTION: Practices to safeguard against erosion must be put in place as per Issue 19 and PEMM, including need for these to be put in contractor contracts. The IEO should periodically review construction practices being followed to ensure no 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.	IEO
Tinh Tho	24	Tinh Tho Commune is due to have upgrades made to an existing road.	ACTION: Although the road is not steeply sloping, action as per Issue 23, including requirement for roadside stabilisation in contractor contracts.	IEO
CYCLE 3 Binh Minh	25	Binh Minh Commune is due to have approximately 500m of track widened in the Commune. The route is flat and the track will form the raised bank between paddy fields and an existing irrigation channel.	ACTION: Practices to ensure stability of the tracks should be put in place. These requirements should be put in contractor contracts.	IEO

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, care should be taken to restrict the movement of soil into the river channel where it can smother fish and plants. 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.

Table 4: Recommendations – Dams and Irrigation Channels

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 Pho Chau	26	<i>The Pho Chau dam involved cement foundation walls being keyed into the banks and bed of one of the streams in the commune to provide summer water storage capacity in the stream channel. Removable wooden slats are used to temporarily dam the water.</i>	<i>The dam has been constructed. ACTION: Spillway to allow fish to pass through is still to be constructed to ensure that fish can migrate down stream.</i>	IEO
CYCLE 2 Nghia Tho	27	<i>The Cau Phen irrigation channel was constructed in 2003 and subsequently upgraded this year. The project was originally designed to reclaim agricultural land from the river. The upgrade is to stabilise the banks of the channel to safeguard against erosion occurring.</i>	Bio engineered solutions are being considered for the stabilisation of this channel and banks using boulders and planting of vegetable grasses. Bio-engineered solutions represent a more environmentally friendly, and cost-effective means of stabilising a river against the 3 main causes of erosion, namely sub-aerial (rain impact loosening the soil), scour (river action) and slumping (bank collapse). Leaf cover is particularly good at intercepting rainfall and preventing sub-aerial erosion and root systems and vegetation can also slow down water movement in the river reducing scour and slumping better than conventional engineered solutions. ACTION: Implement bio-engineering solutions using vegetable grasses and other deep rooted vegetation.	IEO
Nghia Tho	28	Protection measures to the Tamang river bank to stabilise the banks of the canal to safeguard against erosion occurring.	ACTION: Consider implementing bio-engineering solutions using vegetable grasses and other deep rooted vegetation as per issue 27. Attention should be given to straightening the river as much as possible through the sections where meandering is causing undercutting and slumping. Vegetation and rocks would serve to slow down the flow to compensate for the increase in river flow rate from straightening. Failure to straighten is likely to result in meanders returning and undercutting recommencing.	IEO
Hanh Phuoc	29	A new irrigation canal is to be built in Hanh Phuoc later this year.	ACTION: Consider implementing bio-engineering solutions using vegetable grasses and other deep rooted vegetation as per issue 27.	IEO

6 Audit Findings - Income Generation Activities

6.1 Introduction

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 are sustainable. In other words that changed land use and practices do not result in increased damage to the environment. Table 6, Section 7 outlines how the environment is considered as part of the Program's Participatory Planning Process (PPP). All Program activities involving changes to land use, must use this stepped approach when looking at the viability of RCAP from an economic, social and environmental point of view.

Potential environmental issues associated with Program income generation activities are divided into the following:

- Land Use and Land Capability advice relating to agricultural change where alternative cropping systems such as cassava or forests are being put forward, and impacts associated with this;
- Investment in training and support for livestock rearing activities, including cattle, pig, and chicken rearing and cattle fattening;
- Advice relating to improving agricultural productivity including technical advice relating to appropriate practices such as erosion control measures and appropriate pesticide and fertiliser use. It furthermore has an Integrated Pest Management Program (IPM) Program that aims to help reduce pesticide use, and the cost of to the farmer. The Program has EMGs set out in the PEMM providing advice relating to these aspects; and
- Provision of electricity supplies for household and irrigation use (the Tinh Tho electricity substation).

Recommendations relating to potential environmental issues associated with Program income generation activities are set out in Table 5 below.

Table 5: Recommendations – Income Generation Activities

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
ALL	30	All changes to agricultural land use must take into account the capability of the land for the proposed activity. Without this, inappropriate land use practices may be put forward, resulting in increased erosion, soil nutrient loss and the requirement for unsustainable fertiliser and pesticide inputs that themselves can cause long term environmental damage as well as a financial burden to farmers.	Land in Quang Ngai is commonly classified into 7 broad categories based on a combination of land use potential and actual present use: 1. Agriculture ; level or only slightly sloping land with good soil; 2. Forest , potentially any land with slope over 10 degrees; 3. Unused , land not capable of supporting crops or trees; 4. Urban , areas with buildings or roads. Forest land is further classified into three classes: protection, production, special use . ACTION: PMU is considering recommendations made in the report ‘Forestry Land Use Planning and Land Allocation (FLUPLA) in Quang Ngai Province, Vietnam’ (Hocking & Pham). This sets out how the climate, slope steepness and soil type of the land being considered for development needs to be assessed. These recommendations need to be incorporated into the PPP when assessing the viability of a RCAP for agricultural land use change is set submitted to the Program for review. (Refer Also Agricultural Land Use Management EMG No. 5).	PMU
ALL	31	The long term management of land sustainably based on Land Capability is only likely to occur when changes to the land tenure system occur, particularly with respect to Forest Land such that farmers are given ownership of the land. Until such a time, uptake of practices designed to ensure steeply sloping forest land is used sustainably is unlikely to be widespread.	It is recognised that Land Allocation (LA) is a fundamental pre-requisite for increasing farmer motivation to develop land. Sound LA for forest land can be done only after Land Use Planning (LUP) has occurred and both LUP and LA should be participatory with farmers controlling the process while conforming to general policies and guidelines. ACTION: PMU is considering recommendations relating to the tenure of land as part of how changes in LUP might occur. Refer report, ‘Forestry Land Use Planning and Land Allocation (FLUPLA) in Quang Ngai Province, Vietnam’ (Hocking & Pham). (Refer Also Agricultural Land Use Management EMG No. 5).	PMU
Upland Communes	32	“Unused” and unallocated forest land exists in many RUDEP Communes and Districts. (None of this is as a result of Program activity) Much of this land has been cleared of natural forest trees with little virgin forest remaining. Where trees exist, in RUDEP Communes they are typically regenerated and replanted forest with reduced species numbers and environmental value.	ACTION: The Program is looking at the new land tenure system recommended by Hocking and Pham, involving a participatory LUP and LA process with farmers while conforming to general policies and guidelines. (as set out in recommendations 30 and 31). This should place an emphasis on sustainable forest management enterprises in Upland Communes or Communes with steeply sloping areas.	PMU

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
CYCLE 1 Son Hai	33	An area of mixed forest/secondary vegetation at Mang Hien was burnt by individuals from the Son Hai CPC to make way for planting of a commercial cassava crop. This was not a Program activity but was done in response to a cassava processing plant being built in the Commune following a planning decision by the DPC.	ACTION: The Program should continue to offer advice regarding appropriate fertiliser and pesticide application rates to ensure that excess amounts 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 PEMM). Furthermore, given the relative steepness of the slopes in this area, appropriate erosion control measures should be recommended to safeguard against erosion.	PMU
Son Hai	34	Cassava processing plant, Son Hai. Although the Program has no involvement in the operation of the plant as it is not a Program activity, linamarin is a volatile by-product of processing and is released into the air during processing. This can therefore result in potential issues associated with the inhalation of cyanide gas and potentially serious health issues.	The Program only has interest in the processing plant as it built the road used to transport cassava to the plant from where it is grown in Mang Hien. The Program is therefore something of a stakeholder in Son Hai's cassava growing activity and so felt it should make the CPC aware of health issues associated with its processing. ACTION: None required. The cassava plant has been built and the Program has offered its advice on this issue regarding human health risks.	
Son Hai	35	Cassava processing facility, Son Hai. Although this is not a Program activity, the facility is now operational and discharges untreated effluent to the local river. This is bad practice as untreated effluent from cassava processing is likely to have high Biological and Chemical Oxygen Demand and potential some low levels of cyanides that will adversely affect fish and plant communities.	Although the plant is not a Program activity, it demonstrates a much bigger planning issue that the Program is faced with – how to have a say in the EIA decision making process for developments that end up being supported by Program funded infrastructure. In this case the road to Mang Hien that allows cassava to be brought to the processing facility. ACTION: Dialogue with CPC and DPC regarding ways that effluent discharges might be mitigated.	IEO
CYCLES 1 & 2	36	Livestock rearing, including cattle and pigs can give rise to increased erosion on the land due to the cloven hoofed 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	ACTION: Ongoing provision of 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. Appropriate stocking levels of animals to safeguard against land degradation and increased likelihood of erosion.	IEO/DDOs

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
		<i>levels give the naturally high levels present in pig manure. Animal manure ingress and animals drinking direct from wells can cause disease.</i>		
ALL	37	<p><i>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).</i></p> <p><i>Excessive use of pesticides over time will result in a build up of resistance in pest populations.</i></p> <p><i>Pesticides also form one of the major costs born by farmers.</i></p>	<p><i>The Program IPM training program, targeting in the first instance rice growing. The program is an excellent initiative and based on this the Training outline has been incorporated into the PEMM. It is likely to be important that IPM 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.</i></p> <p><i>ACTION: Ongoing work with the IPM program re broader uptake and extending it 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 and reducing amounts of Dissolved Oxygen (DO) available for fish). Fertilisers such as nitrate and phosphate can also accumulate in soils, altering its physical and chemical composition, causing it to become more acid, compact, and porous.</i></p>	PMU
CYCLE 1 Tinh Tho	38	<p>The Program has constructed a 1.1 km long, 15kV overhead power line and transformer in Tinh Tho commune. Power lines can result in the requirement to clear vegetation as well as causing localised issues from activities such as concrete mixing in the field. Furthermore oils in old units can contain Poly chlorinated Biphenyls (PCB) oils that can bioaccumulate in the environment if spilt and that are a carcinogen. For this reason their use has been phased out in transformers and electrical switchgear in most developed countries.</p>	<p><i>The route of the power line in Tinh Tho is across irrigated fields, and required no vegetation clearance. The supports for the pylons were constructed from prefabricated concrete sections, avoiding the requirement for any concrete mixing in the field. The location of the transformer is in an area that according to commune personnel does not flood during the wet season and has a concrete wall and concrete floor around it, to prevent any oils that might escape from leaks reaching ground or water receptors. The oil within the transformer unit does not contain (PCBs). The transformer in the Tinh Tho commune.</i></p> <p><i>ACTION: Periodic maintenance of transformer to ensure leaks are not occurring.</i></p>	IEO

7 Environmental Impact Assessment

7.1 Introduction

The Program EIA process is designed to ensure that Program activities do not result in significant adverse impact on the environment.

There are a number of aspects of Program environmental planning that have been significantly reviewed and updated as part of the 3rd audit visit. This is to improve the way in which Program environmental planning is carried out. This includes the following:

- A brief outline of the Vietnamese Provincial, District and Commune planning process has been provided. This is so that longer term the Program can aim to become more involved (or at least given the opportunity to contribute) to the sustainability of planning decisions being made in the Communes in which it works. This may enable the Program to apply its own environmental standards to the sustainability of developments/practices being approved and improve environmental outcomes as a result. In the absence of this, some potential exists for unsustainable activities to be established in Communes as a result of planning external to the Program and for the Program to end up indirectly supporting these activities via infrastructure it subsequently establishes.
- An updated version of the Program EIA process that merges the 4 stage environmental planning process with the 10 step PPP into a new 13 step process. This is important as the environment needs to be considered as part of the PPP and not as a separate parallel process as was previously the case.
- As the Program is now working with an increased number of communes and some new potential issues as a result, the PEMM, (and the EIAC and EMGs contained within it) have been updated to reflect these activities and any issues that might be associated with them.
- The EMGs have been reworked. This is because their original design was not felt to be clear enough, and it will be particularly important that they are easy to follow to ensure broader uptake by the Program DDOs as the Program continues to work with an increasing number of communes.

Table 6: Recommendations – EIA Process

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
ALL	39	As the Program seeks to expand the agriculture, manufacturing and income generation potential of people it will have environmental consequences. The goals of the Program are however to ensure that such expansion and growth occurs sustainably. At present this involves fitting in with the broader development goals and decisions made by the National, Provincial and District authorities regarding what development occurs in the Communes with which it works.	An outline of the Vietnamese Provincial, District and Commune planning processes has been set out in Section 2.3 of the PEMM. This is important to understand so that longer term the Program can work towards having more say (or at least the opportunity to have its opinion heard) in the sustainability of planning decisions being made in Communes with whom it works. ACTION: More contact between IEO and counterpart in DNRE to contribute Program thinking regarding sustainable development in Communes.	IEO/PMU
ALL	40	Many of the PMU still perceive that most environmental issues associated with Program activities are those associated with construction/ operational 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 allowing development of an area.	The more far-reaching pressure for land use change is the single biggest environmental consideration facing the Program. ACTION: PMU to be trained in importance of considering the broader effects of infrastructure works provided by the Program.	Environ. Specialist/ IEO
ALL	41	Potential impacts associated with income generation activities are not being given due consideration.	ACTION: The environmental assessment of Program income generation should be undertaken by DDOs using the PEMM and EMGs with guidelines for livestock rearing and agricultural land use change. Requires Environmental Specialist to update Income Generation advice and EMGs.	ES/DDOs
ALL	42	A clearly coordinated process of environmental planning for all Program activities is required.	An amalgamated 11 step PPP incorporating environmental planning steps has been prepared and put into the updated PEMM. This is important as the environment needs to be part of the PPP and not a separate parallel process. ACTION: PMU to familiarise themselves with the new combined PPP.	PMU
ALL	43	The Program is now working with an increased number of communes with new activities and potential issues associated with these.	ACTION: PMU to familiarise themselves with the new PEMM, (and the EIAC and EMGs contained within it) that reflect these activities and any issues that might be associated with them: Note: This has included a consolidation of EMGs to avoid duplication and make them more useable.	PMU

Commune	Issue No.	Activity/Issue	Status/Action Required	By Who
ALL	44	<i>The Program did not formerly have an Environment Policy setting out those activities that it regards as acceptable.</i>	<i>An Environmental Policy was prepared following the 2nd audit visit.</i> ACTION: PMU to ensure they are familiar with the Program Environmental Policy (contained in the PEMM).	PMU
ALL	45	<i>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).</i>	<i>An EMG was prepared for this issue at the time of the second audit visit.</i> ACTION: None required.	-
ALL	46	<i>Issue relating to difficulty in tracking the status of environmental work being carried out at the communes.</i>	<i>An Action Plan was prepared for at the time of the second audit visit.</i> ACTION: IEO to continue to use for planning activities required and keeping track of status of issues. The IEO should keep a copy of the Action Plan to show progress to the Australian Team leader and the Environmental Specialist as required.	IEO
ALL	47	<i>The design of the Program EMGs as set out in the <i>The Environmental Impact and Management Issues Scoping Study, December 2001</i> was not felt to be clear enough. They also required update to ensure they adequately catered for the range of activities being undertaken by the Program.</i>	<i>The EMGs have been reworked to be issue-based. This is because their original design was not felt to be clear enough. They included issue-based EMGs (looking at water management, soil management etc); Process-based EMGs (looking and construction etc); and activity based EMGs looking at stockpile management etc). This also resulted in duplication.</i> ACTION: It will be important that DDOs become familiar with the new EMGs and their implications as the Program continues to work with an increasing number of communes. The DDOs should use the EIAC to determine the kinds of issues likely to be associated with Program activities and use them for guidance on how to manage these issues.	PMU
ALL	48	<i>Given the time constraints and location of the IEO in Quang Ngai town, more environmental information dissemination role could fall to the DDOs. The IEO should then focus on liaising with DNRE and DPI counterparts.</i>	<i>This is particularly the case given the increased number of communes the Program is dealing with. Greater involvement of the DDOs in the process of decision making regarding RCAPs 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 RCAPs.</i> ACTION: IEO to liaise more with GoV counterparts. DDOs to become familiar with the combined PPP/environmental planning process. Resources permitting they should also be trained in environmental management including: The PPP/environment planning process Vietnamese laws, Program EMGs, knowledge of endangered species/sensitive areas in Quang Ngai, contacts within the regulatory authorities, land capability, fertiliser application rates and IPM.	PMU

8 Conclusions and Recommendations

8.1 Introduction

This report sets out the findings of the third Environmental Audit (the 'Audit') of RUDEP Program activities (the 'Program') by the Environmental Specialist over the period 18-30 October 2004.

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 and some limited activity in the three Cycle 3 communes. By the time of the next scheduled Environmental Audit by the Environmental Specialist, the Program will be working with a total of 18 Communes.

Audit visits were conducted by the Environmental Specialist accompanied by the IEO to each of the three Cycle 3 Communes working with the Program as well as to look at the status of issues identified during the 2nd audit visit at a number of Cycle 1 and 2 Communes. Further to the Audit visits, desk top reviews and discussions with Program personnel also took place regarding all other Commune activities.

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.

As a result of the Audit, recommendations have been made relating to Program activities and advice concerning any new issues has been incorporated into 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, initiatives undertaken relating to land use/land capability planning and IPM, and acting upon recommendations made in the Second Audit report.

There are several excellent initiatives being proactively undertaken by the Program:

- Land capability planning and changes to land tenure are being considered by the Program. Recommendations relating to these areas are made in the report 'Forestry Land Use Planning and Land Allocation (FLUPLA) in Quang Ngai Province, Vietnam' (Hocking & Pham), commissioned by the Program. The report sets out how the climate, slope steepness and soil type of the land being considered for development

needs to be assessed as well as making recommendations as to how private ownership of steeply sloping forest land units needs to occur to bring about successful uptake of sustainable practices.

- Good ongoing work in the area of Integrated Pest Management (IPM) and sustainable practices such as goat foraging continues to occur. The aim of these are to make farming operations more sustainable, with IPM specifically aimed at reducing pesticide use, and the cost of to the farmer.

8.3 3rd Audit Recommendations

Improving the livelihoods of communes remains one of the principal aims of the Program. It is also important however to ensure that income generation and infrastructure activities undertaken to help achieve this are sustainable. In other words that changed land use and practices carried out when implementing infrastructure or introducing new income generation activity do not result in increased damage to the environment.

In order to safeguard against this, a number of additions have been suggested to the Program's Participatory Planning Process (PPP), principally involving adding the former 4 phase EIA process to it to make a new 11 step PPP. This provides a more holistic approach to assessing activities involving changes to land use, enabling the viability of RUDEP Commune Annual Plans (RCAP) to be assessed from an economic, social and environmental point of view under one umbrella process.

There are no significant environmental issues arising from Program activities in terms of compliance with applicable GoA and GoV laws and guidelines and the Program Environmental Policy. There are however areas where further improvements can be made. These include:

- Recommendations made during the Preliminary and Second Audits that either require additional action or are ongoing operations and maintenance activities. These issues are listed in italics in Tables 1-6 to this report and are divided into Infrastructure, Income Generation and EIA related issues. Each of the 48 issues outlined has furthermore been given a unique identifier number for ease of tracking.
- Additional environmental training of DDOs in environmental management including: The PPP/environment planning process Vietnamese laws, Program EMGs, knowledge of endangered species/sensitive areas in Quang Ngai, contacts within the regulatory authorities, land capability, fertiliser application rates and IPM. This is particularly important as the Program goes on to deal with an increasing number of Communes. Greater involvement of the DDOs in the provision of environmental advice means they will take greater ownership of the process and are in a better position to give feedback to the CPC regarding successful or unsuccessful RCAP.
- A brief outline of the Vietnamese Provincial, District and Commune planning process has been provided in Section 3 of the PEMM. This is so that longer term the Program can aim to become more involved (or at least given the opportunity to contribute) to the sustainability of planning decisions being made by GoV agencies in the Communes in which it works. This may enable the Program to apply its own environmental standards to the sustainability of developments/practices being approved and improve environmental outcomes as a result. In the absence of this, the potential exists for

unsustainable activities to be established in Communes as a result of planning external to the Program and for the Program to end up indirectly supporting these activities via infrastructure it subsequently establishes.

- More contact between IEO and his counterparts in DNRE and DPI is required to contribute Program thinking regarding sustainable development in Communes.
- As the Program is now working with an increased number of communes and some new potential issues as a result, the PEMM, (and the EIAC and EMGs contained within it) have been updated to reflect these activities and any issues that might be associated with them. The EMGs have been reworked and recommendations are now set out under the Program activities to which they relate (bathrooms, roads, agricultural change etc) instead of issue-based as they were before (soil management, water management etc). This was felt to be clearer and rely less on a prior knowledge of the kinds of issues that might be associated with Program activities. This is aimed to bring about broader uptake by the Program DDOs as the Program continues to work with an increasing number of communes.

Annex 1

Program Environmental Management Manual

QUANG NGAI RURAL DEVELOPMENT
PROGRAM (RUDEP) - PHASE 2

Program Environmental Management Manual
October 2004



VIETNAM-AUSTRALIA

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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
DOST	Department of Science, Technology
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 ¹
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
MOST	Ministry of Science, Technology
MNRE	Ministry of Natural Resources and Environment
NGOs	Non-Governmental Organizations
PDA	Participatory Development Adviser
PDOT	Provincial Department of Transport
PEMM	Program Environmental Management Manual
PPP	Participatory Planning Process (incorporating environment planning)
PMU	Program Management Unit
PPC	Provincial People's Committee
PCPAPS	Problem Census/Problem Analysis/Problem Solving
RCAP	RUDEP Commune Annual Plan
RUDEP	Quang Ngai Rural Development Program
SS	Scoping Study (for RUDEP)
VTL	Vietnamese Team Leader

¹ Australian Federal Law

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 compile 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 including Australian and Vietnamese laws and regulations.

- **Section 3 The Program Environment Policy** – This sets out the Environmental Vision, Objectives and Principles of RUDEP. All proposals/RCAPs requesting Program assistance must be comply with the requirements of the Environment Policy as a minimum requirement. This goes to section 3 and PPP to section 4.
- **Section 4 Combined PPP/EIA Process** – The PPP was updated following the 3rd Environmental Audit visit by the Environmental Specialist. It is now a 11 step process representing a merger between the 10 step PPP and the 4 phase EIA process for assessing and managing all of the financial, social and environmental aspects of RCAPs and Program activities.
- **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/Design, Implementation and Operational Phases and references the relevant EMG to use for a given issue. Further information/guidance relating to the range of activities are set out in Environmental Management Guidelines (EMGs).
- **Section 6 Environmental Management Guidelines (EMGs)** – These provide guidance on how to manage potential impacts associated with Program activities. The EMGs have been extensively reviewed following the 3rd Environmental Audit visit by the Environmental Specialist and are now set out under the Program activities to which they relate (bathrooms, roads, agricultural change etc). (They were formerly issue-based - soil management, water management etc).
- **Section 7 Environmental Management Plan (EMP)** – An EMP is simply the RCAP for a proposed activity or sub-project with the relevant EMG, Summary Cover Sheet and supporting information attached outlining how issues are to be managed.
- **Annex 1 - Environmental Action Plan** – This is a listing of all Program issues on a Village Commune basis. This is for the IEO to keep track of the status of issues being managed.

2 Environmental Management

2.1 Introduction

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 goals of the Program are however to ensure that the expansion and growth it supports occurs sustainably. At present this means fitting in with the broader development goals and decisions made by the Vietnamese National, Provincial and District authorities via Laws, Instructions, Decrees and Regulations.

Longer term however it would be useful if the Program were at least given the opportunity to contribute to the decision making process in the Communes in which it works. This may enable the Program to apply its own environmental standards to the sustainability of developments/practices being approved and an improvement in environmental outcomes as a result. To enable this to occur, a brief outline of the Provincial, District and Commune Planning processes has been made in section 2.3 'Vietnamese Requirements', focussing on the environmental component of these processes.

There are many reasons for undertaking environmental management, including the legal requirements for environmental protection in Viet Nam as set out in Section 2.3, 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.

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. EIA 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 of number of laws and regulations make up GOVN environmental policy. The Law on Environmental Protection [EPL] (January 1994) No. 29L/CTN provides the basic framework for environmental management and protection in Viet Nam. All projects must follow the process established under the EPL, and the other decrees that support it.

Vietnamese Planning Process

The Vietnamese planning process requires that developments be assessed via the following process:

1. Items of infrastructure or developments of any kind must submit an Application for investment license. In the case of a Commune working with the Program, a Project Management Board (PMB) made up of CPC personnel submits this to the DPI. 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.

- *Design stage* - No. 1 type projects prepare and submit the EIA report and technical and economic feasibility report.

2. If the project is of a certain size or significance it is assessed by DNRE at a Provincial level. (*Discussions with a senior representative from DNRE indicated that DNRE intends to establish a District level organisational structure in 2005 that will have a role in this process*). If it is a more major development it is assessed by the Ministry of Natural Resources and Environment (MNRE) at a National level. The criteria determining whether DNRE or MNRE assess a development are set out in:

- Circular No. 490-TT-BK - guidelines on preparation and appraisal of environmental impact assessment (EIA).

3. Assuming the proposed development is not of national environmental significance, the PPC receive the proposal first. They assemble a team of people to review it including representatives from DPI, DNRE, and DPC (District Peoples Committee) as required. As a minimum all factories and similar developments undergo an environmental assessment by DNRE. Development proposals are assessed against the EIA requirements in Circular No. 490-TT-BK, and:

- Decree No. 175-CP - guidelines for implementation of EPL.

4. The main considerations when assessing the proposal are:

- Raw material sources and viability of sourcing these.
- Suitability of locations to construct the plant/infrastructure.
- Political considerations (ie whether there are certain areas set aside as priority growth zones).

5. Underpinning all of these considerations is the requirement that any development is consistent with the Provincial Plan for Quang Ngai Province and the priorities set out under this at the District and Commune levels. The Quang Ngai Provincial Plan is termed the '*Economic and Society Development Plan 2005-2010*' (the '*Provincial Plan*'). The District and Communes are furthermore required to establish a series of 5 year and yearly ('*Annual Plans*') to achieve the goals of this '*Provincial Plan*'.

The DPC manage and enforce laws relating to this including the environmental and forest management laws to ensure that development is consistent with it. The Provincial Plan requires that information is made available about what development is planned at the Provincial, District and Commune level so that all levels of government are familiar with what is expected of them and what is or isn't permissible down to the Commune level.

Laws administered by the DPC and DARD include to enforce the process include:

- Instruction/Directive No. 36-CT/TW - Environmental protection.
- Decree No. 26/CP - Enforcement and punishment.
- The Forest Protection and Development Law, 1991.

6. Assuming the development meets with approval, completion involves relevant agencies issuing construction licenses, inspections and stipulation of environmental standards, and approvals and certifications by the environmental standards registration board. On approval, and once all of these processes have been completed the investment license is issued for the development to occur that incorporates environmental controls within it.

The CPC do have the right to appeal against a development going ahead in their Commune by appealing to the PPC. They do not however have the authority to formally request that an item of infrastructure be situated in their Commune.

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 (DOST) and other line agencies for example, PDOT for road subprojects and DARD Dept of Agriculture and Rural Development 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.

The purpose of reviewing a Draft Plan against the RUDEP Environment Policy and carrying out the combined PPP/EIA process in advance of any proposed development is therefore to ensure that any potential negative impacts are identified. Impacts must be identified before they can be managed.

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.

It is the responsibility of the DOST and DNRE 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 DOST as requested, in responding to the proposed environmental planning guidelines and PEMM.

3 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.

4 Combined PPP/EIA Process

Improving the livelihoods of communes is one of the principal aims of the Program. It remains important however to ensure that income generation and infrastructure activities undertaken to help achieve this are sustainable. In other words that changed land use and practices do not result in damage to the environment.

Table 1 outlines the combined PPP/EIA process following the 3rd Environmental Audit visit by the Environmental Specialist. The PPP now consists of a merger between the former 10 step PPP and 4 phase EIA processes into a 11 step process for assessing the financial, social and environmental issues associated with RCAPs.

All RCAPs are required to be developed using this 11 step approach.

Table 1: Participatory Planning Process

PPP Step	EIA Step	Combined Output	Environmental Checks
1. Participatory Rural Appraisal (PRA) and Analysis of PRA data (gathering of baseline data from households)	Gather of baseline data for environment	<ul style="list-style-type: none"> Commune PRA Report 	PRA involves gathering of information on priority environmental issues, problems and solutions based on perceptions of households
2. DDO facilitator training in PRA	Training in (1) Facilitation skills; (2) Village Planning Meeting (VPM) format (3) RUDEP components and activities (4) 4 phase EIA process	<ul style="list-style-type: none"> Trained DDOs in RUDEP Planning approach and facilitation including environmental considerations 	DDOs to be familiar with combined PPP approach
3. Facilitator training (In Village Planning Meetings)	As per PPP Step with environmental training component included	<ul style="list-style-type: none"> DDOs train commune facilitators Facilitator training plus discussion of PRA results and conduct of mock VPM; Includes eg. environment issues Trained CCG/Village heads/Mass Movements/Hamlet 	Facilitators trained in all aspects of VPM including consideration of example environmental issues as part of mock VPM
4. Information Campaign RUDEP and VPM	As per PPP Step	<ul style="list-style-type: none"> Awareness of timing and objective of VPM by village residents 	Scope of VPM to include social, economic and environmental considerations
5. Village Planning meetings (PC/PA/PS)	PLANNING PHASE OF EIA	<ul style="list-style-type: none"> List of activities and projects identified based on consideration against environment, social and economic criteria and other criteria 	Opportunity to decide against proceeding with a proposed activity if it goes against RUDEP goals or Environmental Policy it (eg if a valued habitat is to be destroyed as a result of an activity) Should include consideration of Land Use Planning and Land Capability decisions
6. Commune Plan Preparation Meeting	As per PPP Step	<ul style="list-style-type: none"> Draft RCAP including environmental considerations 	Facilitator discusses and proposes alternatives to activities with major environmental impacts
7. RUDEP Annual Plan approved by DPC and PPC	As per PPP Step	<ul style="list-style-type: none"> Approval of RCAP by DPC and PPC including environmental designs 	PMU decides whether Draft Plan of activity meets RUDEP economic/social/environmental objectives as set out in the PEMM
8. Commune Feedback Meeting (RUDEP presents approved plan to CCG and village leaders)	As per PPP Step	Presentation and discussion of commune plan and budgets	Includes environmental options following design phase

PPP Step	EIA Step	Combined Output	Environmental Checks
9. Village Feedback Meetings (organised by CCG and village leaders to present plan with DDO attending)	As per PPP Step		Includes discussion of environmental considerations
10. Activity Group/VSCF/ Livelihood Group meetings	Draft Plan if approved is then implemented by the activity groups	<ul style="list-style-type: none"> • Presentation and discussion of village plan and budgets • Formation of AGs 	Includes budgets for environmental considerations and controls eg revegetation etc
11. RCAP - Design and Implementation Phase	<p>DESIGN & IMPLEMENTATION PHASES OF EIA</p> <p>PMU looks at issues associated with the new activity and decides best way to design/implement an activity to minimise environmental impact</p>	<p>Designs by DPC for IEO to review incorporating design, implementation and operational environmental considerations. RCAP Finalised</p> <p>Construction of infrastructure or establishment of a new agricultural land use with appropriate long term environmental and budget management controls in place</p>	<p>The PMU looks at issues associated with the new activity and decides best way to design/plan activity to minimise environmental impact. Eg route of a road could avoid a valued habitat</p> <p>The Implementation phase is either the Construction phase for Infrastructure or the Establishment phase for a new agriculture activity. This phase looks at minimising harm from building infrastructure or establishing a new land use</p>

5 EIA 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 EIA

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 that 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 tools in RUDEP's EIA 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, DOST & DNRE to develop the 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 EIAC 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 EIAC, EMGs together form the project EMP. The generic EIAC is set out in Table 2 and the EMGs are set out in Section 6.

NOTE: EMGs provide guidance on managing and assessing the kinds of potential issues associated with Program activities and are now set out under the Program activities to which they relate (bathrooms, roads, agricultural change etc). This means that they can now be used independent of the EIAC when undertaking environmental planning.

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/Design 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.	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	3
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	3
	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	3
	Creation of opportunity for further illegal land clearing activity		Loss of biodiversity	Consult with community to safeguard against this	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	3

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	3
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	3
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	3
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	3
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	3
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	3
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	3
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	3

Agricultural Land Use Management

Activity Affecting Environment	Impacts on the Environment	Applicable? Yes/No	Main Environmental Issue	Recommended Action	EMG References
Planning/Design 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	5
	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	5
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	5
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	5
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	5
Introduction of livestock grazing	Cloven hooved 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	5
	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	5
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	5

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	5
	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')		5
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	7
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	7
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	5, 7
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	5,7
Track/road use to new area	Noise and dust pollution		Nuisance to community	Site track away from sensitive community facilities eg kindergartens if possible	5

Buildings & Minor Infrastructure

Activity Affecting Environment	Impacts on the Environment	Applicable? Yes/No	Main Environmental Issue	Recommended Action	EMG References
Planning/Design 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	1, 2, 3
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	1, 2, 3
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	1, 2, 3
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	1, 2, 3
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	1, 2, 3
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	1, 2, 3

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	1, 2
				Existing asbestos roofs should be painted to extend life and safeguard against fibre release	1, 2
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	1, 2, 3, 4
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	1, 2, 3, 4
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	6
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	1, 2,
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	1

Irrigation Activities

Activity Affecting Environment	Impacts on the Environment	Applicable? Yes/No	Main Environmental Issue	Recommended Action	EMG References
Planning/Design 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	5
	Encroachment on historically or culturally significant sites		Cultural impacts for community	Consult with community to avoid use of these areas	5
	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	5
	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	5
	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	5
	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	5
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, 5
	Noise and dust during construction period		Nuisance to community	Provide safety protection for workers. Limit days and time of construction	4, 5,

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, 5
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, 5
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	4, 5
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	4, 5
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	4, 5
	Noise pollution		Nuisance to certain households in community	Site pump away from houses where possible or restrict hours of use	4, 5

6 Environmental Management Guidelines

ENVIRONMENTAL MANAGEMENT GUIDELINES SUMMARY SHEET

District	
Commune	
Village	
Date	
USER NOTES: These EMGs are designed to cater for the current range of Program activities as identified by the Environment Specialist following the 3 rd Environmental Audit in October 2004. 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 a Program activities and subprojects have been identified. This document and the EMGs it nominates will become the RUDEP Environmental Management Plan (EMP) for that given RCAP activity. These should be attached to the documents submitted for Department of Science, Technology (DOST) and Department of Natural Resources and Environment (DNRE) for approval. 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. NOTE: Tick the final column to show which parts of the EMG applies to the Program activity in a Commune or Village. Attach this to the RCAP with any supporting information to form the EMP for the activity.	
IEO Signature:	Date:

EMG 1 - KINDERGARTENS, HEALTH CENTRES AND MARKETS

Policy/Objective

To avoid using forest, sensitive cultural areas or contaminated sites as the sites for such buildings; to avoid using any asbestos or lead paint materials in their construction; and that appropriate measures are put in place to prevent wastes, sediment or other building materials reaching sensitive receptors such as rivers or residential houses.

Phase	Issues/guidance	Applicable?
Planning	<p>CULTURAL IMPACTS</p> <p>1. Ensure that the proposed site for such buildings has no significant impact on the cultural heritage of the local population.</p> <p>2. The Contractor will liaise with the local community to identify sites of cultural importance and avoid using these.</p>	
	<p>FOREST/SENSITIVE AREAS</p> <p>1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance (<i>Refer Section 2.4 Environmental Scoping Study</i>).</p> <p>2. The Contractor will avoid disturbing areas of forest or valued natural habitat. Mature trees or trees of environmental significance must, where possible, be retained. Preferred locations for constructing buildings are where land has already been used for housing or agriculture before.</p>	
	<p>CONTAMINATED LAND ISSUES</p> <p>1. Liaise with the local community to identify whether the site intended for use has been used previously for a potentially contaminating activity. This includes pesticide and fuel storage.</p> <p>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.</p>	
Design	<p>CULTURAL IMPACTS</p> <p>As per the Planning Phase</p>	
	<p>FOREST/SENSITIVE AREAS</p> <p>As per the Planning Phase</p>	
	<p>CONTAMINATED LAND ISSUES</p> <p>1. If the site is still preferred despite evidence of a previously contaminative use 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 any contamination present.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Consider rainwater collection systems as a means of supplying clean water for such buildings, particularly 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 communal buildings.</p>	

Phase	Issues/guidance	Applicable?
Construction	<p>CONTAMINATED LAND ISSUES (Only applies if identified at Planning or design phase)</p> <ol style="list-style-type: none"> 1. 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 in consultation with the Environmental Specialist. 2. The samples should be sent to an approved laboratory for analysis and a second laboratory to check results by the IEO. The units in which measurements are to be made should be clearly stated by the IEO in liaison with the Environment Specialist. 3. 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. 4. The Environmental Specialist will submit a report indicating what remediation or additional sampling needs to be carried out. 	
	<p>FOREST/SENSITIVE AREAS</p> <ol style="list-style-type: none"> 1. Where trees in or near the construction site are to be retained they shall be protected throughout the construction period. 2. Clearance of mature vegetation/trees to be kept to a minimum. 	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <ol style="list-style-type: none"> 1. 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. 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. 4. Clearly signpost alternate routes and detours and erect barriers to restrict access to work areas to unauthorised personnel. 5. Store all materials and equipment on site to minimise hazards to persons, materials, equipment and the environment. 6. The Contractor to avoid disturbances near residential areas where possible via the following means: Use of modern and well maintained equipment; Use of noise screens or mounds near residential areas, providing advice to commune leaders, school and health clinic staff etc when there will be unavoidable noise, and avoid working at night where disturbance to residents may occur. 7. Dust suppression measures including spraying water on exposed surfaces and material being transported in trucks, wind breaks, dust screens areas etc should be used. 8. Ensure that asbestos containing materials are not used in building construction. Use tin or tiles as roofing material to avoid possible serious respiratory ailments. Where asbestos roofing materials have been used, these should be painted to safeguard against deterioration and prevent fibre release. 9. IEO to conduct regular inspections during construction activities, check on safety measures and waste management issues. Contractor and IEO to liaise with local CPU leaders regarding this. 	

Phase	Issues/guidance	Applicable?
	<p>WATER MANAGEMENT/SEDIMENT CONTROL</p> <p>1. Use Filter/gross sediment traps where applicable: These consist of a mesh or grid near the outlet drain from a construction site, to trap items like plastic bags, cans, bottles, paper. Water discharging from such sites should also pass over a vegetated surface to remove petroleum-based organic pollutants before discharging into drainage systems.</p> <p>2. Hazardous goods (including fuel and oil) shall be stored and handled only within a bunded area set aside for that purpose and wash down of vehicles should occur in a contained area away from watercourses.</p> <p>3. The contractor should negotiate with the local community and DOST/DNRE regarding the location of disposal areas and stockpiles.</p> <p>4. Construct control structures at the outset of construction to reduce erosion including 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.</p> <p>5. All disturbed areas that are not to be paved or gravelled should be revegetated or prepared for natural revegetation after final landscaping.</p> <p>6. 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.</p>	
	<p>WASTE MANAGEMENT</p> <p>1. Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. Filter/gross sediment traps should be cleaned regularly and the waste disposed of appropriately.</p> <p>2. Contain all stored waste within the construction site.</p> <p>3. Crush, burn and bury all inorganic waste in an approved area.</p> <p>4. 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 and other liquid contaminants shall be stored in appropriate containers and disposed of at an authorised toxic landfill site.</p>	
<p>Operational</p>	<p>CULTURAL IMPACTS</p> <p>1. The IEO will liaise with local community on an ongoing basis to ensure that sites of cultural importance are/have been adequately protected.</p> <p>2. If any damage occurs, discuss with the local community and implement any remedial actions requested by them.</p>	
	<p>CONTAMINATED LAND ISSUES</p> <p>1. The IEO needs to select an appropriate contractor to remediate the site/remove contaminated material as required. The IEO/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.</p> <p>2. Ongoing monitoring to ensure that contamination clean up has removed contaminants to safe levels in accordance with ES report recommendations that take into account the new use of the site.</p>	

Phase	Issues/guidance	Applicable?
	This might for example include taking additional soil samples from the site or water samples from nearby wells. 3. If contractors do not remediate (clean-up) contaminated material in accordance with instructions, the IEO should recommend use of a different contractor for future work.	
	VEGETATION MANAGEMENT 1. Encourage re-vegetation after construction activities are completed.	
	WASTE MANAGEMENT 1. Use Filter/gross sediment traps where applicable: These consist of a mesh or grid near the outlet drain from a construction site, to trap items of waste such as plastic bags, cans, bottles, paper. 2. For market sites, consideration should be given to composting green organic wastes. Refer EMG** Composting.	

EMG 2 – WELLS, TANKS, BATHROOMS/TOILETS & WATER FILTERS

Policy/Objective

To ensure that these are constructed and installed in a way that improves the health and hygiene of the people and that any wastes, sediment or other building materials generated during construction do not enter sensitive receptors such as rivers.

Phase	Issues/guidance	Applicable?
Planning	CULTURAL IMPACTS 1. Ensure that the proposed site for such buildings has no significant impact on the cultural heritage of the local population. 2. The Contractor will liaise with the local community to identify sites of cultural importance and avoid using these.	
	FOREST/SENSITIVE AREAS 1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance (<i>Refer Section 2.4 Environmental Scoping Study</i>). 2. The Contractor will avoid disturbing areas of forest or valued natural habitat. Mature trees or trees of environmental significance must, where possible, be retained. Preferred locations for constructing buildings are where land has already been used for housing or agriculture before.	
	CONTAMINATED LAND ISSUES 1. Liaise with the local community to identify whether the site intended for sinking a WELL has been used previously for a potentially contaminating activity. This includes pesticide and fuel storage. 2. If the site was used for a known potentially contaminative end use such as fuel, chemical, pesticide or herbicide storage, an alternative site must be chosen for the siting of wells as contaminated material may enter the well.	
Design	CULTURAL IMPACTS As per the Planning Phase	
	FOREST/SENSITIVE AREAS As per the Planning Phase	
	HEALTH & SAFETY CONSIDERATIONS – WELLS* Design criteria should include the following: 1. A concrete surface slab and lining and barricade wall to reduce contamination. 2. A sand/gravel filter at the base of the well. 3. Relocation of any potential sources of contamination away from locations immediately adjacent and upslope of the wells (20 metres if possible). This will include animal pens, buffalo wallows and human toilets. 4. Contractor is responsible for pump/clean out of wells prior to commissioning. 5. Ensure a program of well sampling at commissioning and once in use is put into contractor documents. Sampling to occur against the Vietnamese standard for drinking water, as set out in Ministry of Health Decision 505/BYT/QD (1992). 6. New toilet facilities shall be: located away from sources of potable water supply and be of sufficient capacity to service the population using the facility; and, above pit latrines or composting toilets. 7. Ensure septic tank outflows are not located near potable water supplies or drain into the natural watercourse catchments.	

Phase	Issues/guidance	Applicable?
Construction	<p>FOREST/SENSITIVE AREAS</p> <ol style="list-style-type: none"> Where trees in or near the construction site are to be retained they shall be protected throughout the construction period. Clearance of mature vegetation/trees to be kept to a minimum. 	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <ol style="list-style-type: none"> The IEO/Contractor shall ensure that all staff and local residents are aware of all health and safety requirements on the construction site. Contractor documents to specify the requirement for clean-out of wells before commissioning. Relocate sources of potential contamination eg buffalo pens, wallows and toilets away from wells. Store all materials and equipment on site to minimise hazards to persons, materials, equipment and the environment. The Contractor to avoid disturbances near residential areas where possible via the following means: Use of modern and well maintained equipment; providing advice to commune leaders, school and health clinic staff etc when there will be unavoidable noise, and avoid working at night where disturbance to residents may occur. Dust suppression measures including spraying water on exposed surfaces and material being transported in trucks, wind breaks, dust screens areas etc should be used. Ensure that asbestos containing materials are not used in bathrooms. Use tin or tiles as roofing material instead. Where asbestos roofing materials have been used, these should be painted to safeguard against deterioration and prevent fibre release. IEO to conduct regular inspections during construction activities, check on safety measures and waste management issues. Contractor and IEO to liaise with local CPU leaders regarding this. 	
	<p>WATER MANAGEMENT/SEDIMENT CONTROL</p> <ol style="list-style-type: none"> The Contractor shall control runoff and manage sediments near gardens, fishponds and water bodies using hay bales or other appropriate measures. Hazardous goods (including fuel and oil) shall be stored and handled only within a bunded area set aside for that purpose and wash down of vehicles should occur in a contained area away from watercourses. The contractor to negotiate with the local community and DOST/DNRE regarding the location of disposal areas and stockpiles. 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. 	
	<p>WASTE MANAGEMENT</p> <ol style="list-style-type: none"> Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. Filter/gross sediment traps should be cleaned regularly and the waste disposed of appropriately. Contain all stored waste within the construction site. Crush, burn and bury all inorganic waste in an approved area. 	

Phase	Issues/guidance	Applicable?
	4. During site clean up dispose of contaminants in an approved manner: burn all spilled fuel oil; discharge gaseous contaminants - diluting with fresh air; chemicals shall be stored in appropriate containers and disposed of at an authorised landfill site.	
Operational	<p>CULTURAL IMPACTS</p> <p>1. The IEO will liaise with local community on an ongoing basis to ensure that sites of cultural importance are/have been adequately protected.</p> <p>2. If any damage occurs, discuss with the local community and implement any remedial actions requested by them.</p>	
	<p>VEGETATION MANAGEMENT</p> <p>1. Encourage re-vegetation after construction activities are completed.</p>	
	<p>WASTE MANAGEMENT</p> <p>1. Periodic pump out of toilet pits should occur via a licensed contractor and disposed of appropriately.</p>	
	<p>HEALTH AND SAFETY CONSIDERATIONS – WELLS*</p> <p>1. In the event that sample from wells after commissioning indicates elevated E coli levels when 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, undertake the following:</p> <p>2. Train Commune personnel in improved health practices including requirement not to cross –contaminate wells using dirty buckets when drawing water.</p> <p>3. Limited sampling should be undertaken to see if practice change has improved the situation.</p> <p>4. If situation remains unchanged, introduce means of filtering water once it has been drawn.</p> <p>5. Alternatively investigate the possibility of capping wells and installing a hand pump to prevent ingress of faecal matter.</p> <p>6. If These measures do not result in improved water quality, contact CERWASS (Centre for Rural Water Supply and Sanitation in Hanoi) or the Environment Specialist for further advice.</p>	

EMG 3 – BRIDGES & ROADS

Policy/Objective

To consider what the impacts of building a road or bridge will be in terms of land use change and whether this is acceptable; to avoid sensitive cultural areas, forest, or other valued habitats when selecting the location for such infrastructure; and that appropriate measures are put in place to prevent wastes, sediment or other building materials reaching sensitive receptors such as rivers or residential houses.

Phase	Issues/guidance	Applicable?
Planning	<p>CULTURAL IMPACTS</p> <ol style="list-style-type: none"> 1. Ensure that the proposed site for has no significant impact on the cultural heritage of the local population. 2. The Contractor will liaise with the local community to identify sites of cultural importance and avoid using these. 	
	<p>FOREST/SENSITIVE AREAS</p> <ol style="list-style-type: none"> 1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance (<i>Refer Section 2.4 Environmental Scoping Study</i>). 2. 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 bridge and plans made to safeguard against disease spread occurring. 3. 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 in a new area in an unsustainable way (eg logging of forested areas etc). Program must ensure that infrastructure such as roads and bridges do not contribute to unsustainable practices. 4. The Contractor will avoid disturbing areas of forest or valued natural habitat in the planning of the route. Mature trees or trees of environmental significance must, where possible, be retained. 	
Design	<p>CULTURAL IMPACTS</p> <ol style="list-style-type: none"> 1. The Contractor shall ensure that all construction workers are aware of the significance of culturally important sites and the need to avoid impacts to any such sites As per the Planning Phase. 	
	<p>FOREST/SENSITIVE AREAS</p> <ol style="list-style-type: none"> 1. The Contractor shall ensure that all construction workers are aware of the significance of environmentally important sites such as forests and the need to avoid impacts to any such sites with route selection As per the Planning Phase. 	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>Ensure that the contractor is aware of all Program Health and Safety requirements before construction phase of activity begins.</p>	
	<p>WATER MANAGEMENT/EROSION CONTROL</p> <ol style="list-style-type: none"> 1. Ensure that Program activities/infrastructure do not result in isolation of communities of plants, animals and fish, or disrupt watercourses. 2. 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. 3. 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. 	

Phase	Issues/guidance	Applicable?
	4. Cross drains, and erosion control measures in side drains on all roads of >10% slope steepness in accordance with Vietnamese guidelines for road construction. If side drains are not concrete lined then rocks to be placed in drains to slow down water flow.	
Construction	FOREST/SENSITIVE AREAS 1. Where trees in or near the construction site are to be retained they shall be protected throughout the construction period. 2. Clearance of mature vegetation/trees to be kept to a minimum.	
	HEALTH & SAFETY CONSIDERATIONS 1. 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. 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. 4. Clearly signpost alternate routes and detours and erect barriers to restrict access to work areas to unauthorised personnel. 5. Store all materials and equipment in a dedicated area to minimise hazards to persons, materials, equipment and the environment. 6. The Contractor to avoid disturbances near residential areas where possible via the following means: Use of modern and well maintained equipment; Use of noise screens or mounds near residential areas, providing advice to commune leaders, school and health clinic staff etc when there will be unavoidable noise, and avoid working at night where disturbance to resident may occur. 7. Dust suppression measures including spraying water on exposed surfaces and material being transported in trucks, wind breaks, dust screens areas etc should be used. 8. IEO to conduct regular inspections during construction activities, check on safety measures and waste management issues. Contractor and IEO to liaise with local CPU leaders regarding this.	
	WATER MANAGEMENT/EROSION CONTROL 1. Earthworks to be completed in stages such that a minimal area of ground is open or clear or exposed at any one time and activities scheduled so that large areas of soil and earth are not exposed during the wet season. 2. Ensure that activities do not significantly disrupt the natural flows of rivers during construction. 3. Keep construction vehicles, plant and equipment on defined tracks. 4. The Contractor shall control runoff and manage sediments near gardens, fishponds and water bodies. 5. Water should be directed over a vegetated surface to remove petroleum-based organic pollutants before discharging into drainage systems from areas where machinery/fuel is being stored. 6. Hazardous goods (including fuel and oil) shall be stored and handled only within a bunded area set aside for that purpose and wash down of vehicles should occur in a contained area away from watercourses. 7. The contractor to negotiate with the local community and DOST/DNRE regarding the location of disposal areas and stockpiles. 8. Construct necessary temporary/permanent control structures at the outset of construction. These structures may include:	

Phase	Issues/guidance	Applicable?
	<ul style="list-style-type: none"> ▪ 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. ▪ In clayey areas, and areas of high rainfall sediment traps must be large enough to retain water for at least 24 hours. Sand grains are deposited rapidly and silt traps in sandy areas may be small. Finer silt and clay particles are deposited very slowly. Silt traps must be cleaned out regularly. <p>9. Cross drains, and erosion control measures in side drains on all roads of >10% slope steepness in accordance with Vietnamese guidelines for road construction. If side drains are not concrete lined then rocks to be placed in drains to slow down water flow.</p> <p>10. 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.</p> <p>11. Stormwater runoff from construction sites should pass through a gross pollutant trap consisting of a mesh or grid near the outlet drain from the site to trap items such as plastic bags, cans, bottles etc.</p>	
	<p>WASTE MANAGEMENT</p> <p>1. Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. Filter/gross sediment traps should be cleaned regularly and the waste disposed of appropriately.</p> <p>2. Contain all stored waste within the construction site.</p> <p>3. Crush, burn and bury all inorganic waste in an approved area.</p> <p>4. 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 and other liquid contaminants shall be stored in appropriate containers and disposed of at an authorised landfill site.</p>	
	<p>SPOIL/BORROW PIT MANAGEMENT</p> <p>1. 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.</p> <p>2. Borrow not to be taken from valued environmental or cultural areas.</p> <p>3. The Contractor shall negotiate with commune leaders about the location of spoil dumping areas. If spoil is to be dumped locally, prepare a level site on which it can be dumped and piled.</p> <p>4. 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.</p> <p>5. 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.</p> <p>6. Stockpiles and spoil heaps must be subject to stability calculations to safeguard against a major slip occurring.</p> <p>7. Where possible, spoil should be used to backfill quarry areas, borrow pits or waste disposal sites before they are re-vegetated.</p> <p>8. Avoid discharging water onto unstable slopes or old landslips.</p> <p>9. Encourage revegetation after construction activities have finished.</p>	

Phase	Issues/guidance	Applicable?
	10. 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 and to check compliance with the guidelines.	
Operational	CULTURAL IMPACTS 1. The IEO will liaise with local community on an ongoing basis to ensure that sites of cultural importance are/have been adequately protected. 2. If any damage occurs, discuss with the local community and implement any remedial actions requested by them.	
	VEGETATION MANAGEMENT 1. Encourage re-vegetation after construction activities are completed.	
	WATER MANAGEMENT/EROSION CONTROL 1. Ensure revegetation of all verges, roadside and borrow pits after construction activities have finished. 2. All disturbed areas that are not to be paved or gravelled should be revegetated or prepared for natural revegetation after final landscaping. 3. Repairs to damaged areas, re-establishment of vegetation re-growth. Modify and improve drainage control strategies. 4. IEO to review roads periodically to assess condition. Modification of contractor documents to improve practices over time	

EMG 4 – DAMS, IRRIGATION CHANNELS & RIVER BANK STABILISATION

Policy/Objective

To consider what the impacts of a dam, irrigation channel or river bank stabilisation will be in terms of land use change and disruption to natural river flows and fish and plant communities. To ensure that appropriate measures are put in place to prevent wastes, sediment or other building materials reaching rivers during construction and to ensure that irrigation channels do not suffer from erosion.

Phase	Issues/guidance	Applicable?
Planning	CULTURAL IMPACTS 1. Ensure that the proposed route of the irrigation channel does not cause significant impact on the cultural heritage of the local population. 2. The Contractor will liaise with the local community to identify sites of cultural importance and avoid using these.	
	FOREST/SENSITIVE AREAS 1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance via the re-routing of a river or establishment of an irrigation channel (<i>Refer Section 2.4 Environmental Scoping Study</i>). 2. The Contractor will avoid disturbing areas of forest or valued natural habitat in the planning of the route. Mature trees or trees of environmental significance must, where possible, be retained.	
	WATER MANAGEMENT/EROSION CONTROL 1. Ensure that irrigation channels do not disrupt the main flow of rivers to the extent that fish and plants that rely on it are significantly affected. 2. Ensure that any new irrigation activity does not impact upon the volume of water passing to groundwater and cause lowering of water levels in wells and impacts upon the community as result. 3. To ensure that measures put in place do not give rise to bigger problems downstream. This may occur if concrete bank reinforcement occurs on slumping meanders, as flow rate is increased due to reduced friction of river on concrete giving rise to greater pressure to erode downstream.	
Design	CULTURAL IMPACTS 1. The Contractor shall ensure that all construction workers are aware of the significance of culturally important sites and the need to avoid impacts to any such sites As per the Planning Phase.	
	FOREST/SENSITIVE AREAS 1. The Contractor shall ensure that all construction workers are aware of the significance of environmentally important sites such as forests and the need to avoid impacts to any such sites with route selection As per the Planning Phase.	
	HEALTH & SAFETY CONSIDERATIONS Ensure that the contractor is aware of all Program Health and Safety requirements before construction phase of activity begins.	

Phase	Issues/guidance	Applicable?
	<p>WATER MANAGEMENT/EROSION CONTROL</p> <ol style="list-style-type: none"> 1. Ensure that Program activities/infrastructure do not result in isolation of communities of plants, animals and fish, or significantly disrupt the flow of rivers. 2. Ensure that design allows for good flows to remain in river being used as the source of irrigation water. 3. Ensure that engineering design does not result in increased erosion risk in source river. This can occur when flows in the original river channel are disrupted/changed. Appropriate design and slope/bank stabilisation to occur. 4. Investigate bio engineered solutions for the stabilisation of irrigation channels. This has the effect of slowing down water flow rates and preventing erosion being caused further downstream that concrete infrastructure often results in as it does not slow water flow rates. Bio-engineered solutions also represent a more environmentally friendly solution as they help retain nutrients along the river banks, and can be far more cost-effective means of stabilising a river against the 3 main causes of erosion: 5. Vegetation chosen should have deep root systems to be able to bind the soil with dense leaves and branches to slow down water movement in the river and counter the two main types of erosion in rivers: Scour (river action) and Slumping (bank undercutting and collapse). - In addition good leaf cover to intercept rainfall and prevent Sub-aerial erosion (rain drop impact loosening the soil) is useful, although secondary to countering the other 2 river erosion processes. 	
Construction	<p>FOREST/SENSITIVE AREAS</p> <ol style="list-style-type: none"> 1. Where trees in or near the construction site are to be retained they shall be protected throughout the construction period. 2. Clearance of mature vegetation/trees to be kept to a minimum. 	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <ol style="list-style-type: none"> 1. 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, particularly against danger of drowning etc. 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. 4. Clearly signpost alternate routes and detours and erect barriers to restrict access to work areas to unauthorised personnel. 5. Store all materials and equipment in a dedicated area to minimise hazards to persons, materials, equipment and the environment. 6. The Contractor to avoid disturbances near residential areas where possible via the following means: Use of modern and well maintained equipment; Use of noise screens or mounds near residential areas, providing advice to commune leaders, school and health clinic staff etc when there will be unavoidable noise, and avoid working at night where disturbance to resident may occur. 7. IEO to conduct regular inspections during construction activities, check on safety measures and waste management issues. Contractor and IEO to liaise with local CPU leaders regarding this. 	

Phase	Issues/guidance	Applicable?
	<p>WATER MANAGEMENT/EROSION CONTROL IRRIGATION CHANNELS</p> <ol style="list-style-type: none"> 1. Ensure that activities do not significantly disrupt the natural flows of rivers during construction. 2. Keep construction vehicles, plant and equipment on defined tracks. 3. The Contractor shall control runoff and manage sediments to rivers to avoid smothering plants and fish. 4. Hazardous goods (including fuel and oil) shall be stored and handled only within a bunded area set aside for that purpose. This and vehicle washdown should occur in a contained area away from watercourses. 5. Ensure that banks of the irrigation channel are not prone to subsidence or erosion via use of appropriate bio-engineering solutions and slope/bank stabilisation using deep rooted vegetation, being careful to ensure that solutions do not simply transfer erosive forces downstream. 6. Stormwater runoff from construction sites should pass through a gross pollutant trap consisting of a mesh or grid near the outlet drain from the site to trap items such as plastic bags, cans, bottles etc. <p>DAMS</p> <ol style="list-style-type: none"> 1. Ensure that dams have a dedicated overflow in place to enable fish to migrate down stream. 	
	<p>WASTE MANAGEMENT</p> <ol style="list-style-type: none"> 1. Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. Filter/gross sediment traps should be cleaned regularly and the waste disposed of appropriately. 2. Contain all stored waste within the construction site. 3. Crush, burn and bury all inorganic waste in an approved area. 4. 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 and other liquid contaminants shall be stored in appropriate containers and disposed of at an authorised landfill site. 5. Do not allow wastes such as oils, plastic bags, cement residues or any other construction wastes to enter rivers. 	
	<p>SPOIL/BORROW PIT MANAGEMENT</p> <ol style="list-style-type: none"> 1. 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. 2. Borrow not to be taken from valued environmental or cultural areas. 3. The Contractor shall negotiate with commune leaders about the location of spoil dumping areas. If spoil is to be dumped locally, prepare a level site on which it can be dumped and piled. 4. 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. 5. 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. 6. Stockpiles and spoil heaps must be subject to stability calculations to safeguard against a major slip occurring. 	

Phase	Issues/guidance	Applicable?
	7. Where possible, spoil should be used to backfill quarry areas, borrow pits or waste disposal sites before they are re-vegetated. 8. Avoid discharging water onto unstable slopes or old landslips. 9. Encourage revegetation after construction activities have finished. 10. 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 and to check compliance with the guidelines.	
Operational	CULTURAL IMPACTS 1. The IEO will liaise with local community on an ongoing basis to ensure that sites of cultural importance are/have been adequately protected. 2. If any damage occurs, discuss with the local community and implement any remedial actions requested by them.	
	VEGETATION MANAGEMENT 1. Encourage re-vegetation after construction activities are completed.	
	WATER MANAGEMENT/EROSION CONTROL 1. Ensure revegetation of the banks of all irrigation channels occurs after construction activities have finished. 2. All disturbed areas that are not to be paved or gravelled should be revegetated or prepared for natural revegetation after final landscaping. 3. Repairs to damaged areas, re-establishment of vegetation re-growth. Modify and improve drainage control strategies. 4. IEO to review irrigation channels to assess condition and whether erosion is occurring.	

EMG 5 – AGRICULTURAL LAND USE MANAGEMENT

Policy/Objective

To consider what the impacts of a proposed agricultural activity/land use change will be in terms of impact on the natural environment. To ensure that appropriate practices are followed to minimise erosion and safeguard against the need for high pesticide and fertiliser inputs to maintain fertility of the land and protect the broader environment.

Phase	Issues/guidance	Applicable?
Planning	<p>FOREST/SENSITIVE AREAS</p> <p>1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance via the establishment of a new agricultural practice or land use (<i>Refer Section 2.4 Environmental Scoping Study</i>).</p> <p>2. The PMU should avoid disturbing areas of forest or valued natural habitat when planning/assessing new agricultural practices. Mature trees or trees of environmental significance must, where possible, be retained.</p>	
	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>1. Ensure that land capability is taken into account when planning new agriculture activities. (ie that agricultural change being suggested is well suited to the slope steepness, rainfall and soil type of the area being considered). Without this, inappropriate land use practices may be put forward, resulting in increased erosion, soil nutrient loss and the requirement for high fertiliser and pesticide inputs that can cause long term environmental damage as well as a financial burden.</p> <p>2. Refer FLUPLA report and guidance and whether proposed practices are suitable against land use categories for Quang Ngai: 1. Agriculture; level or only slightly sloping land with good soil; 2. Forest, potentially any land with slope over 10 degrees; 3. Unused, land not capable of supporting crops or trees; 4. Urban, areas with buildings or roads. Forest land is further classified into three classes: protection, production, special use.</p> <p>3. If high erosion is likely to result, or requirement for large pesticide and fertiliser inputs is required then suggest more suitable activities to Commune personnel.</p>	
	<p>CULTURAL IMPACTS</p> <p>1. Ensure that the proposed land use does not cause significant impact on the cultural heritage of the local population.</p> <p>2. PMU will liaise with the local community to identify sites of cultural importance and avoid using these.</p>	
Design	<p>FOREST/SENSITIVE AREAS</p> <p>1. The PMU shall ensure that all Commune personnel are aware of the significance of environmentally important sites such as forests and the need to avoid impacts to such sites via alternative agriculture practices being recommended. As per the Planning phase.</p>	
	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>As per Planning phase.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Ensure that all pesticides, fertilisers and fuels are appropriately stored away from wells, and water sources.</p>	

	<p>CULTURAL IMPACTS</p> <p>1. The PMU shall ensure that all Commune personnel are aware of the significance of culturally important sites and the need to avoid impacts to any such sites As per the Planning Phase.</p>	
Establishment	<p>FOREST/SENSITIVE AREAS</p> <p>1. Where trees in or near the construction site are to be retained they shall be protected throughout the construction period.</p> <p>2. Clearance of mature vegetation/trees to be kept to a minimum.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Store all pesticides in a dedicated area to minimise hazards to persons, materials, equipment and the environment.</p>	
	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>1. Ensure that clearance of land/planting occurs in the dry season to avoid high erosion risk.</p> <p>2. Establish a cover crop or leave cleared vegetation as mulch to reduce erosion.</p> <p>3. Leave corridors to prevent animals and plants becoming isolated. These can be the natural vegetation at the top and bottom of a field.</p> <p>4. Make earth contour bunds on steep slopes (>10%) and leave cleared vegetation or rough till ground to reduce erosion risk.</p>	
Operational	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>1. Maintain all practices established in Establishment phase.</p> <p>2. Ensure that fertilisers are applied appropriately and in accordance with GOV guidelines. Excess application can result in impacts to rivers such as ‘eutrophication’. Fertilisers such as nitrate and phosphate can also alter soils making them more acid, compact, and porous. (<i>refer Tables 21 & 22 in Environmental Scoping Study and Section 2 for guidance on suitable application rates</i>).</p> <p>3. Ensure appropriate pesticide use only, and apply IPM practices to reduce amounts of pesticide and fertiliser inputs. This has a positive environmental and economic benefit to the farmer and involves:</p> <ul style="list-style-type: none"> ▪ Monitoring closely insect pest numbers. ▪ Pesticide spraying at the most effective times for the insects you are trying to kill. ▪ Reducing the quantities of pesticides being used. ▪ Using different types of insecticides to reduce the likelihood of resistance to any one chemical building up. ▪ Understanding the natural predators that eat insects and avoid harming them or their habitats. <p>4. IEO/DDOs to conduct periodic inspections to assess practices being followed and whether erosion measures are adequate.</p>	
	<p>CASSAVA PROCESSING</p> <p>1. Cassava requires careful, quick processing, including the following:</p> <p>2. Processing needs to occur in a well ventilated area due to its volatility and potential for health issues as a result of inhalation.</p> <p>3. Correct drying, soaking in water, rinsing or baking of the cassava plant take place to reduce linamarin content to safe levels.</p> <p>4. Effluent should be appropriately treated prior to discharge. This involves use of settling ponds; and ponds where biological action can occur to reduce the organic content and Biological and Chemical Oxygen Demand (BOD & COD) of the effluent. If ponds are not aerated using a pump, large surface areas are required to oxygenate them.</p> <p>5. Failure to do this will cause high BOD and COD in rivers to which it is disposed resulting in impacts on fish and plant communities.</p>	

EMG 6 – LIVESTOCK REARING

Policy/Objective

To consider what the impacts of livestock rearing will be in terms of impact on the natural environment. To ensure that appropriate practices are followed to minimise erosion risk and safeguard against the need for high pesticide and fertiliser inputs to maintain fertility of the land and protect the broader environment.

Phase	Issues/guidance	Applicable?
Planning	<p>FOREST/SENSITIVE AREAS</p> <p>1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance via the establishment of a new agricultural practice or land use (<i>Refer Section 2.4 Environmental Scoping Study</i>).</p> <p>2. The PMU should avoid disturbing areas of forest or valued natural habitat when planning/assessing viability of livestock rearing. Mature trees or trees of environmental significance must, where possible, be retained.</p>	
	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>1. Ensure that land capability is taken into account when planning livestock rearing. (ie that the area being suggested is well suited to the livestock rearing in terms of slope steepness, rainfall and soil type). Without this, inappropriate land use practices may be put forward, resulting in increased erosion, soil nutrient loss and the requirement for high fertiliser and pesticide inputs that can cause long term environmental damage as well as a financial burden.</p> <p>2. Refer FLUPLA report/guidance on whether livestock rearing is suitable for land use categories being considered. In Quang Ngai these are:</p> <p>1. Agriculture; level or only slightly sloping land with good soil; 2. Forest, potentially any land with slope over 10 degrees; 3. Unused, land not capable of supporting crops or trees; 4. Urban, areas with buildings or roads. Forest land is further classified into three classes: protection, production, special use.</p> <p>3. If high erosion is likely to result, or requirement for large pesticide and fertiliser inputs is required then suggest more suitable activities to Commune personnel.</p>	
	<p>CULTURAL IMPACTS</p> <p>1. Ensure that the proposed land use does not cause significant impact on the cultural heritage of the local population.</p> <p>2. PMU will liaise with the local community to identify sites of cultural importance and avoid using these.</p>	
Design	<p>FOREST/SENSITIVE AREAS</p> <p>1. The PMU shall ensure that all Commune personnel are aware of the significance of environmentally important sites such as forests and the need to avoid impacts to such sites via alternative agriculture practices being recommended. As per the Planning phase.</p>	
	<p>SOIL/WATER MANAGEMENT/EROSION CONTROL</p> <p>As per Planning phase.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Ensure that buffalo wallows and livestock activities are not conducted adjacent to or upslope of wells. (Try to ensure 20m distance between livestock and wells is maintained).</p> <p>2. Animals must not drink from wells designed for human use or buckets used for drawing water from such wells.</p>	

Phase	Issues/guidance	Applicable?
	3. Buckets for drawing water from wells must be kept clean and stored so that they do not come into contact with animal faeces. 4. Ensure that animals are vaccinated as appropriate and that they are not allowed to interbreed in individual villages for too long. This may result in long term susceptibility to disease due to genetic deterioration over generations. 5. Spreading pig manure can result in elevated metals levels so appropriate application should occur or application in different areas.	
	CULTURAL IMPACTS 1.The PMU shall ensure that all Commune personnel are aware of the significance of culturally important sites and the need to avoid impacts to any such sites As per the Planning Phase.	
Establishment	FOREST/SENSITIVE AREAS 1. Clearance of mature vegetation/trees to be kept to a minimum. 2. Less developed trees/saplings should be protected from damage/excessive grazing by livestock.	
	SOIL/WATER MANAGEMENT/EROSION CONTROL 1. Ensure that high stocking numbers do not give rise to increased erosion risk. 2. Move water troughs and fodder areas every few months to reduce erosion risk as a result of hoof damage/trampling. 3. Keep animals away from wells and sources of drinking water for humans.	
Operational	SOIL/WATER MANAGEMENT/EROSION CONTROL 1. Maintain all practices established in Establishment phase. 2. IEO/DDOs to conduct periodic inspections to assess practices being followed and whether erosion is occurring.	

EMG 7 –ELECTRICAL TRANSFORMERS

Policy/Objective

To ensure that appropriate practices are followed when establishing electrical infrastructure and that transformers are banded and that oils do not contain PCBs.

Phase	Issues/guidance	Applicable?
Planning	<p>FOREST/SENSITIVE AREAS</p> <p>1. PMU to liaise with the local community and DNRE to identify sensitive areas valued by the community and avoid disturbing forest areas or areas environmental importance.</p> <p>2. The PMU should avoid disturbing areas of forest or valued natural habitat when putting in power lines or transformer units. Mature trees or trees of environmental significance must, where possible, be retained. Routes should where possible avoid clearance of stands of trees.</p>	
	<p>CULTURAL IMPACTS</p> <p>1. Ensure that the proposed land use does not cause significant impact on the cultural heritage of the local population.</p> <p>2. PMU will liaise with the local community to identify sites of cultural importance and avoid using these.</p>	
Design	<p>FOREST/SENSITIVE AREAS</p> <p>1. The PMU shall ensure that all Commune personnel are aware of the significance of environmentally important sites such as forests and the need to avoid cutting trees down when establishing electrical infrastructure and choosing the route of power lines. As per the Planning phase.</p>	
	<p>SOIL/WATER MANAGEMENT</p> <p>1. All transformers must be situated on a concrete pad with concrete walls around them to prevent any leakages of oils reaching the environment.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Ensure that none of the transformers contain Poly Chlorinated Biphenyls (PCBs). If leaks or spill occur PCBs are carcinogens and accumulate in the environment causing human and animal health issues.</p> <p>2. All transformers must be situated on a concrete pad with concrete walls and lockable gate around them to prevent any harm to people.</p> <p>3. Ensure that no houses are located underneath high voltage power lines in accordance with GOV guidelines.</p>	
	<p>CULTURAL IMPACTS</p> <p>1. The PMU shall ensure that all Commune personnel are aware of the significance of culturally important sites and the need to avoid impacts to any such sites As per the Planning Phase.</p>	
Construction	<p>FOREST/SENSITIVE AREAS</p> <p>1. Where trees are in the route of the power line, cut branches of trees rather than uprooting trees.</p> <p>2. Clearance of mature vegetation/trees to be kept to a minimum.</p>	
	<p>HEALTH & SAFETY CONSIDERATIONS</p> <p>1. Ensure all personnel/contractors are aware of hazards associated with electricity and associated infrastructure.</p> <p>2. Ensure that contracts stipulate that no PCBs are to be contained in any transformers.</p>	

	<p>WASTE MANAGEMENT</p> <ol style="list-style-type: none"> 1. Ensure all wastes generated are appropriately disposed of in accordance with GOV laws and guidelines. 2. If mixing cement for transformer enclosure or power pylons in the field, do not allow residues or wastes such as oils, plastic bags, construction wastes to enter rivers or paddy fields. 3. Crush, burn and bury all inorganic waste in an approved area. 4. During site clean up dispose of contaminants in an approved manner: - Burn any spilled fuel oil etc; - discharge gaseous contaminants - diluting with fresh air; - chemical and other liquid contaminants shall be stored in appropriate containers and disposed of at an authorised landfill site. 	
<p>Operational</p>	<p>WATER MANAGEMENT/EROSION CONTROL</p> <ol style="list-style-type: none"> 1. Maintain all practices established in Establishment phase. 2. IEO/DDOs to do visual inspection to ensure no leaks of transformers. 3. Contractor contracts should include requirement for maintenance of units. 	

EMG 8 – COMPOSTING

Composting requires that the right organisms, water, oxygen, organic material and nutrients are available for microbial growth. Otherwise compost can have some minor adverse effects. The most significant is that if composting doesn't occur throughout the material, then if applied to eg agricultural land before it has finished composting it can restrict nutrient supply to plants as the microorganisms use the available nutrients in the soil to continue the composting process. They therefore effectively compete with plants for the available nutrients and can limit plant growth while this occurs. If too much water or not enough turning occurs, anaerobic conditions can cause bad smells to develop.

Policy/Objective

Sets out the means by which composting of green waste can be carried out to ensure that any pathogens and weed seeds are destroyed, it has a neutral pH, and does not generate any bad odour.

Phase	Issues/guidance	Applicable?
Planning	<p>Composting is a good option for breaking down large volumes of organic material. Not only does it have the potential to turn waste organic material into a re-useable/saleable resource, but when applied to agricultural land it also improves soil structure and water retention. It also mineralises nutrients making them more available to plants and tends to release them more slowly, reducing the loss of nutrients to the environment.</p> <p>The main benefit in terms of sustainability of farming operations of course is that it reduces the need for inorganic fertilisers.</p> <p>It also has the added advantage of destroying pathogens and weed seeds due to the temperatures generated in the pile, has a neutral pH, reduces the volume of original material by up to 60% and if done properly doesn't generate any bad odour.</p> <p>When considering composting, first ensure the following are available:</p> <ol style="list-style-type: none"> 1. Ingredients – (Refer table 1). 2. A suitable location for composting. 	
Design	<p>When choosing a site, direction of prevailing winds, and the impact associated with any odour, noise, dust, leaching and run-off need consideration. If in an outdoor location, composting should only be conducted on a compacted pad of low permeability, with at least 2 metres between the base of the pile and the water table.</p>	
Establishment	<ol style="list-style-type: none"> 1. Clear the intended area for the compost pad of all trees, scrub and stumps. 2. Strip topsoil (Because of its high organic matter content, topsoil is unsuitable for compaction in the pad foundation) Strip topsoil to a depth of approx 15-20cm and use impermeable clay as base. (Or construct a cement pad). 3. Pad should be at gradient of between 2% and 4% to adequately drain. 4. Ensure pad runoff is collected in a pond with a compacted base. This water can then be reused to water compost. (It is likely that rainfall amounts during wet season are going to wash away compost, so area should be covered/roofed). 5. Ensure that means exist to shred, turn, and water compost (eg. that it is not spread too deep for it to be turned manually). 	

	<p>6. Compost should be stacked in windrows. ie piles about 1.5 m high, 2-3 m wide at the base and 1m at the top (unless this is too difficult to turn manually). Constructing the piles or windrows parallel to the slope will prevent the accumulation of water on the upside of the piles.</p> <p>7. Ensure run-off from other sources is directed away from the pad.</p> <p>8. Follow management practices outlined and leave compost for curing at end of 8 week period for a further month.</p> <p>9. Screen compost to remove any large material and rocks etc before applying to land.</p>	
Operational	<p>1. Review the factors affecting composting (Table 2).</p> <p>2. The length of time required to transform manure into compost depends on moisture, temperature, aeration, C:N, and the physical structure of the raw materials. If optimal conditions are maintained, the composting process can be completed in around 8 weeks, with 4 weeks additional curing time following the active composting stage. Curing involves the further aerobic decomposition of some compounds, organic acids and large particles that remain after composting. Less oxygen and water are required during curing than during active composting. However, compost that has had insufficient curing may damage some horticultural crops.</p> <p>3. Compost is ready to be applied if the temperature of the material does not rise after turning and watering at the end of the approx. 3 month cycle.</p>	

Table 1: Characteristics of some materials that might be composted

Organic Material	Characteristics	Nitrogen Addition?	Carbon Addition?	Degradability
Cattle manure	High nitrogen, wet	No	Yes	High
Litter (manure & bedding)	Balanced carbon and nitrogen, semi dry	No	No	High
Pig manure	High nitrogen, wet	No	Yes	Moderate
Poultry manure	High nitrogen, moist	No	Yes	High
Sawdust	High carbon, dry	Yes	No	Moderate
Straw/vegetation	High carbon, dry	Yes	No	High
Woodchips	High carbon, dry	Yes	No	Poor

Table 2: Main factors affecting composting

Factor	Why important	How to measure	Level	Management technique
Moisture	Moisture is necessary for the microbes to work efficiently, as it acts as a medium for chemical reactions, the transport of nutrients and the movement of the micro-organisms. However If too wet conditions can become anaerobic (lack of oxygen) and unpleasant odour may result.	The compost is too wet if water can be squeezed out by hand, or too dry if it is not moist to the touch.	Keep at between 40-50%	The composting material generally dries out with time, so water should be added regularly in the dry season. The composting area should however be well drained if uncovered, or if roofed, water added weekly and compost turned to ensure water distributed throughout.
Carbon to Nitrogen ratio	Micro-organisms require a balance of carbon and nitrogen for healthy cell growth. It is important to provide carbon and nitrogen in the right proportions to encourage microbial activity.	Keep note of materials being added to keep ratio approximately right.	A carbon to nitrogen ratio (C:N) between 15:1 (15 parts carbon to 1 part nitrogen) and 30:1 is required	The C:N ratio basically determines the blend of materials to be used, The table below provides guidance on what is nitrogen rich and what is carbon rich.
Aeration	The compost pile needs sufficient oxygen to maintain adequate microbial activity.	Keep record of how frequently turned.	Weekly turning of whole pile	Turning the piles regularly (weekly) to allow air to move easily through the pile. A bulking agent such as sawdust or woodchips can be used to increase the air pockets within the pile.
Particle size	Small particle size increases surface area of material and increases microbial action.	Visually assess size of particles.	If possible shred to smaller than 5cm	Chop up vegetation into small pieces if practicable.
Temperature	The natural composting process produces heat, and the micro-organisms grow best within a temperature range between 55°C and 65°C. This also destroys weed seeds and most pathogens.	Thermometer or ensure no odour.	Must be kept at between 55°C and 65 °C	If odour occurs then turning must occur more frequently to reduce temperature. Alternatively reduce large pile into smaller compost piles.

7 Environmental Management Plans

7.1 Introduction

An EMP is a project-specific activity plan designed to minimise the negative impacts identified following the PPP/environmental assessment 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 is likely to consist of an EMG summary sheet, and the relevant EMG for a particular activity.

7.2 Preparation of the EMP

EMGs provide guidance on managing and assessing the kinds of potential issues associated with Program activities and are now set out under the Program activities to which they relate (bathrooms, roads, agricultural change etc). This means that they can now be used independent of the EIAC when undertaking environmental planning.

The EIAC however provides an additional resource to check off any site-specific environmental issues that need to be addressed. The checklist also contains references to relevant EMGs that provide steps to avoid or minimise any negative impacts. The IEO will select the relevant information from the particular EMG and attach this to the RCAP. These then 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 DOST & DNRE 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. DOST & DNRE 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

Limitations

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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.

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