

The Philippine Environmental Governance 2 Project

Assessment of Disposal Sites of EcoGov-Assisted LGUs

*Determining ways to ensure
compliance with RA 9003*

September 2005



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ACRONYMS

BOT	-	Build Operate Transfer
DAO	-	DENR Department Administrative Order
DENR	-	Department of Environment and Natural Resources
EcoGov	-	The Philippine Environmental Governance Project
EMB	-	Environmental Management Bureau
IRR	-	Implementing Rules and Regulations
ISWM	-	Integrated Solid Waste Management
LGU	-	Local Government Unit
MGB	-	Mines and Geosciences Bureau
NTP	-	Notice to Proceed
RA	-	Republic Act
SLF	-	Sanitary Landfill
SOW	-	Scope of Work
SWM	-	Solid Waste Management
UEM	-	Urban Environmental Management
USAID	-	United States Agency for International Development

1.0 INTRODUCTION

1.1 BACKGROUND

The USAID-funded Philippine Environmental Governance (EcoGov) Project, implemented with the Department of Environment and Natural Resources (DENR) and other partners, assists 82 local government units (LGUs)—which include 67 municipalities, 15 cities and 16 provinces—in the areas of forests and forest lands management, coastal resource management and urban environment management (UEM). Under the UEM sector, EcoGov has been helping 48 LGUs—from formulating their integrated solid waste management plans to having them approved by their local councils and implementing them.

Part of EcoGov’s technical assistance is guiding the LGUs in the selection of sites for disposal facilities, ensuring that the principles of good governance—functionality, transparency, accountability and participatory decision-making—are observed in the process. Recognizing that Republic Act 9003 (Ecological Solid Waste Management Act of 2000) will no longer allow the use of controlled dumps beyond February 2006, the Project thought it necessary to determine the status of EcoGov-assisted LGUs as far as the selection of their disposal sites are concerned. Thus, this assessment.

1.2 OBJECTIVES

In general, this assessment aims to:

- Find out where the LGUs are in terms of siting their disposal facilities and whether these meet the standards set by RA 9003 and its Implementing Rules and Regulations (IRR).
- Recommend ways to ensure LGU can comply with RA 9003 provisions pertaining to disposal facilities.

Specifically, this assessment responds to Item 2 under Tasks of the Scope of Work for the UEM Solid Waste Specialist which requires the following:

1. Conduct an assessment of the ISWM plans of 19¹ LGUs on the selection and evaluation of sites for their respective waste management facilities.
2. Hold selected visits and assessment of the proposed sites as indicated in the plans in coordination with the LGUs and DENR.
3. Come up with an output corresponding to a matrix of assessment criteria of actual condition as against prescribed standards and documentations of site assessments in LGUs.

¹ At the time this report was made, only 16 plans are available for review and assessment.

1.3 INTENDED USERS

In addition to EcoGov Project managers, DENR and USAID, this Report could be of valuable use to the National Solid Waste Management Commission in its efforts to enable LGUs to comply with the law.

1.4 METHODOLOGY AND LIMITATIONS

Data gathering for this assessment was done through actual site visits and accessing available SWM plans of EcoGov-assisted LGUs. However, only 8 LGUs out of a possible 19, were visited. They were Bambang and Bayombong in Nueva Vizcaya (Region 2); Tagbilaran and Albur in Bohol (Region 7), Isabela City in Basilan (Region 9), Kidapawan in North Cotabato (Region 12); Koronadal in South Cotabato (Region 12); and Tacurong in Sultan Kudarat (Region 12). The cursory visits were made as part of the training workshops for disposal management held at the four regions under EcoGov assistance.

The visits included trips to current open dumpsites or controlled dumps and the proposed sanitary landfill (SLF) sites of the LGUs. The existing open/controlled dumps were evaluated using the 22 parameters—based on RA 9003 and DENR Department Order (DAO) 98-49 (Technical Guidelines for Municipal Solid Waste)—compiled for an Asian Development Bank project and meant to be used for Metro Manila. The proposed SLF sites were evaluated using the combined siting criteria of RA 9003 and DAO 98-50 (Adopting the Landfill Site Identification and Screening Criteria for Municipal Solid Waste Disposal Facility).

The assessment for the rest of the LGUs was based on descriptions indicated in the 16 currently available SWM plans and on a few reports from the Mines and Geosciences Bureau (MGB) on the suitability of the sites either for controlled dump or for SLF development.

Notwithstanding these limitations, this assessment has expanded its coverage beyond the 19 LGUs specified in the scope of work (SOW) to the currently available data on waste disposal of LGUs being assisted by EcoGov.

2.0 KEY FINDINGS

The assessment findings are presented as follows:

- Inspected open and controlled dumpsites;
- Inspected SLF sites; and
- SLF sites of the LGUs which were not inspected but were presented in SWM plans that were accessed.

To facilitate discussion and to highlight the level of data availability regarding disposal sites of EcoGov-assisted LGUs (Figure 1), a disposal data summary is presented in Table 1 (see next page).

2.1 INSPECTED OPEN AND CONTROLLED DUMPSITES

2.1.1 Solano Open Dump²

The Solano Open Dumpsite is a 1-ha facility located in Barangay Concepcion 6 km northeast of the Poblacion (Figure 2). It has been sited on the foot slope of a low hill which has been benched and graded by the site development activities. The site is accessible from the main highway via a 2-lane, 2-km feeder road. A number of informal dwellings could be found along this road about 500 meters from the dump. The dwellings also serve as stockade for recovered recyclable materials.

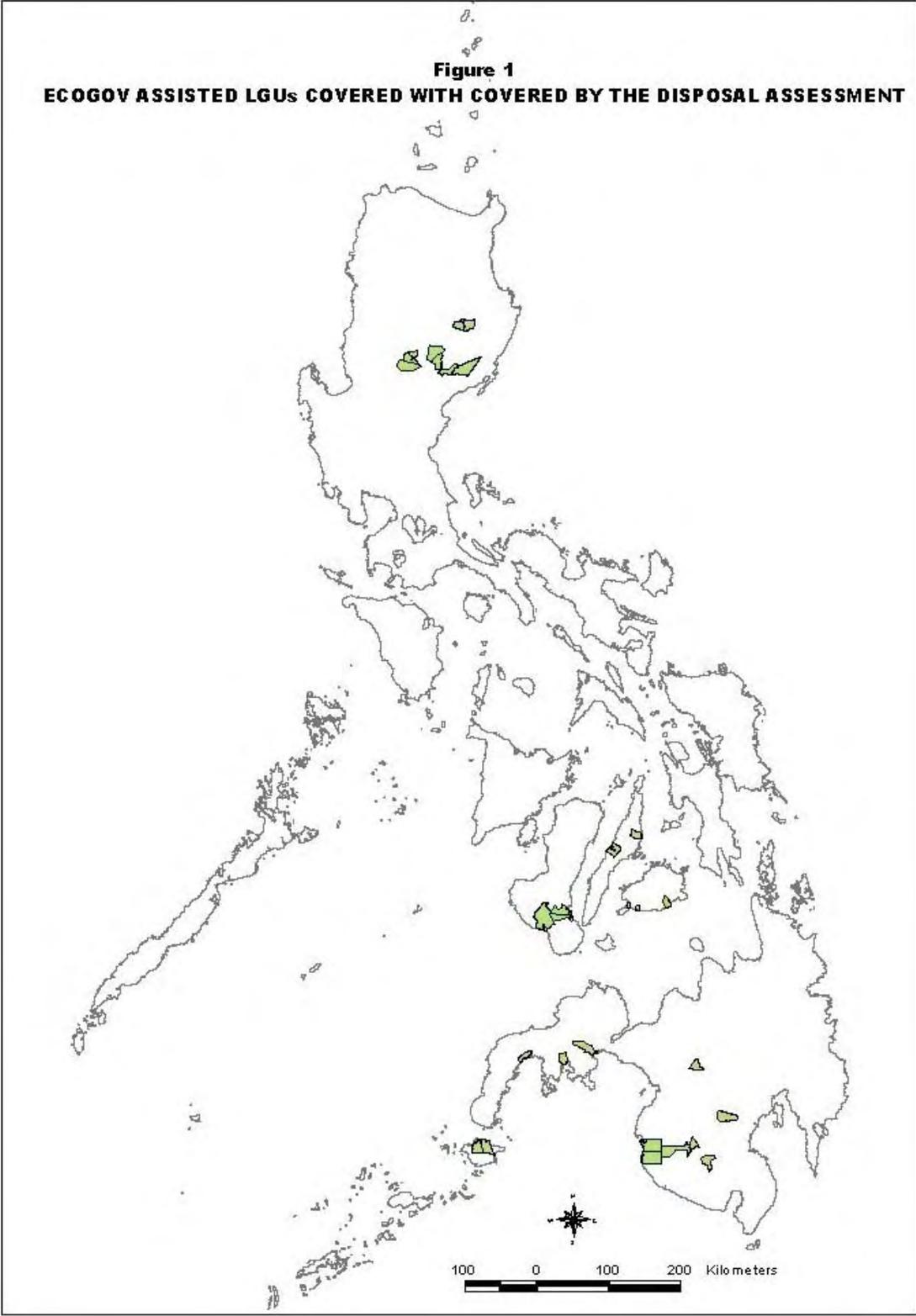
The Solano site is not fenced and the only semblance of site management is the application of soil cover on the benched section.

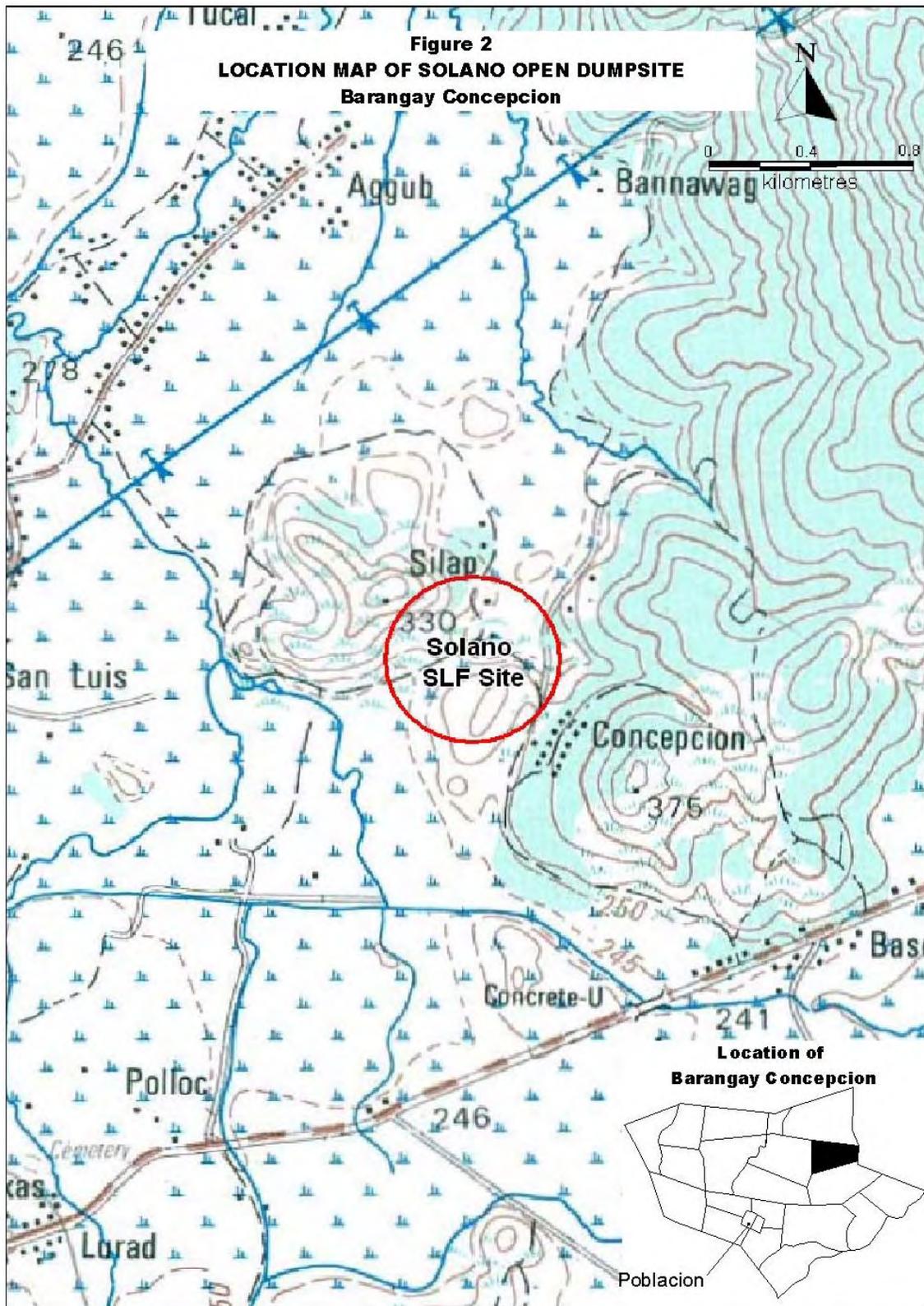
The upper level benched section of the site has been covered with soil. The edge of the bench down to the lower toe of the hill however consists of exposed waste. The active portion is now limited to the toe of the waste pile.

The site is not fenced and the only semblance of site management is the application of soil cover on the benched section. Otherwise, waste pickers can easily get into the unfenced waste pile.

At the time of the inspection (May 2005), the LGU does not yet have definite closure plans for the dumpsite.

² Annex 1 – Assessment of Solano Open Dumpsite





2.1.2 Bambang Open Dump³

The Bambang Open Dumpsite occupies about 3 ha of a 14-ha area designated by the LGU for waste disposal facility. It is located in Barangay Aliaga (Figure 3), about 4 km west of the main highway. The site receives mixed waste at a reported rate of 4.7 tons per day.

The Bambang site is unfenced and poorly managed. The exposed waste occupies the northern lower slope of a hill, bounded farther north by an intermittent creek.

The site is unfenced and poorly managed. The exposed waste occupies the northern lower slope of a hill, bounded farther north by an intermittent creek. At the

time of the inspection in May 2005, the northern edge of the waste pile has assumed a steep profile which could easily topple into the nearby creek by its own weight or during rains.

Access to the site is via a single lane and winding unpaved road. This road becomes impassable during the rainy season. A number of waste pickers have been observed working on the exposed waste. There are no huts or residential units within the immediate vicinity of the site.

The LGU does not yet have definite closure plans for the dumpsite.

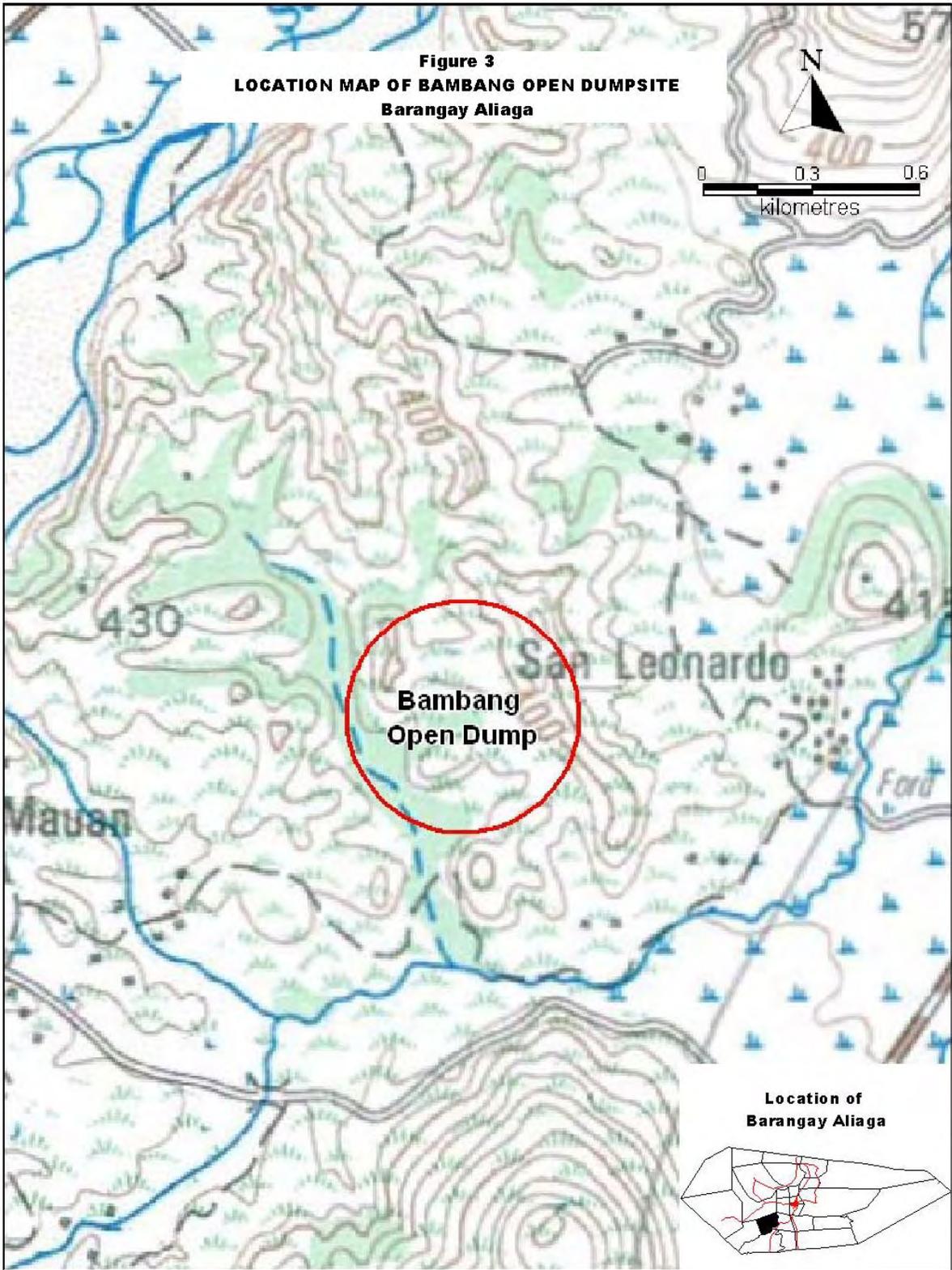
2.1.3 Tagbilaran Open Dump⁴

The Dampas Open Dumpsite is a 2.6-ha facility located 3 km north of Tagbilaran City (Figure 4). It has been operational since 1991 and sits on a permeable limestone formation. The bulk of the waste has been dumped at near the edge of a large sinkhole. Definite plans for closure have not been developed as the city waits for the development of the proposed SLF facility in Albur.

An adjacent lot to the west has been issued a Notice to Proceed (NTP) for development into a controlled dump. This new site has been subjected to a hydro-geological and geo-resistivity survey by a private contractor. Notwithstanding the surveys conducted and the issued NTP, the proposed controlled dumpsite is not suitable for waste disposal as it likewise is located on a permeable limestone formation.

³ Annex 2 - Assessment of Bambang Open Dumpsite

⁴ Annex 3 – Assessment of Dampas Open Dumpsite, Tagbilaran City



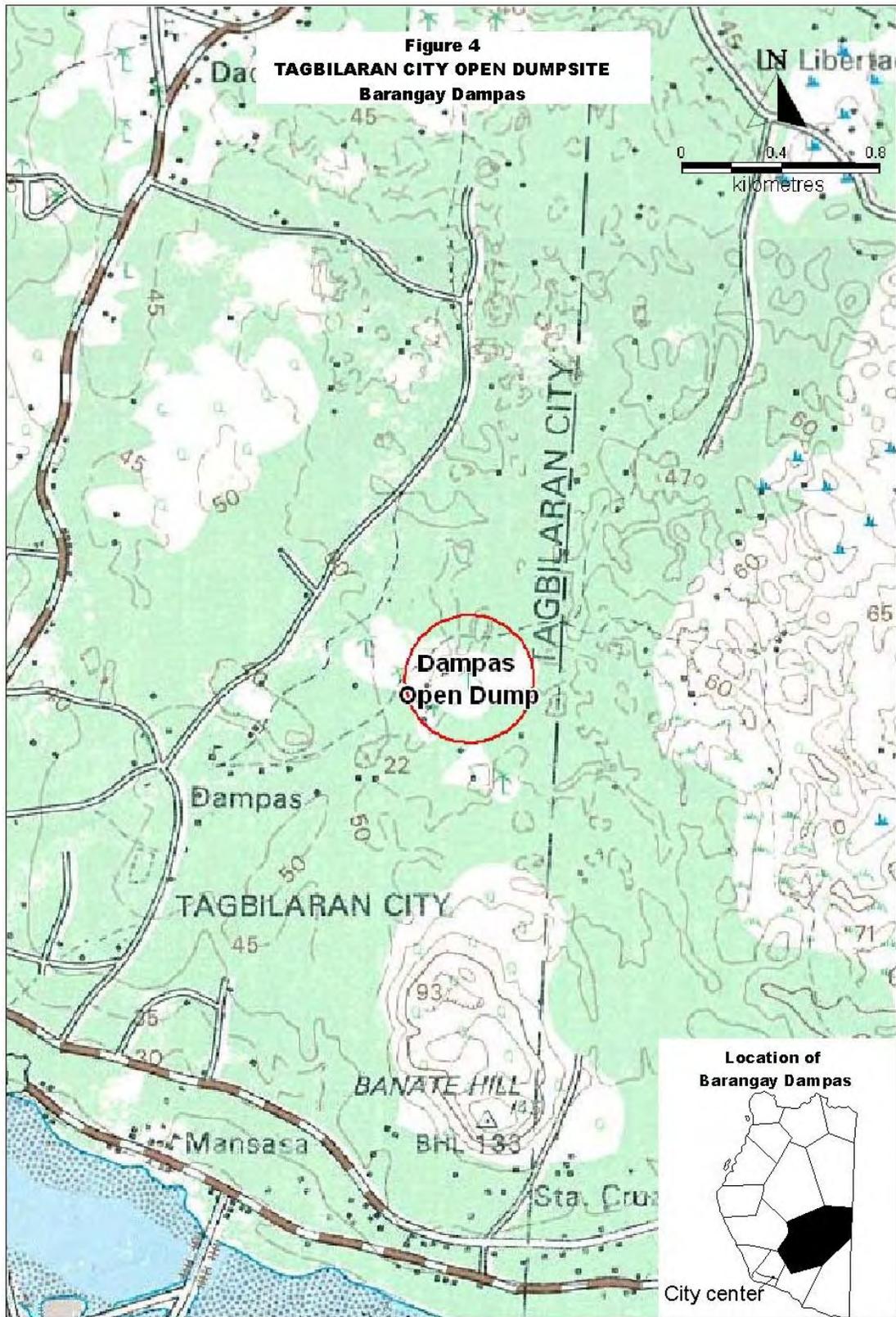


Table 1. Disposal Data Summary – EcoGov-Assisted LGUs

LGUs	Wi h SWM Plan	Open dump		Controlled dump area		Proposed/Existing SLF area	
		Location	Area (has)	Location	Area (has)	Location	Area (has)
Region		Northern Luzon					
Bambang	x	Brgy. Aliaga	3	Brgy. Aliaga	No data	Brgy. Aliaga	14
Bayombong	x	Brgy. Vista Alegre, Don Mariano	No data	Brgy. Luyang, new site at Brgy. Upper	No data	Brgy. Nalubunan	4
Cabarroguis	x	Brgy. Zamora	No data	Brgy. San Marcos	3	Brgy. San Marcos	3
Cauayan		No data	4			No data	No data
Diffun	x	Brgy. Isidro Paredes	No data	Brgy. Ricarte Norte	5	Brgy. Ricarte Norte	5
Madela	x	Brgy. Sta. Maria	1			Brgy. Balligui	7
Solano		Brgy. Concepcion	1			Brgy. Concepcion	30
Region		Central Visayas					
Albur	x	East Poblacion	0.5	East Poblacion	0.5	Brgy. Dangay	7
Bais	x	Brgy. Talungon	No data			Brgy. Cambanjay	2.7
Bayawan	x	Sitio Buli-buli of Brgy. Banga	No data	No data	No data	No data	No data
Danao	x	Brgy. Guinacot	2.4	Brgy. Guinacot	No data	Brgy. Maslog	2
Jagna	x	Brgy. Canjulao	1			Brgy. Larapan	2
Tagbilaran	x	Brgy. Dampas	6				
Tanjay	x	Brgy. Azagra	No data			Brgy. Azagra	5
Toledo		No data	No data			No data	No data
Region		Southern Mindanao					
Isulan		No data	1.5			Brgy. Laguilayan	
Kidapawan	x	Brgy. Binoligan	3.7	Brgy. Binoligan	1	Brgy. Onica	No data
Koronadal	x	Brgy. Sta. Cruz	12			Brgy. Paraiso	7
Tacurong	x			Brgy. Upper Katungal	2	Brgy. Upper Katungal	1.8
Region		Western Mindanao					
Buug		No data	5.8				No data
Ipil		No data	6.3			No data	No data
Isabela City	x			Sitio Burakan Lantung, Brgy. Baluno	2.5	Sitio Burakan Lantung, Brgy. Baluno	2.5
Kalamansig		No data	No data			No data	No data
Lamitan		No data	No data			No data	No data
Lebak		No data	0.5			Brgy. Salaman	5
Pagadian City		Brgy. Palangasan	3.3			No data	No data
Wao		No data	1			No data	No data

Legend Inspected

2.1.4 Koronadal Open Dump⁵

The Koronadal Open Dumpsite is a 12-ha facility located in Barangay Sta. Cruz about 3.5 km southwest of the central business district (Figure 5). It has been sited on the gently inclined mid-slope of a limestone hill. The site receives mixed waste at a reported rate of 16 tons per day. About 50 percent of the site has been graded and partially covered with soil. Litter is still found throughout most of the site. The active portion is now limited to the southwest, more elevated section of the site.

The small, intermittent creeks and portions of the road leading to the site have likewise served as dumping areas for waste.

The permeable Koronadal dumpsite favors the entry of the contaminated waters into the groundwater system located at the valley areas to the east.

The permeable dumpsite favors the entry of the contaminated waters into the groundwater system located at the valley areas to the east. The inferred effect has not yet been validated as samples of water from wells from these areas have not been tested and a comprehensive study has not been undertaken.

A summary plan for the closure of the site has been drafted, but this has yet to be implemented.

2.1.5 Kidapawan Open Dump/Controlled Dump⁶

The Kidapawan open dumpsite (Figure 6) has been operational since 1994 and occupies the top of a flattened hill made up of semi-permeable pyroclastics. Only a small part of the central section has been covered with soil, the rest of the waste is largely exposed. The waste pile extends into the channels of the intermittent streams which bound it to the north and south and into a small pond to the northeast. This condition allows the leaching of contaminated water into the waterways. Definite plans for the closure of the site have not been formulated.

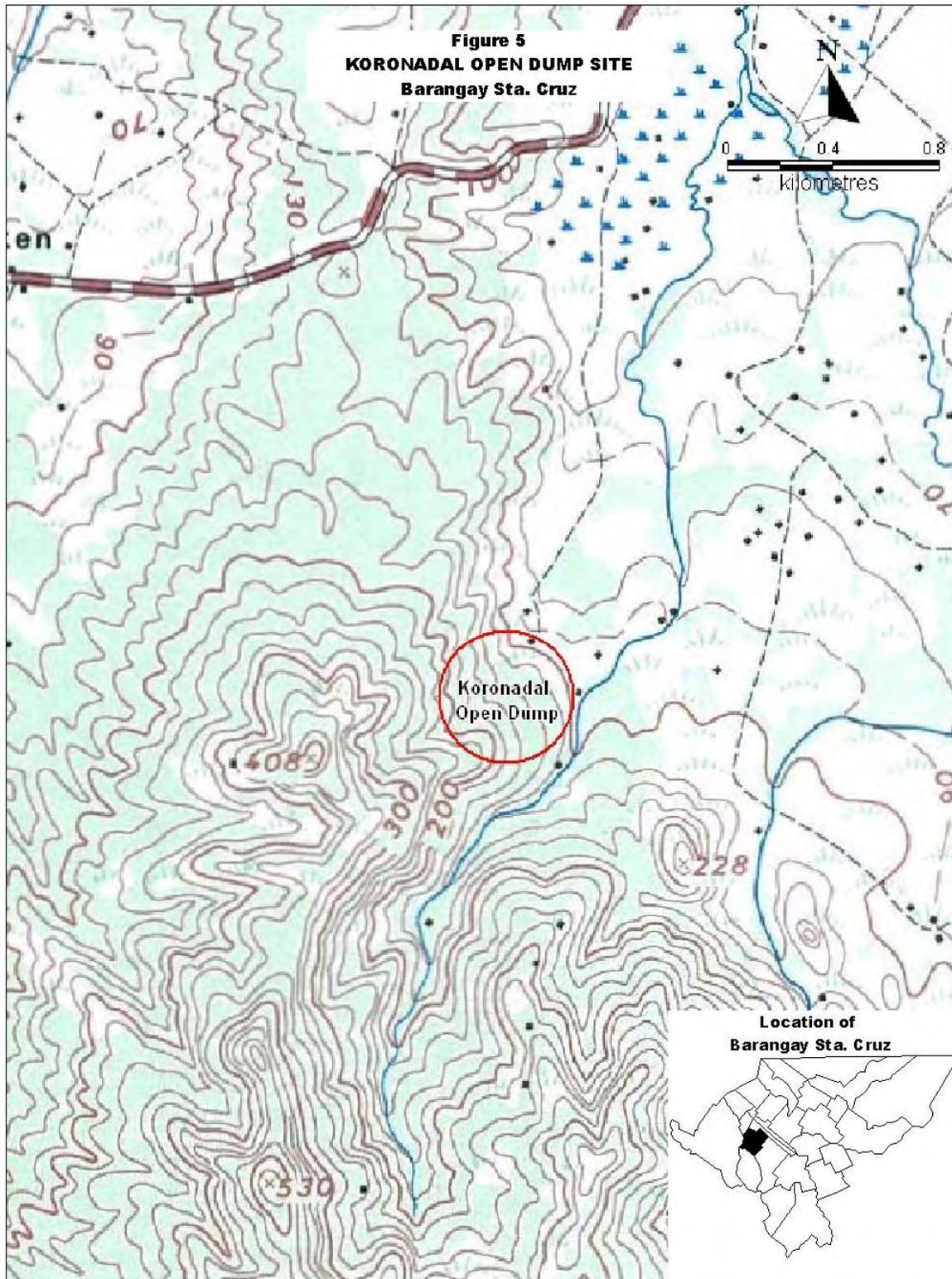
The current Kidapawan open dump allows the leaching of contaminated water into the waterways. On the other hand, several issues still have to be resolved re: the proposed controlled dump located to the south of the existing open dump.

The LGU has begun the development of the narrow 1-ha valley of the stream to the south into a “controlled dump”. However, the new site though has to resolve the following:

- Limited working area;
- Effectiveness of the drainage system to handle large stream flows and direct heavy rainfall;
- Large waste pile along the right bank of the stream;
- Additional inflow of water from the small creek issuing from the left bank;

⁵ Annex 4 – Assessment of Koronadal Open Dumpsite

⁶ Annex 5 – Assessment of Kidapawan Open Dump





- Absence of suitable location for the proposed waste water treatment facility of ponds; and
- Impact of site on the informal dwellers which occupy the immediate eastern edge.

2.1.6 Isabela City Controlled Dump⁷

The Isabela City controlled dumpsite occupies 2.5 ha of a gently sloping to rolling terrain in Sitio Burakan Lantung, Barangay Baluno about 13 km northeast of the city (Figure 7). The adjacent 2.5 ha area is planned to be developed as an SLF by the LGU.

The facility is well sited with a favorable terrain, easily workable foundation and locally available materials for soil cover. Cover is immediately applied to incoming waste. There are no waste pickers in the area. The adjacent area to the northwest has a Materials Recovery Facility (MRF) with provisions for washing of the waste trucks exiting from the dumpsite. Medical and related wastes are placed in a concrete vault.

The operations can be further improved with training of the site personnel, installation of signages, construction of perimeter fence, putting in place an integrated drainage system and facilitating systematic recording of incoming waste.

The Isabela facility is well sited with favorable terrain, easily workable foundation and locally available materials for soil cover. Additional site investigations are needed to serve as inputs to the design of the proposed SLF.

Additional site investigations, which include conduct of detailed topographic surveys, hydro-geological studies and foundation tests, are needed to serve as inputs to the design of the proposed SLF

2.2 INSPECTED SLF SITES

2.2.1 Solano SLF Site⁸

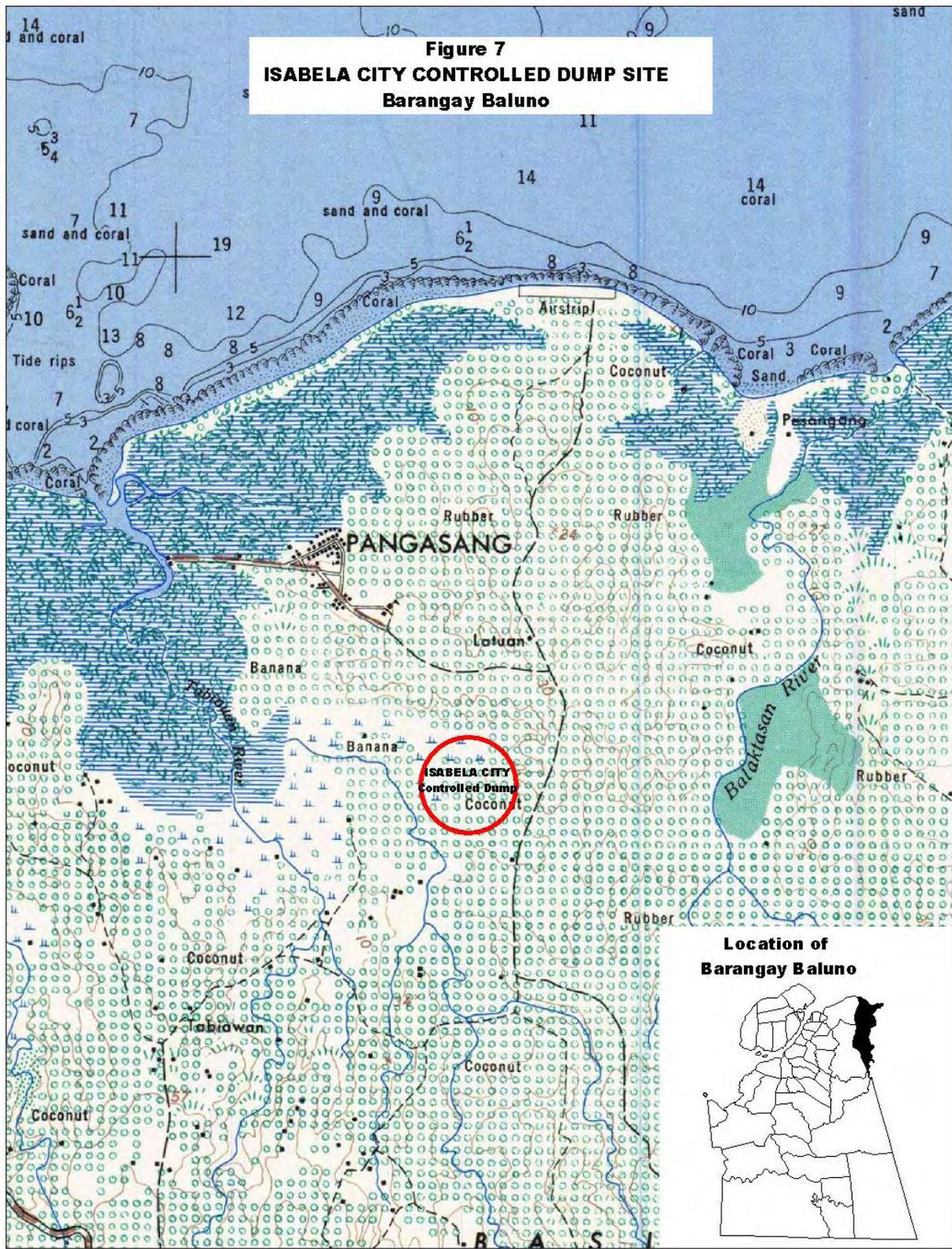
The proposed Solano SLF site was identified during the training exercise held for the Northern Luzon LGUs in May 2005. It is located at Barangay Concepcion about 10 km northeast of Bayombong Poblacion (Figure 8). It will include an amphitheater defined by gently sloping hills to the northwest, south and northeast and will cover at least 30 ha. The southeastern portion contains the existing Solano open dumpsite.

The proposed site has the following favorable features: large gently sloping area, adequate distance from major aquifer system, not susceptible to flooding, good access and with available soil cover. Issues regarding land ownership and land use of the eastern edge of the site need to be resolved. Otherwise, the site has a potential for being developed into a regional disposal facility, which can serve a cluster of LGUs.

Proposed Solano site is a good one, but issues, like land ownership, have to be resolved first. Has potential as a regional disposal facility.

⁷ Annex 6 – Assessment of Isabela City Controlled Dump

⁸ Annex 7 – Assessment of Potential SLF Site in Solano, Nueva Viscaya





2.2.2 Bagabag SLF Area⁹

The potential SLF area was identified during the training exercise held for the Northern Luzon LGUs in May 2005. This is located within a gently sloping to rolling terrain along side the road section from the Magat River crossing in Kinakao to Mantanibong in Bagabag; it covers approximately 100 ha (Figure 9). The center of the area is about 30 km northeast of Bagabag.

Site has favorable features; may be developed into a regional facility for cluster of LGUs.

The area in general has the following favorable features: large gently sloping sections enclosed within small catchments which form natural buffers and may correspond to waste cells, available soil cover, low groundwater potential which translates to relatively impervious foundation, accessible by good roads and generally low land productivity.

The size of the potential area is favorable for the development of a regional disposal facility for a cluster of LGUs.

2.2.3 Nalubunan SLF Site¹⁰

The proposed Nalubunan SLF site is located in Sitio Piña, Barangay Nalubunan, Quezon (Figure 10). It will occupy the steep slopes of an intermittent creek which flows westward into Magat River. The site is not suitable for development into a disposal facility due to the unfavorable combination of the following features:

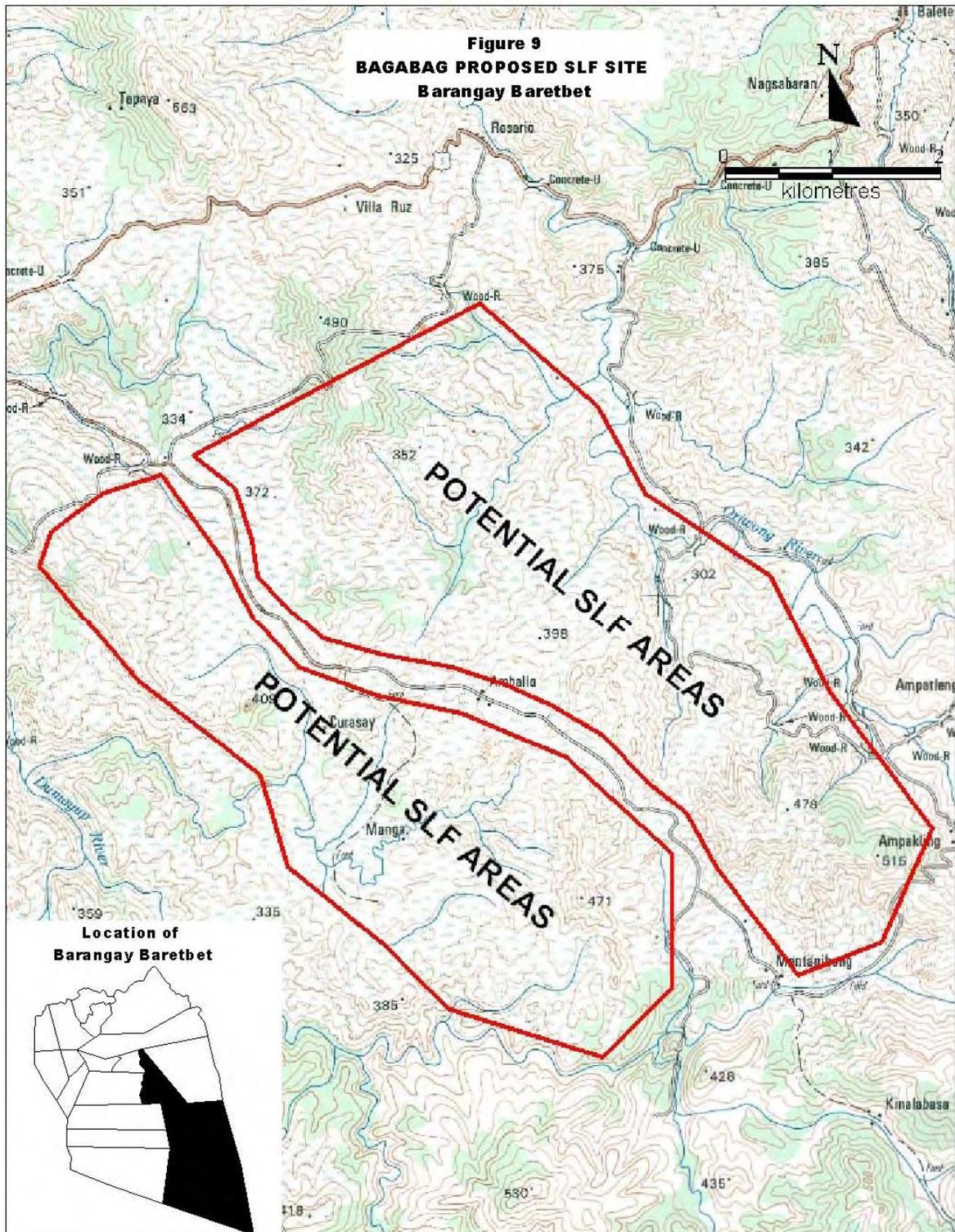
1. Poor accessibility which would necessitate additional cost for road improvement and maintenance
2. Steep slope which would require extensive excavation
3. Large catchment which would require extensive drainage works
4. Proximity to Magat River and its alluvial aquifers

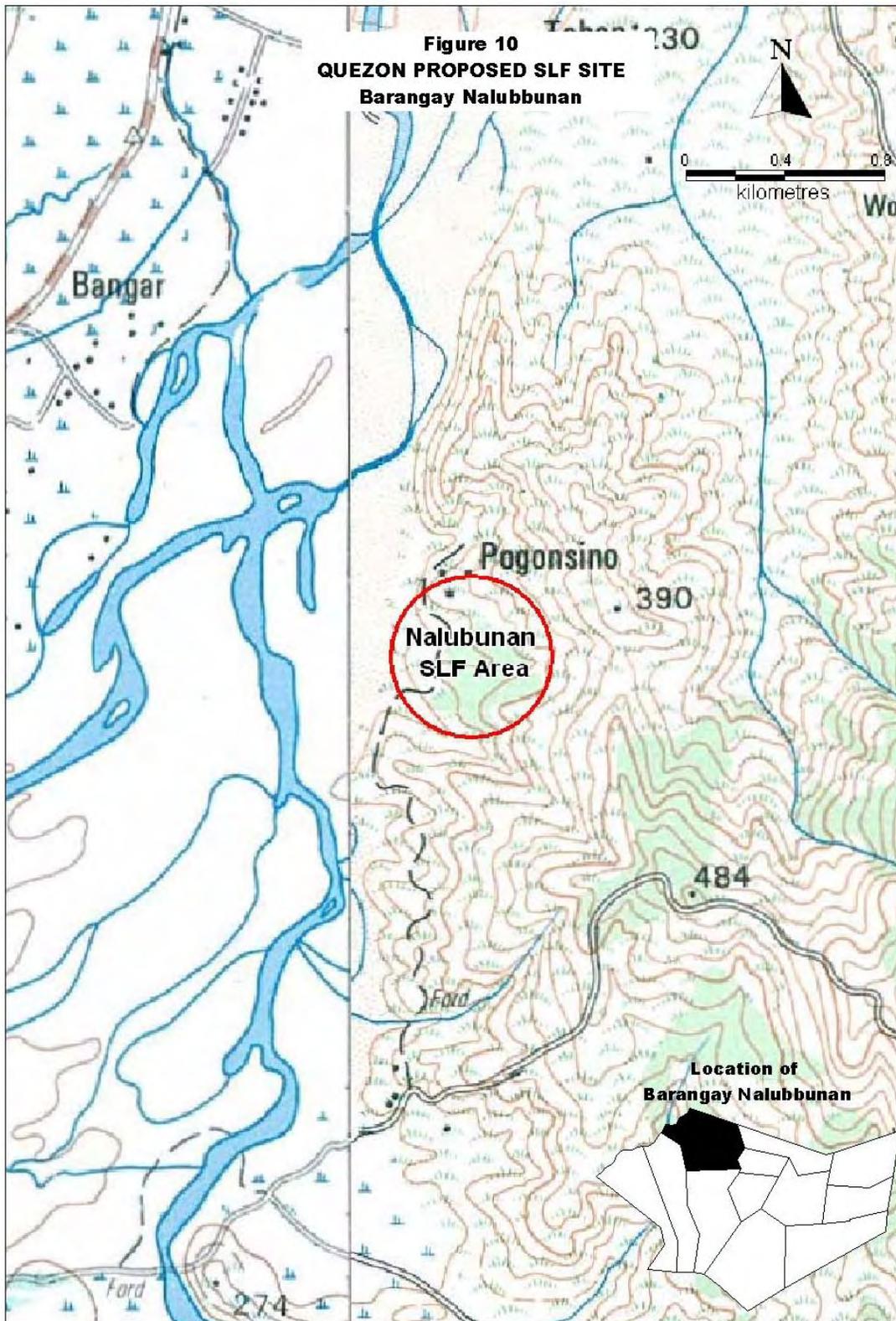
The Nalubunan site is not suitable for development into a disposal facility.

The site has also been evaluated by the Mines and Geosciences Bureau (MGB), which raised the issue on its poor accessibility.

⁹ Annex 8 – Assessment of Potential SLF Area in Bagabag, Nueva Viscaya

¹⁰ Annex 9 – Assessment of Proposed Nalubunan SLF Site in Nalubunan, Nueva Viscaya





2.2.4 Albur SLF Site¹¹

The proposed Albur SLF site will occupy an abandoned silica quarry on the hilly area north of the municipality of Albur (Figure 11). It has an area of about 7 ha which includes hilly sections with intervening gently sloping to flat areas bounded on the north, east and south by low ridges. Foundation consists of fractured silica rocks with adequate bearing capacity for the proposed structures. Presumptive permeability is deemed low. The site is not susceptible to flooding owing to its elevated position and the relatively small catchments above it.

Current access from Albur is via a single-lane road which passes through a residential area; the road needs to be improved. Soil cover will initially be available from the materials obtained from site grading. Otherwise, offsite sourcing may be resorted to.

The Albur site is not susceptible to flooding; presumptive permeability is deemed low.

The site has also been evaluated by the MGB which found it suitable for SLF development.

2.2.5 Tacurong SLF Site¹²

The proposed Tacurong SLF site is located in a 4-ha property acquired by the LGU for waste processing and disposal. It is about 6 km northeast of the city proper and easily accessible via existing well maintained road network which extends up to the site (Figure 12). The site covers 1.8 ha¹³ and has been partially excavated to serve as source of soil for the operation of the adjacent controlled dump.

The foundation of the site is adequate. Development, however, may be constrained by the limited space and the shallow groundwater table. The estimated SLF life of 30 years may be overstated as the plan has yet to take into consideration the space to be used by the embankments and the soil cover. An additional space must be provided for the leachate pond and the treatment facility.

The foundation of the Tacurong site is adequate. Development, however, may be constrained by the limited space and the shallow groundwater table. The estimated SLF life of 30 years may be overstated.

2.2.6 Koronadal SLF Areas¹⁴

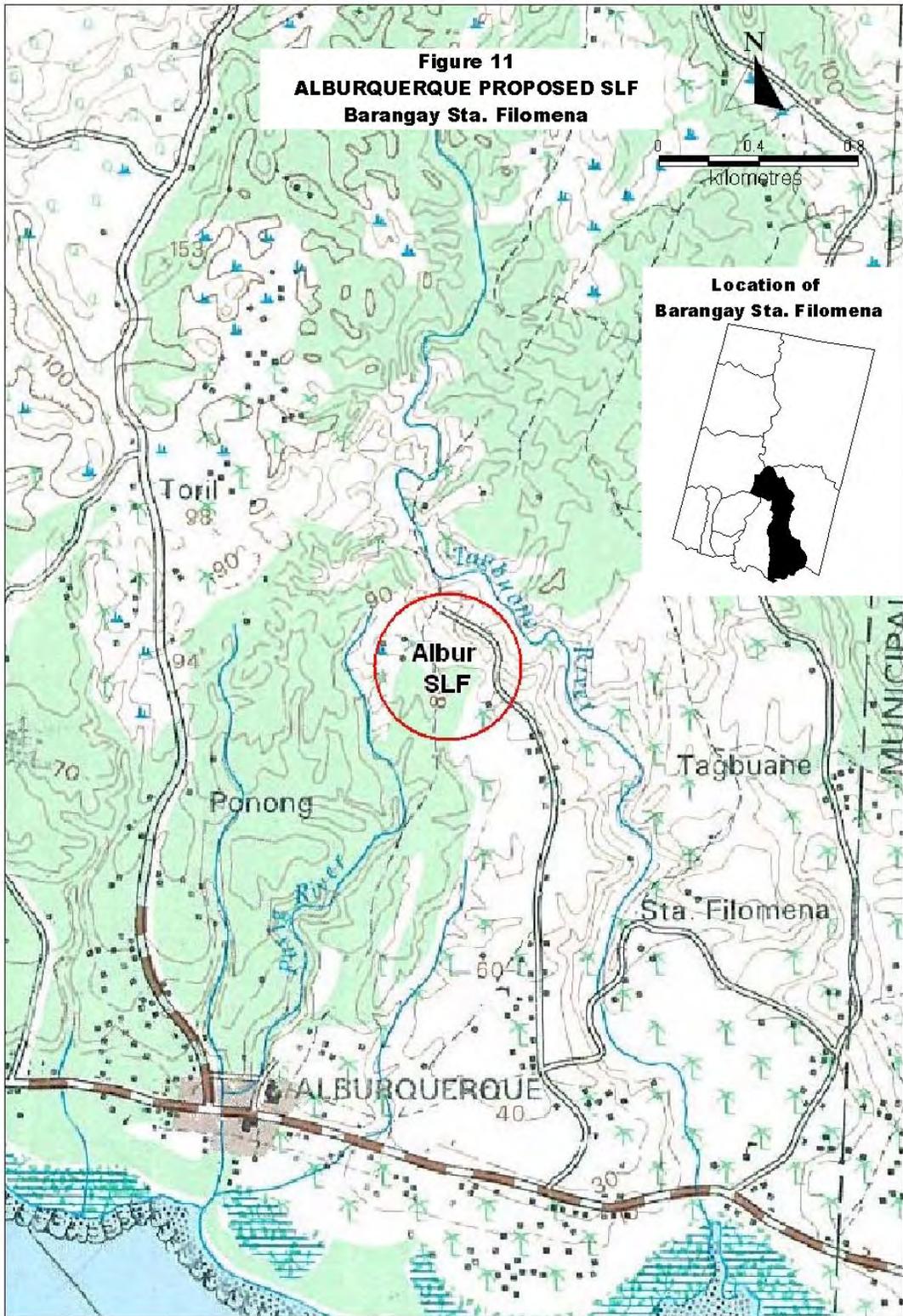
The proposed Koronadal SLF areas were identified during the training exercise held for the Southern Mindanao LGUs in July 2005. These are located within a series of small catchments within Barangay Paraiso located about 6 km southwest of Koronadal City (Figure 13).

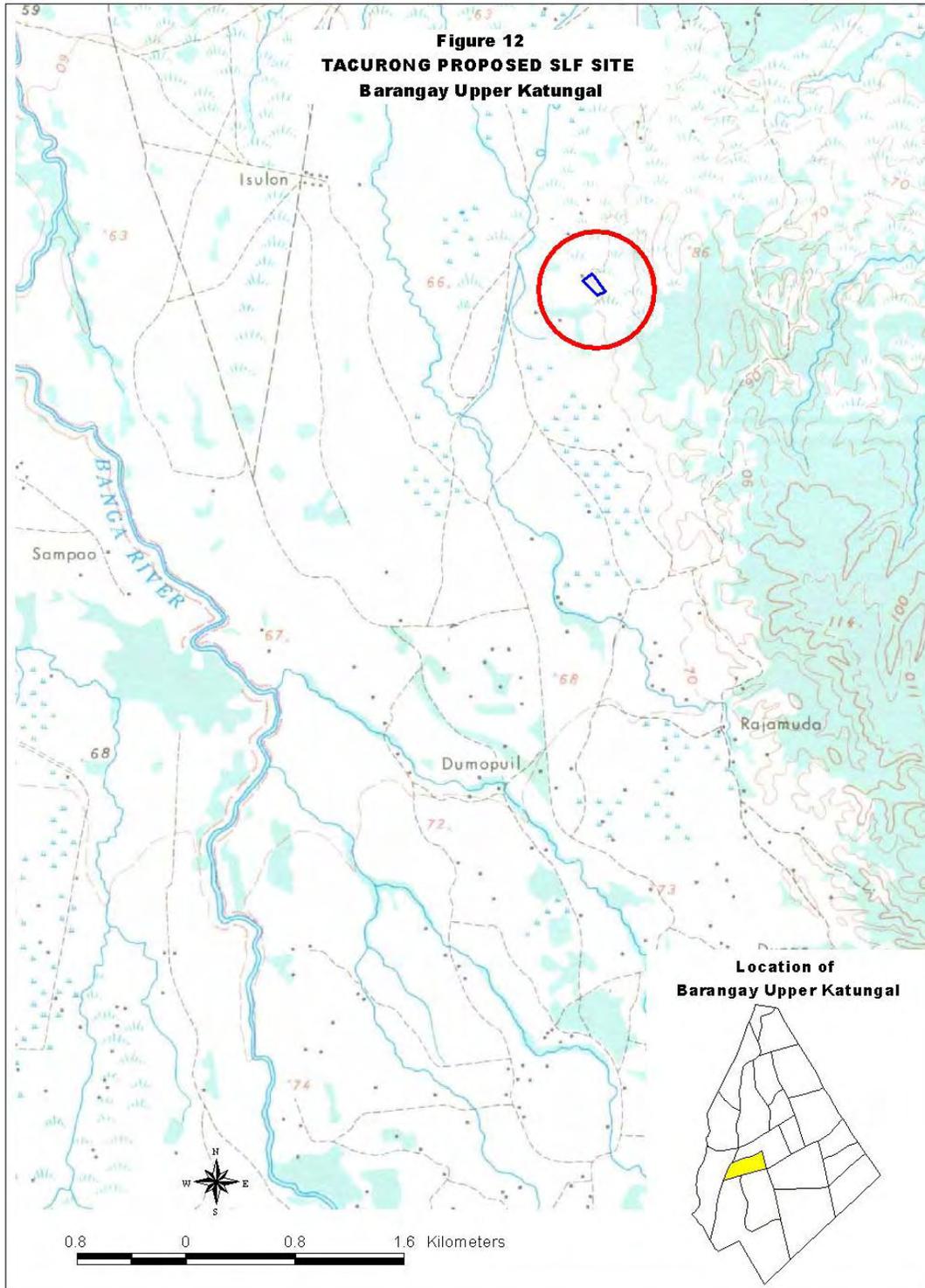
¹¹ Annex 10 – Assessment of Proposed SLF Site in Albur, Bohol

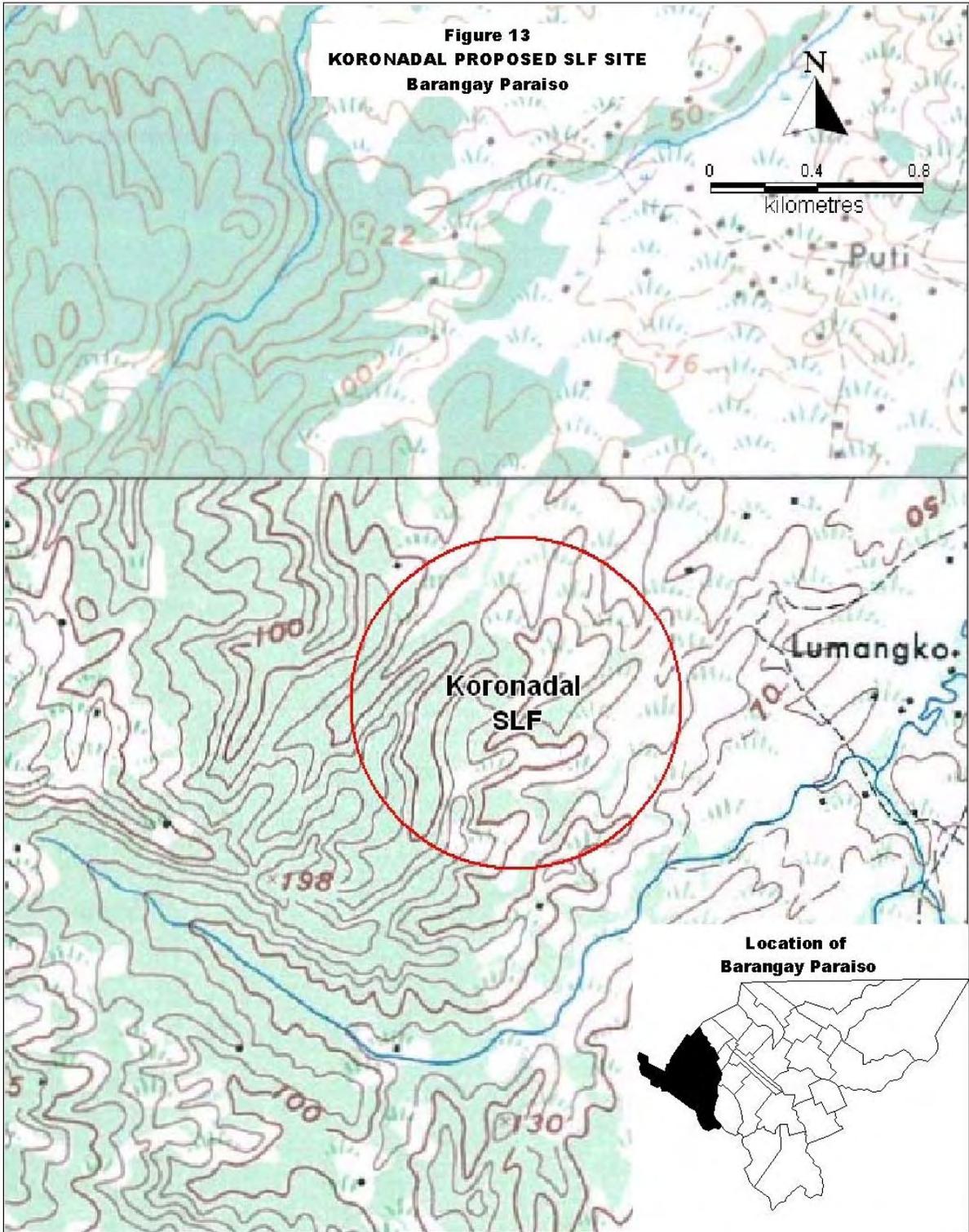
¹² Annex 11 – Assessment of Proposed SLF Site in Tacurong, Sultan Kudarat

¹³ Based on the Solid Waste Management Plan of the City of Tacurong

¹⁴ Annex 12 - Assessment of Proposed SLF Areas in Koronadal, South Cotobato







These areas, covering a total of at least 7 ha, assume basinal features enclosed by gentle to moderate slopes and underlain by sedimentary rocks of adequate bearing capacity.

The Koronadal site, found by MGB to be suitable, has favorable features. But the shallow water table could limit depth of excavation.

The proposed areas are separated by small divides or low ridges which could be integrated and developed into a disposal facility site. These have the following favorable features: large gently sloping area, adequate distance from major aquifer system, not susceptible to flooding, and has available soil cover. The shallow water table could limit depth of excavation. Development of the area would require the construction of the extension of the present feeder road, acquisition of the lots by the LGU and the resolution of potential land use issues.

The potential areas have also been evaluated by the MGB, which found them suitable for SLF development.

2.3 DISPOSAL FACILITIES WHICH WERE NOT INSPECTED

The prospective SLF sites of the following nine LGUs were not subjected to inspection: Bambang, Cabarroguis, Diffun, Madela, Bais, Bayawan, Danao, Jagna and Tanjay. The locations and areas of these sites are presented in Table 1. Among them, the sites at Bambang, Cabarroguis and Tanjay were considered suitable for SLF development by MGB. The Bais site, which has now been developed into an SLF, was studied with the assistance of the German government.

The SLF data presented in the LGU SWM plans are summarized in Table 2.

Table 2. Summary of SLF Data presented in SWM Plans of Ecogov Assisted LGUs

LGU	SLF data	Others
Bambang	Site location, area, source of soil cover, site capacity based on projected waste collection rates, conceptual design	Site evaluated and approved by MGB
Cabarroguis		Site evaluated and approved by MGB
Diffun		Site evaluated and approved by MGB
Madela		Site still to be evaluated by MGB
Bais	Site location, area, source of soil cover and liner, method of development, implemented design, capacity	Site studied and developed with assistance from German government
Bayawan	Conceptual design	Site still to be evaluated by MGB
Danao	Site location, area, conceptual design, projected capacity requirement	Site still to be evaluated by MGB
Jagna	Site location, area	Site still to be evaluated by MGB
Tanjay	Site location, area, conceptual design	Site evaluated and approved by MGB

The source of soil cover for the sites at Bambang, Cabarroguis, Diffun and Madela correspond to the materials to be excavated during development. The source of soil for Bais will likewise come from the excavations. Its liner though represents a combination of locally available clay and bentonite.

The capacity of the sites at Bambang, Cabarroguis, Diffun and Madela were based on projected collection rates within the 10-year planning period. With a standard assumption of a 1.8 ha footprint and a waste height of 10 m, all four sites can accommodate their projected collected waste within the next 10 years.

3.0 DISPOSAL ISSUES

3.1 DISPOSAL CAPACITIES

Estimates for the SLF capacities were based on the method applied at Tacurong, which has the smallest disposal site among the EcoGov-assisted LGUs. The method assumes an area of 1.8 ha, waste height of 10 m and a conservative compaction of 400 kg/m³. The potential waste generation within the planned collection area with and without 25 percent diversion was considered in the evaluation.

Applying this method on the potential areas¹⁵ acquired by the LGUs, estimates of the expected life of the disposal facility of the rest of the LGUs are made and presented in Table 3. Where collection area coverage is not available, the maximum (in the case of Albur), was set at 20 percent.

Table 3. Estimate of Disposal Facility Life of EcoGov Assisted LGUs

LGU	10 year waste collection (tons)	Potential SLF Area (has)	Potential Waste Footprint (has)	Facility life w/o diversion (years)	Facility life w/ 25% diversion (years)
Albur	4,816	7	4.6	320	426
Madela	13,423	7	4.6	115	153
Diffun	14,746	5	3.3	75	99
Cabarroguis	22,900	3	2.0	29	38
Bayombong	43,477	30	19.8	152	202
Jagna	43,659	2	1.3	10	13
Bambang	54,478	14	9.2	57	75
Bayawan	60,930	5	3.3	18	24
Tacurong	64,634		1.8	9	12
Bais	76,043		2.7	14	16
Koronadal	84,092	7	4.6	18	24
Danao	135,235	2	1.3	3	4
Kidapawan	152,873	5	3.3	7	10
Tagbilaran	268,272	7	4.6	6	8
Buug	No data	No data	No data	No data	No data
Wao	No data	No data	No data	No data	No data
Kalamansig	No data	No data	No data	No data	No data
Lamitan	No data	No data	No data	No data	No data
Ipil	No data	No data	No data	No data	No data
Solano	No data	No data	No data	No data	No data
Lebak	No data	No data	No data	No data	No data
Isulan	No data	No data	No data	No data	No data
Tanjay	No data	No data	No data	No data	No data
Isabela City	No data	No data	No data	No data	No data
Toledo	No data	No data	No data	No data	No data
Pagadian City	No data	No data	No data	No data	No data

¹⁵ For a given LGU, 66% of the identified SLF area was used as the waste footprint with the rest allotted for the support facilities.

The LGUs with estimated disposal life less than the 10-year planning period are Tacurong, Danao, Kidapawan and Tagbilaran. LGUs with capacities that are slightly over 10 years include Jagna and Bais.

In order to at least meet the disposal requirements for the next 10 years, these LGUs must undertake either one or both of the following:

1. Pursue aggressive waste diversion to lower the volume of waste to be dumped at the disposal facility
2. Acquire additional areas for solid waste facility

It will be noted that Tagbilaran, which plans to cluster with Albur and other LGUs can on its own fill up the currently available 7 ha facility within a short period of time.

For LGUs which have not yet identified or acquired lots for their disposal facilities, it would be prudent to pursue bigger sites which can accommodate their solid waste beyond the 10-year planning period.

3.2 COMPLIANCE WITH DISPOSAL REQUIREMENTS

With barely five months left prior to the February 16, 2006 deadline, it is definite that the EcoGov-assisted LGUs will not meet the disposal milestone set by RA 9003. With the exception of Bais, which currently operates an SLF, these LGUs are either at the stage of site validation via the MGB or lot acquisition. Only the city of Tacurong has progressed to the point of loan application for its disposal facility. The proposed Albur cluster SLF at Bohol has been awarded to a Visayas-based contractor under the Build Operate Transfer (BOT) scheme, but this is not expected to prosper without the participation of the major waste generator in the island, Tagbilaran City.

With the exception of Bais, which currently operates an SLF, the EcoGov-assisted LGUs will not be able to meet the disposal milestone set by RA 9003 on February 16, 2006.

Notwithstanding the new disposal categories which will apply mainly to lower income municipalities and cities such as those being assisted by EcoGov, it will take from 1.5 to 3 years to operate a new disposal facility from its current site selection state. The major activities to be completed within this period include:

1. Feasibility study
2. Environmental permitting
3. Design
4. Loan application and processing
5. Bidding
6. Construction

3.3 CONTINUED OPERATION OF OPEN DUMPS

With the expected delay in the development of facilities better than the controlled dumps coupled with technical, financial, economic, social, institutional and political problems which beset the LGUs, the use of open dumps will continue.

The sites which pose significant environmental impacts include those used by Tagbilaran, Kidapawan and Koronadal among others. These sites have large areas of exposed waste, which can leak leachate into the local ground water and drainage system and affect the health of waste pickers and nearby communities. Uncontrolled burning was noted in one of these sites. Impacts in other sites need to be assessed by the LGUs and partner agencies so that appropriate mitigating measures can be formulated and implemented.

3.4 LIMITED ROLE OF PARTNER AGENCIES

The first major step towards the development of a potential site into a disposal facility is the evaluation that must be performed jointly by the EMB and the MGB. As observed,

It was observed that the EMB and the MGB play a reactive role in the process of site selection and evaluation. The search for potential disposal sites is performed mainly by the LGU with the EMB and MGB responding mainly to the request for subsequent validation.

these agencies play a reactive role in the process of site selection and evaluation. As a result, the search for potential disposal sites is performed mainly by the LGU with the EMB and MGB responding mainly to the request for subsequent validation.

The assessments performed by the agencies are essentially limited to advisory on whether the site is suitable or not as referred to the RA 9003 criteria. The

MGB in particular has provided adequate geological characterization of the sites they have visited. There is a need though to focus on the hydrogeology and terrain of the sites instead of the usual regional lithological and structural descriptions. Based on practice, the LGU needs the following from MGB and EMB:

1. Evaluation of the drainage system as it relates to potential diversion of runoff and propagation of contaminated liquids from the facility.
2. Characterization of the slope and terrain features as they relate to natural buffers, extent of grading and excavation, definition of the footprint or waste cells and the positioning of the other support facilities.
3. Assessment of soil and rock features as they relate to foundation, availability of soil cover and workability.
4. Water point inventory and hydrogeological assessment to allow the positioning of monitoring wells, assessment of potential flow direction, approximation of recharge, depth to local groundwater and indicative permeability of foundation materials, among others.
5. Accurate map showing the outline and position of the proposed site with respect to major transport routes, waterways and population centers.

4.0 RECOMMENDED DISPOSAL STRATEGIES

4.1 ADOPTION OF NEW DISPOSAL FACILITY CATEGORY FOR LGUs

In order to assist the country's LGUs in complying with the requirements of RA 9003 on disposal, it is recommended that facilities which need to be operational by February 2006 be further categorized according to waste generation rates. The recommended four categories of waste disposal facilities and their basic features are presented in Table 4.

Table 4. Basic Features of Proposed Waste Disposal Facility Categories

Features	Category 1 ≤ 15 tpd	Category 2 > 15 tpd, ≤ 75 tpd	Category 3 > 75 tpd, ≤ 200 tpd	Category 4 > 200 tpd
Leachate Treatment	Natural Attenuation	Pond system	Combination of physical, biological & chemical	Combination of physical, biological & chemical
Leachate Re-circulation	At a later stage of operation	At a later stage of operation	At a later stage of operation	At a later stage of operation
Clay liner	Clay liner be at least 60 cm thick and has a permeability of 10^{-5} cm/sec	Clay liner must be at least 75 cm thick and has a permeability of 10^{-6} cm/sec		
Clay liner and/or synthetic liner			Clay liner at least 75 cm thick clay liner with a permeability of 10^{-7} cm/sec or better, if not available, an equivalent replacement would be a composite liner consisting of at least 1.5mm thick HDPE membrane	Synthetic liner at least 1.5mm thick HDPE membrane over at least 60 cm thickness of compacted clay materials with permeability no more than 10^{-7} cm/sec.

Aside from satisfying the siting criteria of RA 9003, all disposal facility categories shall have the basic features which include daily and intermediate soil cover, cell separation or embankment, drainage facility, gas venting and leachate collection.

Table 5 presents a matrix containing the projected 2006 population of the EcoGov-assisted LGUs, projected 2006 waste generation rates and daily waste generation. This table shows that most of the LGUs will fall under Category 1 and 2, with Pagadian City falling under Category 3.

With these new categories LGUs can develop a simplified version of the disposal facilities and still be able to comply with the basic requirement of waste containment.

The LGUs, however, need to be appraised not only of the technical features of the new disposal categories but also the financial as well as institutional aspects. This can be done though an information and education campaign that shall be undertaken by the advocacy group of EcoGov in coordination with the partner agencies.

Table 5. Matrix of Waste Generation Data and Disposal Facility Category

LGU	Year 2006 Population	Per capita 2003 (kg/day)	Per capita 2006 (kg/day)	Daily Waste Gen 2006 (tons)	Disposal Facility Category
Albur	10,096	0.51	0.525	5.3	1
Danao	22,123	0.300	0.309	6.6	
Jagna	32,264	0.25	0.258	8.3	
Buug	32,972	0.300	0.309	10.2	
Cabarroguis	29,988	0.38	0.392	11.7	
Madela	36,828	0.31	0.319	11.8	
Wao	48,274	0.300	0.309	14.5	
Diffun	44,054	0.35	0.361	15.9	2
Kalamansig	57,995	0.300	0.309	17.9	
Lamitan	64,285	0.300	0.309	19.9	
Ipil	64,858	0.300	0.309	20.0	
Bayombong	56,177	0.39	0.402	22.6	
Bambang	47,396	0.49	0.505	23.9	
Solano	59,766	0.400	0.412	24.6	
Lebak	83,466	0.300	0.309	25.8	
Tanjay	73,663	0.34	0.350	25.8	
Isulan	83,923	0.300	0.309	25.9	
Tacurong	85,003	0.33	0.340	28.9	
Isabela City	78,789	0.393	0.405	31.9	
Tagbilaran	93,348	0.45	0.464	43.3	
Bais	74,301	0.597	0.615	45.7	
Bayawan	115,509	0.52	0.536	61.9	
Kidapawan	120,088	0.53	0.546	65.6	
Toledo	169,083	0.400	0.412	67.6	
Koronadal	155,176	0.46	0.474	73.5	
Pagadian City	165,511	0.5	0.515	85.3	3

4.2 REGIONWIDE SITE SELECTION AND CLUSTERING

Using the currently available digital and printed thematic maps from the different partner agencies, regionwide selection of potential disposal areas can be made using the Geographic Information System. The method has already been employed in selecting some of the sites for the EcoGov-assisted LGUs particularly for South Cotabato. The results can be made available to LGUs and partner agencies for subsequent validation. These will allow them to systematically cover larger areas in their site selection efforts. The same results can be used to analyze the possibilities for clustering. In the case of the EcoGov-assisted LGUs, the centers of the clusters which may be considered are:

1. Solano or Bagabag for Nueva Viscaya
2. Cauayan for Isabela
3. Kidapawan for North Cotabato
4. General Santos and/or Koronadal for South Cotabato¹⁶
5. Albur and/or Ubay-Talibon for Bohol
6. Bayawan for Negros Oriental
7. Toledo and vicinity for Western Cebu
8. Danao and vicinity for Eastern Cebu
9. Pagadian for Zamboanga

The features of these areas with respect to the RA 9003 criteria and clustering considerations, such as collective waste generation, proximity, road linkage, availability of sites and institutional and political arrangements, need to be evaluated.

4.3 SUSTAINED CAPACITY BUILDING

The areas for capacity building, which may be extended by EcoGov not only to LGUs, but also to partner agencies include:

1. Dump site assessment to facilitate improvement and closure planning;
2. Disposal facility surveys and investigations;
3. Basic design; and
4. Disposal facility management and operations.

¹⁶ A rapid assessment of the clustering potential for South Cotabato has been previously prepared under EcoGov 2.

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Annexes

ASSESSMENT OF SOLANO OPEN DUMPSITE

The Solano Open Dumpsite is a 1 hectare facility located in Barangay Concepcion 6 kilometers northeast of the Poblacion (Figure 2). It has been sited on the footslope of a low hill which has been benched and graded by the site development activities. The site is accessible from the main highway via a 2 lane, 2 km feeder road. A number of informal dwellings could be found along this road about 500 meters from the dump. The dwellings serve also as stockade for recyclable materials.

The upper level benched section of the site as been covered with soil. The edge of the bench till the lower toe of the hill however consists of exposed waste. The active portion is now limited to the toe of the waste pile.

The site is not fenced and the only semblance of site management is the application of soil cover on the benched section. Otherwise, waste pickers can easily get into the unfenced waste pile.

At the time of the inspection, the LGU does not have definite closure plans for the dumpsite.

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day time operation	Maintain day time operations
2.	Daily and Intermediate Cover	Partial soil cover, large part disposal site not covered	Provide soil cover or equivalent
3.	Site Drainage	None.	Provide drainage canal near the break of slope at northwestern edge of the partially covered waste pile.
4.	Odor Control	None, unpleasant smell pervades within the site	Provide soil cover on a regular basis
5.	Waste Placement	Waste still disposed over large part of the site particularly at the toe of the pile.	Limit disposal to a smaller part of the site
6.	Site Management	None, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Solano
7.	Site Control	None, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Solano
8.	Fencing, Litter Control	None	Provide fence or vegetation buffer around dumpsite taking note of the natural enclosure provides by the elevated section to the northwest.
9.	Record Keeping	None	Implement systematic recording, deploy, train site staff
10.	Access Road Maintenance	Adequate during summer, likely to be slippery during the rainy season	Improve steep sections of the access road
11.	Other Site Infrastructure	None	
12.	Environmental Monitoring	None	Conduct hydrogeological assessment before implementing relevant water quality monitoring where appropriate
13.	Maintenance	None observed	

No.	Parameter	Observations/Assessment	Recommendations
14.	Protection of Local Amenities	None implemented, leachate and contaminated water likely to affect surface and groundwater to the east of the area	Conduct hydrogeological assessment before implementing relevant water quality monitoring where appropriate
15.	Waste Picking	Present.	Children should not be allowed on site
16.	Closure and Post Closure	LGU yet to draft a closure plan	Detailed site assessment and implementation of appropriate closure measures
17.	Hydrogeology	Site underlain by volcanic rocks, depth to local groundwater not known	Hydrogeological and contaminant investigation
18.	Open Burning	None observed	Advise waste pickers to refrain from open burning. Monitoring.
19.	Squatting	None observed at site although waste picker occupy huts along the road leading to the site	Monitoring.
20.	Unauthorized Dumping	Site supposed to be closed as of 2004	Close site and implement appropriate closure measures
21.	Vicinity Development	Informal dwellings and residential units along road leading to dumpsite	
22.	Surface and Groundwater Resource Proximity	Area to the northeast likely to have shallow groundwater which could be affected by leachate and contaminated water from the site.	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells

ASSESSMENT OF BAMBANG OPEN DUMPSITE

The Bambang Open Dumpsite occupies about 3 hectares of a 14 hectare area in designated by the LGU for waste disposal facility. It is located in Barangay Aliaga, about 4 kilometers west of the main highway. The site receives mixed waste at a reported rate of 4.7 tons per day.

The site is unfenced and poorly managed. The exposed waste occupies the northern lower slope of a hill which is bounded farther north by an intermittent creek. At the time of the inspection in May 2005, the northern edge of the waste pile has assumed a steep profile which could easily topple into the nearby creek by its own weight or during rains.

Access to the site is via a single lane and winding unpaved road. This road becomes impassable during the rainy season. A number of waste pickers have been observed working on the exposed waste. There are no huts or residential units within the immediate vicinity of the site.

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day time operation	Maintain day time operations
2.	Daily and Intermediate Cover	None	Provide soil cover or equivalent
3.	Site Drainage	None. Edge of waste pile extends into the valley of an intermittent creek.	Provide drainage canal where appropriate.
4.	Odor Control	None, unpleasant smell pervades within the site	Provide soil cover on a regular basis
5.	Waste Placement	Waste disposed at random.	Limit disposal to a smaller part of the site
6.	Site Management	None, limited number of waste pickers noted.	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Bambang
7.	Site Control	None, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Bambang
8.	Fencing, Litter Control	None	Provide fence or vegetation buffer around dumpsite taking note of the natural enclosure provided by the elevated section to the south.
9.	Record Keeping	None	Implement systematic recording, deploy, train site staff
10.	Access Road Maintenance	Adequate during summer, likely to be muddy and impassable during the rainy season	Improve steep sections of the access road. Widen road.
11.	Other Site Infrastructure	None	
12.	Environmental Monitoring	None	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells
13.	Maintenance	None observed	

No.	Parameter	Observations/Assessment	Recommendations
14.	Protection of Local Amenities	None implemented, leachate and contaminated water likely to affect areas downstream of the dumpsite.	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells
15.	Waste Picking	Present.	Proper apparel needed for pickers, children should not be allowed on site
16.	Closure and Post Closure	LGU has yet to draft closure plan	Detailed site assessment and implementation of appropriate closure measures
17.	Hydrogeology	Site underlain by low permeability rocks, depth to local groundwater not known	Hydrogeological and contaminant investigation
18.	Open Burning	Open burning observed	Advise waste pickers to refrain from open burning
19.	Squatting	None observed.	Monitoring.
20.	Unauthorized Dumping	Site supposed to be closed as of 2004	Close site and implement appropriate closure measures
21.	Vicinity Development	Site and immediate vicinity essentially uninhabited.	Monitoring.
22.	Surface and Groundwater Resource Proximity	Site located on low permeability rock formation. Runoff expected to be dominant and may contribute to the transmission of contaminated waters into the intermittent creek to the north.	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells

ASSESSMENT OF DAMPAS OPEN DUMPSITE, TAGBILARAN CITY

The Dampas Open Dumpsite is a 2.6 hectare facility located 3 kilometers north of Tagbilaran City. It has been operational since 1991 and sits on a permeable limestone formation. The bulk of the waste has been dumped at and near the edge of a large sinkhole. Definite plans for closure have not been developed as the city waits for the development of the proposed SLF facility in Albur. An adjacent lot to the west has been issued an NTP for development into a controlled dump. This new site has been subjected to a hydrogeological and georesistivity survey. Notwithstanding the surveys conducted and the issued NTP, the proposed controlled dumpsite is not suitable for waste disposal as it likewise is located on a permeable limestone formation.

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day and night time operations	Limit operations to daylight hours where possible
2.	Daily and Intermediate Cover	No waste cover	Provide soil cover or equivalent
3.	Site Drainage	None, permeable foundation	Canals will not be effective due to permeable foundation
4.	Odor Control	None	Provide soil cover
5.	Waste Placement	Waste disposed over large part of the site, waste pickers allowed to move the waste	Limit disposal to a smaller part of the site
6.	Site Management	Limited, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers association
7.	Site Control	Limited, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers association
8.	Fencing, Litter Control	None	Provide fence with gate around dumpsite
9.	Record Keeping	With record keeping	Systematic recording format needed, training for site staff
10.	Access Road Maintenance	Adequate	
11.	Other Site Infrastructure	Lacking, no wash area, no parking for equipment	Needs improvement
12.	Environmental Monitoring	Limited, no water quality monitoring	Implement regular water quality monitoring of downstream wells if present
13.	Maintenance	None observed	
14.	Protection of Local Amenities	NA	Water quality monitoring if wells are present
15.	Waste Picking	Organized	Proper apparel needed for pickers, children should not be allowed on site
16.	Closure and Post Closure	No definite plans	Detailed site assessment and implementation of appropriate closure measures
17.	Hydrogeology	Site on sinkhole, permeable ground, highly susceptible to contamination	Hydrogeological and contaminant investigation
18.	Open Burning	Present	Apply soil cover, prohibit burning
19.	Squatting	Adjacent area has informal dwellings	Relocate informal dwellers if possible
20.	Unauthorized Dumping	Site supposed to be closed as of 2004	
21.	Vicinity Development	Informal dwellings and residential units adjacent to dumpsite	Relocate informal dwellers if possible
22.	Surface and Groundwater Resource Proximity	Site on sinkhole, permeable ground, highly susceptible to contamination	Hydrogeological and contaminant investigation



Exposed waste and open burning at the Dampas Open Dump ran



Waste pickers at exposed waste pile in Dampas Open Dump

ASSESSMENT OF KORONADAL OPEN DUMPSITE

The Koronadal Open Dumpsite is a 12 hectare facility located in Barangay Sta. Cruz about 3.5 kilometers southwest west of the central business district. It has been sited on the gently inclined midslope of a limestone hill. The site receives mixed waste at a reported rate of 16 tons per day. About 50% of the site has been graded and partially covered with soil. Litter is still found throughout most of the site. The active portion is now limited to the southwest, more elevated section of the site.

The small, intermittent creeks and portions of the road leading to the site have likewise served as dumping areas for waste.

The permeable dumpsite favors the entry of the contaminated waters into the groundwater system located at the valley areas to the east. The inferred effect has not yet been validated as samples of water from wells from these areas have not been tested and a comprehensive study has not been undertaken.

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day time operation	Maintain day time operations
2.	Daily and Intermediate Cover	Partial soil cover, large part disposal site not covered	Provide soil cover or equivalent
3.	Site Drainage	None. A natural depression runs along the western edge of the site which corresponds to the channel of an intermittent creek.	Provide drainage canal where appropriate taking into consideration the permeability of the underlying limestone.
4.	Odor Control	None, unpleasant smell pervades within the site	Provide soil cover on a regular basis
5.	Waste Placement	Waste still disposed over large part of the site	Limit disposal to a smaller part of the site
6.	Site Management	None, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Koronadal
7.	Site Control	None, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Koronadal
8.	Fencing, Litter Control	None	Provide fence or vegetation buffer around dumpsite taking note of the natural enclosure provides by the elevated section to the southwest
9.	Record Keeping	None	Implement systematic recording, deploy, train site staff
10.	Access Road Maintenance	Adequate during summer, likely to be slippery during the rainy season	Improve steep sections of the access road
11.	Other Site Infrastructure	None	
12.	Environmental Monitoring	None	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells
13.	Maintenance	None observed	

No.	Parameter	Observations/Assessment	Recommendations
14.	Protection of Local Amenities	None implemented, leachate and contaminated water likely to affect surface and groundwater to the east of the area	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells
15.	Waste Picking	Present including children	Proper apparel needed for pickers, children should not be allowed on site
16.	Closure and Post Closure	LGU has drafted closure plan	Detailed site assessment and implementation of appropriate closure measures
17.	Hydrogeology	Site underlain by permeable limestone, depth to local groundwater not known	Hydrogeological and contaminant investigation
18.	Open Burning	Open burning observed	Advise waste pickers to refrain from open burning
19.	Squatting	Site has sheds for waste pickers	Remove sheds as these may be converted as semi permanent residences by waste pickers
20.	Unauthorized Dumping	Site supposed to be closed as of 2004	Close site and implement appropriate closure measures
21.	Vicinity Development	Informal dwellings and residential units adjacent to dumpsite	Relocate informal dwellers if possible
22.	Surface and Groundwater Resource Proximity	Site located on permeable limestone formation which can transmit contaminated wasters to the local groundwater site. Site bounded by an intermittent creek to the west	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells



Open burning of exposed waste at Koronadal Open Dump

ASSESSMENT OF KIDAPAWAN OPEN/CONTROLLED DUMPSITE

The Kidapawan Open Dumpsite is a 4.7 hectare facility located in Barangay Binoligan about 8 kilometers west of the town proper. It has been operational since 1994 and occupies the top of a flattened hill made up of semi permeable pyroclastics. A small part of the central section has been covered with soil but waste is largely exposed throughout. The waste pile extends into the channels of the intermittent streams which bound it to the north and south and into a small pond to the northeast. This condition favors the leaching of contaminated water into the waterways. Definite plans for the closure of the site have not been formulated.

The LGU has begun the development of the narrow 1-hectare valley of the stream to the south into a “controlled dump”. The new site though has to resolve the following issues:

1. Limited working area
2. Effectivity of the drainage system to handle large stream flows and direct heavy rainfall
3. Large waste pile along the right bank of the stream
4. Additional inflow of water from the small creek issuing from the left bank
5. Absence of suitable location for the proposed waste water treatment facility of ponds
6. Impact of site on the informal dwellers which occupy the immediate eastern edge

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day time operation	Maintain day time operations
2.	Daily and Intermediate Cover	Partial soil cover, main disposal site not covered	Provide soil cover or equivalent
3.	Site Drainage	None, waste pile extends into channel of intermittent creeks which bound the site to the south, west, north and to a pool of water to the northeast	Provide drainage canal where appropriate taking into consideration the existing waste placements and the nearby pool of water
4.	Odor Control	None	Provide soil cover on a regular basis
5.	Waste Placement	Waste disposed over large part of the site	Limit disposal to a smaller part of the site
6.	Site Management	Apparently none, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers
7.	Site Control	Apparently none, waste pickers roam the site freely	Develop site management operational guidelines to be followed by waste pickers
8.	Fencing, Litter Control	None	Provide fence with gate around dumpsite
9.	Record Keeping	None	Implement systematic recording, deploy, train site staff
10.	Access Road Maintenance	Adequate	
11.	Other Site Infrastructure	None	
12.	Environmental Monitoring	None	Implement regular water quality monitoring of downstream creeks including wells if present
13.	Maintenance	None observed	
14.	Protection of Local Amenities	None implemented, leachate and contaminated water likely to affect	Water quality monitoring

No.	Parameter	Observations/Assessment	Recommendations
		surface water to the west of the area	
15.	Waste Picking	Present including children	Proper apparel needed for pickers, children should not be allowed on site
16.	Closure and Post Closure	No definite plans	Detailed site assessment and implementation of appropriate closure measures
17.	Hydrogeology	Site underlain by semi-permeable pyroclastics, depth to local groundwater not known	Hydrogeological and contaminant investigation
18.	Open Burning	None observed	Monitoring
19.	Squatting	Adjacent area has informal dwellers	Relocate informal dwellers if possible
20.	Unauthorized Dumping	Site supposed to be closed as of 2004	Close site and implement appropriate closure measures
21.	Vicinity Development	Informal dwellings and residential units adjacent to dumpsite	Relocate informal dwellers if possible
22.	Surface and Groundwater Resource Proximity	Site bounded by intermittent creeks, no reported wells downstream of site (This needs verification)	Water quality monitoring



Exposed waste and litter atop the Kidapawan open dump



Small valley adjacent to open dump which will be utilized as controlled dump



Drainage canal built to divert flow of intermittent creek away from the proposed controlled dump

ASSESSMENT OF ISABELA CITY CONTROLLED DUMPSITE, BASILAN

The Isabela City Controlled Dumpsite occupies 2.5 hectares of a gently sloping to rolling terrain in Sitio Burakan Lantung, Barangay Baluno about 13 kilometers northeast of the city. The adjacent 2.5 hectare area is planned to be developed as an SLF by the LGU.

The facility is well sited with a favorable terrain, easily workable foundation and locally available materials for soil cover. As noted, cover is immediately applied to incoming waste. There are no waste pickers in the area. The adjacent area to the northwest has an MRF with provisions for washing of the waste trucks exiting from the dumpsite. Medical and related wastes are placed in a concrete vault.

The operations can be farther improved with training of the site personnel, installation of signage, construction of perimeter fence, putting in place an integrated drainage system and facilitating systematic recording of incoming waste.

Additional site investigations which include conduct of detailed topographic surveys, hydrogeological studies and foundation tests are needed to serve as inputs to the design of the proposed SLF

No.	Parameter	Observations/Assessment	Recommendations
1.	Site Availability	Day time operation	Maintain day time operations
2.	Daily and Intermediate Cover	Daily soil cover applied	The soil cover must be applied at the end of each working day and not after each truck delivery to optimize the use of currently available soil and air space.
3.	Site Drainage	None. Current waste trench likely to be filled with water during heavy rains.	Design integrated system based on an accurate topographic which should consider the low areas that surround the proposed disposal facility.
4.	Odor Control	No unpleasant odor detected as waste is fully covered with soil	Continue application of daily soil cover
5.	Waste Placement	Good waste placement, limited to a small sector of current waste trench.	Maintain current practice of using only a small part of waste trench for disposal
6.	Site Management	Good site management but lacks appropriate signage.	Develop site management operational guidelines to be followed by waste pickers under supervision of SWM office of Isabela City. Provide signage within and at the approach to the site.
7.	Site Control	Site appears to be well controlled.	Develop site management operational guidelines to be followed by site staff.
8.	Fencing, Litter Control	None	Provide fence or vegetation buffer around dumpsite by the elevated section to the northwest.
9.	Record Keeping	None	Implement systematic recording, deploy, train site staff
10.	Access Road Maintenance	Adequate	Regular road maintenance
11.	Other Site Infrastructure	MRF and composting area which includes a wash area for outgoing dump trucks	Continue site infrastructure maintenance

No.	Parameter	Observations/Assessment	Recommendations
12.	Environmental Monitoring	None	Conduct hydrogeological assessment before implementing relevant water quality monitoring where appropriate
13.	Maintenance	Site well kept, washing of outgoing waste trucks noted	Continue site infrastructure maintenance
14.	Protection of Local Amenities	None implemented as there are no observed significant water bodies or wells within the area	Conduct hydrogeological assessment before implementing relevant water quality monitoring where appropriate
15.	Waste Picking	None	Discourage waste picking at site. Provide fence around the site.
16.	Closure and Post Closure	LGU will not close site but develop rest of the area into an SLF type of facility	Detailed site investigation as input into design of SLF type facility
17.	Hydrogeology	Site underlain by volcanic rocks, depth to local groundwater not known	Conduct hydrogeological investigation supported by georesistivity survey.
18.	Open Burning	None observed	Monitoring. Regular application of daily soil cover.
19.	Squatting	None observed at site and immediate vicinity	Provision of fence around facility
20.	Unauthorized Dumping	None	
21.	Vicinity Development	None	
22.	Surface and Groundwater Resource Proximity	There are no major drainage systems in the area which will likely be affected by the operations of the facility. Groundwater occurs at an unknown depth.	Conduct hydrogeological assessment before implementing regular water quality monitoring of downstream creeks including wells and possibly springs

ASSESSMENT OF POTENTIAL SLF SITE IN SOLANO, NUEVA VISCAYA

The proposed Solano SLF site was identified during the training exercise held for the Northern Luzon LGUs in May 2005. It is located at Barangay Concepcion about 10 kilometers northeast of Bayombong Poblacion. It will include an amphitheater defined by gently sloping hills to the northwest, south and northeast and will cover at least 30 hectares. The southeastern portion contains the existing Solano open dumpsite.

The proposed site has the following favorable features: large gently sloping area, distance from major aquifer system, not susceptible to flooding, good access and available soil cover. Issues regarding land ownership and landuse of the eastern edge of the site need to be resolved. Otherwise, the site has a potential for being developed into a regional disposal facility which can serve a cluster of LGUs.

Criteria	Assessment
Topography	Site corresponds to a natural basin enclosed by gently sloping hills. This would require minimal excavation to attain the required level area. The excavated materials could be used as soil cover.
Proximity to sensitive groundwater resources	Site not within vicinity of major aquifer system. Currently, there is no information regarding groundwater at the site.
Area capacity and availability	Site covers about 30 hectares gently sloping to hilly land. Ownership has yet to be established.
Availability of soil cover	Soil and weathered rock to be excavated from the site during development could be used for cover.
Current and future landuse	Eastern flat edge currently planted to rice. Hilly areas correspond to a brush land.
Geologic condition	Foundation corresponds to volcanic rocks with adequate bearing capacity, no regional active fault mapped within immediate site
Haul distance and time	About 10 kms road kilometers northeast of Bayombong, main access via the national highway thence through a 2.5 kilometer 2 lane feeder road.
Local ecological conditions	There are no ecologically sensitive areas within immediate vicinity of proposed site
Occurrence of flooding	Site located on a slightly elevated area and not susceptible to flooding. Catchment above site too small to generate significant floods.
Proximity to airports	Site outside of the 3 kilometer radius of the Bagabag Airfield which is located 7 kilometers to the northeast.
Proximity to perennial streams	Site sheltered from the main channel of Cagayan River by a ridge.
Proximity to sensitive land users	Site essentially away from residential areas but about 2 kilometers from a cluster of informal dwellers who currently pick waste at the Solano open dump.
Seismic condition	As in the rest of the Philippines, site susceptible to earthquakes, regional ground acceleration may vary from 0.11 to 0.2 g
Social acceptability	Still to established and acquired
Soil and land condition	Site underlain by stable rock formation

ASSESSMENT OF POTENTIAL SLF AREA IN BAGABAG, NUEVA VISCAYA

The potential SLF area was identified during the training exercise held for the Northern Luzon LGUs in May 2005. This is located within a gently sloping to rolling terrain along side the road section from the Magat River crossing in Kinakao to Mantanibong in Bagabag and covers approximately 100 hectares. The center of the areas is about 30 kilometers northeast of Bagabag.

The area in general has the following favorable features: large gently sloping sections enclosed within small catchments which form natural buffers and may correspond to waste cells, available soil cover, low groundwater potential which translates to relatively impervious foundation, access by good roads and generally low land productivity.

The size of the potential area is favorable for the development of a regional disposal facility for a cluster of LGUs.

Criteria	Assessment
Topography	Gently sloping to rolling terrain within small catchments
Proximity to sensitive groundwater resources	Regionally area has low groundwater potential.
Area capacity and availability	Area covers about 30 hectares. Ownership yet to be established.
Availability of soil cover	Soil and weathered rock to be excavated from the area during development could be used for cover.
Current and future landuse	Most of the potential area covered with grass and shrubs.
Geologic condition	Foundation corresponds to volcanic rocks with adequate bearing capacity, no regional active fault mapped within immediate site
Haul distance and time	About 30 road kilometers northeast of Bayombong. Main access via the national highway thence possibly through foot trails to either side of the road.
Local ecological conditions	There are no ecologically sensitive areas within the potential SLF area.
Occurrence of flooding	Area located within small catchments away from the major drainage system in the region. Flooding at of area not likely to take place.
Proximity to airports	Potential area located east of the Bagabag airfield
Proximity to perennial streams	Area located within small catchments away from the major drainage system in the region.
Proximity to sensitive land users	There are sites within the potential area which are located away from residential areas. Residential units noted along the main highway.
Seismic condition	As in the rest of the Philippines, area susceptible to earthquakes, regional ground acceleration range from 0.1 to 0.2 g
Social acceptability	Still to established and acquired
Soil and land condition	Area underlain by stable rock formation