



Republic of the Philippines

**Department of Environment and Natural Resources  
BIODIVERSITY MANAGEMENT BUREAU**

Ninoy Aquino Parks and Wildlife Center

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JUL 15 2019

**TECHNICAL BULLETIN  
No. 2019 - 01**

**SUBJECT : CLARIFYING THE GUIDELINES AND PROCEDURES IN THE DEMARCATION OF BOUNDARIES OF LEGISLATED PROTECTED AREAS UNDER THE NATIONAL INTEGRATED PROTECTED AREAS SYSTEM (NIPAS)**

Pursuant to Section 4, Article XII of the 1987 Philippine Constitution, Section 5 of Republic Act No. 7586 or the National Integrated Protected Areas System (NIPAS) Act of 1992, as amended by R.A. 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018, and DENR Administrative Order No. 2019-05 or the Implementing Rules and Regulations (IRR) of the NIPAS Act, this Technical Bulletin is hereby issued for the guidance of all concerned.

**Section 1. Objective.** This Bulletin provides the specific guidelines and procedures for the survey and demarcation of boundaries of all legislated protected areas under the NIPAS.

**Section 2. Scope and Coverage.** This Bulletin shall apply to all legislated protected areas pursuant to the NIPAS Act, as amended by the ENIPAS Act of 2018 and other protected areas with specific legislations.

**Section 3. Definition of Terms.** As used in this Technical Bulletin, the following terms shall mean as defined hereunder:

1. Boundary markers - the monuments and markings such as concrete monuments, buoys or natural markers such as deciduous trees, big rocks/stones and the likes installed and painted to identify the corners of protected areas as described in the legislation;
2. Demarcation - the establishment of the boundaries of legislated protected areas using visible markers, monuments, buoys in case of marine areas, and known natural features or landmarks, among others, as a result of the actual ground delineation;
3. Digital Platform - geospatial software that is designed to capture, store, manipulate, analyze, manage and present all types of geographical data;
4. Final map - map generated from the relocation and demarcation of boundaries of protected areas as provided in the legislation using a scale of 1 :50,000, or which may vary according to the size of the protected area;
5. Mooring Buoy - a type of buoy that is designed in a manner that there is a heavier weight located right in the bottom of the sea or anchored on an appropriate manner;
6. Preliminary map - initial map generated out of the technical description prescribed in the legislations prior to the actual boundary relocation;

7. Strategic Places – vantage points adjacent to local communities, traverse in riverbanks and streams, roadsides and entry points where monitoring of illegal activities can take place.
8. Witness Monument – a monument indicating the appropriate survey symbols established along stable or non-ambulatory shorelines/river banks at the low tide level for corners that fall into the sea or any bodies of water that cannot be marked with regular monuments.

**Section 4. Installation of Monuments and/or Markers.** The demarcation of boundaries shall involve the actual relocation of corners and installation of concrete monuments and other prominent physical landmarks or features of the protected area to ensure its integrity from threats, deter other illegal activities and facilitate enforcement and monitoring.

The demarcation of boundaries shall involve the following:

*4.1 Preparatory Phase.* Prior to the conduct of the actual ground survey, the following activities shall be undertaken:

- 4.1.1 Prepare the preliminary map based on the technical description provided in RA 11038 or other specific legislations of protected areas. This will be used as reference for the actual boundary demarcation.
- 4.1.2 Conduct meeting of the Regional Delineation and Demarcation Committee (RDDC) together with the Regional Delineation and Demarcation Team (RDDT) to present the preliminary map and to provide technical guidance in preparation for the actual demarcation activities;
- 4.1.3 For marine protected areas, the RDDC shall be enjoined by the Philippine Coast Guard in order to determine whether markers would be applicable in the area;
- 4.1.4 Conduct coordination meetings and Communication, Education and Public Awareness (CEPA) involving the concerned municipalities and key stakeholders within the protected area.

The demarcation survey shall be conducted with prior written notice to the affected communities to be posted in the Barangay and Municipal Halls. The concerned Barangay and Municipal Officials shall be responsible for informing their constituents on this matter. The said survey shall commence not earlier than five (5) days upon receipt of such notice. If there are nearby or adjacent on-going survey projects, the Head of the Team/Party executing said survey shall be informed in writing for purposes of work coordination in consonance with Sec. 165.b, DENR Memorandum Circular No. 2010-13, the Manual on Land Survey Procedures.

The demarcation survey shall be undertaken in the same manner as an isolated survey pursuant to Sec. 165.c, DMC 2010-13.

The survey shall be at least in the 4th Order Accuracy. The existing corner points of titled/decreed properties and those areas covered by

previously approved surveys within and along the perimeter should be observed for connection and checking purposes pursuant to Sec. 165.d, DMC 2010-13.

*4.2 Implementation Phase.* The following steps shall be undertaken in the actual demarcation of PA boundaries:

- 4.2.1 Relocate on the ground the corners of the protected area using the preliminary map based on the technical description as provided in the Congressional Act. The lines and corners of the protected area shall be compliant with the Philippine Reference System of 1992 (PRS92) pursuant to E.O. 45 as amended by E.O. 280 and 321. The conduct of demarcation of PA boundaries shall be consistent with the DENR Administrative Order No. 2007-29 also known as the Revised Regulations on Land Surveys and DENR Memorandum Circular No. 2010-13. Process flow of the relocation survey of NIPAS boundaries as shown in **Annex A**.
- 4.2.2 The corners shall be marked with monuments and appropriate markers in accordance with the prescribed design and specification provided for in **Annex B**. In between corners, signage/markers must be installed in strategic places and/or every 250 m, if necessary.
- 4.2.3 For terrestrial protected areas, three (3) strips (quincunx) of suitable and fruit/flowering endemic tree species shall be planted along the boundary lines in between concrete monuments with spacing of 4 m x 4 m as illustrated in **Annex C**;
- 4.2.4 Physical markers such as buoys or floating signage aid in the management interventions, navigation and enforcement within MPAs. However, in some areas where physical demarcation may not be practically applicable due to external factors, boundaries should be demarcated on a digital platform. Generated geographical information shall then be submitted to NAMRIA for its integration on charted maps such as nautical charts;
- 4.2.5 On digitally demarcated MPAs, two witness monuments shall be established in a stable and non-ambulatory location on the nearest terrestrial feature adjacent to the demarcated area. Bearing and distance from the boundary corner shall be legibly and properly marked on each monument;
- 4.2.6 Use of precise survey instruments, marine navigational tools and other survey instruments as prescribed by the Land Management Bureau in all surveys;
- 4.2.7 Observations and information gathered during the field activities shall be recorded in the survey returns and form part of the final report of the RDDTs;
- 4.2.8 Corners that fall within settlements/communities should be duly noted and their exact location, marked on the ground and on the map;

4.2.9 The participation of representatives from the local communities especially those that will be affected by such activity will be encouraged during the conduct of the actual boundary demarcation; and

4.3 The following, unless otherwise stated, shall be done in the LMB prescribed forms and shall be included in the submission of survey returns in consonance with Sec. 184, DMC 2010-13:

4.3.1 References and Technical Documents:

4.3.1.1 GPS Field Sheets;

4.3.1.2 Approved Geographic Position of Reference Points;

4.3.1.3 Final List of Position;

4.3.1.4 Grid Distance Computation;

4.3.1.5 Monument Description Sheet(s); and

4.3.1.6 Location Monument Recovery Report

4.3.2 Digital and hard copy of maps printed in mylar drafting film;

4.4 Inspection, Verification and Approval of Surveys (IVAS). The Regional Survey and Mapping Division (RSMD) shall verify the correctness and technical accuracy of the survey returns covering national parks/protected areas boundary. The process of PA IVAS shall be done within the Land Administration and Management System (LAMS), the DENR computer-based verification of Survey Plans. The inspection, verification and approval of surveys shall be in accordance with DMC 2010-13;

Criteria and requirements in the undertaking of IVAS are as follows:

- a. Two survey controls, *at least 200 meters apart* shall be established on stable ground near the approximate location of every boundary monument to be constructed.
- b. The positions of the survey controls near the boundary corners locations shall be established using survey grade dual frequency GPS/GNSS Satellite Receivers with reference to existing NAMRIA PRS92 survey controls within or near the project site by using uniform coordinate system.
- c. The survey controls shall be at least of 4<sup>th</sup> order accuracy.
- d. Two witness monuments shall be established in a stable location for every corner boundary location that falls within the creek, river or body of water.
- e. The bearing and distance from each witness monument to the boundary corner location shall be legibly and properly marked on each witness monument.

- f. The coordinate system of the boundary corners shall be with same system of the established survey controls prior to the setting of boundary monuments.
- g. The boundary corner location shall be set and checked using the established survey controls near each boundary location. One of the two survey controls shall be used for stake-out while the other survey control shall be used for checking.
- h. All surveying and mapping activities shall be with reference to R.A.8560 otherwise known as the Philippine Geodetic Engineering Act of 1988 and the latest revised Manual of Land Surveying in the Philippines.

#### 4.5 Approval Phase.

- 4.5.1 The final map of the protected area shall be prepared in accordance to the template provided in **Annex D**;
- 4.5.2 The RDDT shall submit the map for further review by the RDDC through the PASu and the Conservation and Development Division Chief of the Regional Office for further review and endorsement to the National Delineation and Demarcation Committee (NDDC);
- 4.5.3 The Regional Executive Director (RED), as Chair of the RDDC, shall certify the correctness and authenticity of the map. The RED shall sign and endorse the said map to the Secretary through the NDDC Chair, Undersecretary for Field Operations and BMB for final approval;
- 4.5.4 The DENR Secretary shall inform the Congress of any proposed amendment to the law of the concerned PA; and
- 4.5.5 The copy of the approved PA map shall also be furnished to the Chief, Survey and Mapping Division (SMD) of the DENR Regional Offices for updating of LAMS.

**Section 5. Standard Design and Specifications of Boundary Markers.** Permanent markers such as monuments, buoys and alternative markers shall be installed using the standard design and specifications as provided herein:

#### 5.1 For Terrestrial Protected Areas

- 5.1.1 Concrete monuments shall have a minimum dimension of 20.00 cm x 20.00 cm x 90.00 cm. The materials to be used shall be Class A (1:2:4) concrete, longitudinally reinforced with four 10.00 mm diameter standard deformed steel bar, properly embedded on the four corners. A footing of 20 cm on all sides of the monument and 10 cm high starting from the base of the monument shall be included.
- 5.1.2 The boundary markers shall bear the letters "NPbs" which means "National Park boundary survey"; respective Regional Number i.e. "13"; Map Number i.e. "01"; and the corner numbers "CN.\_" engraved at the center on top and front of the monuments. The letter should be 05.00 cm high in arial font and the "corner number" in 2.5 cm diameter

(Corner No. 1). The said monuments should be installed vertically and as accurately as possible where the corner points of the protected area are located on the ground. The monument shall be implanted 45.00 cm deep on the ground.

- 5.1.3 The signage/markers shall be installed in built-up areas and strategic places in every 250 m along the boundary. These shall have the markings as provided for in DAO No. 2009-09 dated August 20, 2009, and should be stated in English and in the local dialect as shown in **Annex E**.
- 5.1.4 Should there be corners located in spots where the use of concrete monuments are not applicable, permanent features on the ground such as boulders or rock surfaces, with an exposed surface of at least one (1) meter, can serve as alternative markers. They shall be marked with the Corner Number (CN), the letter "NPbs" and the Survey Plan Number. The font size of which is 10.00 cm arial font. These shall be painted red with at least three (3) coatings. A 15 cm x 15 cm square box shall also be painted with the same paint and coatings to enclose the markings and the corner number at its center. The geographic coordinates of each corner should be recorded.
- 5.1.5 Large deciduous trees with at least one (1) meter in diameter at breast height (DBH) may also be used as an alternative marker.

## 5.2 For Marine Protected Areas

- 5.2.1 Buoy systems to be used for a particular MPA will be determined by the system considerations and the site location. Such considerations are as follows:
- 5.2.1.1 **Water depth:** This shall be the main consideration in determining which particular buoy system can be used for a given site. This information is usually obtained from a nautical chart for design purposes and then verified on scene during ground validation.
- 5.2.1.2 **Current:** Surface current and deep ocean currents must also be taken into consideration in determining whether the area is suitable for physical demarcation. Further, currents must also be factored in to determine the appropriate materials and anchoring systems to be used.
- 5.2.1.3 **Bottom Conditions:** The type of bottom may also be of concern to the type of mooring and anchoring system. In MPAs with coralline substrate, a special anchoring system may be required in order not to damage the ecosystem present in the area.
- 5.2.1.4 **Buoy hull:** The designation of a particular hull for a selected mooring site will aid in determining which mooring system should be used. Smaller hulls have limited buoyancy that may limit the size or amount of line and/or chain being used

in the mooring in deep water. The type of buoy hull will also determine the mooring component sizes through strength requirements; larger hulls exert a greater load on the mooring and thus require greater mooring strength, which is essentially accomplished through component size increases;

- 5.2.1.5 **Special Considerations:** Special consideration would include proximity to sea lanes or fishing areas. If located on shipping lanes, the buoy hull may have to be reduced in order to keep the buoy clear from possible collisions.
- 5.2.2 The survey party shall coordinate with the Philippine Coast Guard for the preparatory activities and during the installation of the buoys. Survey parties must ensure that the materials and installation procedure shall be in consonance with PCG Memorandum Circular 01-05.
- 5.2.3 If the corner points are located on the sea or in any water body, the use of yellow factory made stainless or polyethylene buoys with 30.48 cm minimum diameter can be used, provided, that the letters "NPbs" (5.00 cm high, Arial font) and the corner number (1cm) are painted using marine-grade paint around the buoy. The said buoys with sinker should be properly chained and anchored. However, damage to under water resources such as corals, sea grasses, and the likes should be avoided. A solar powered blinker (International Association of Marine Aids to Navigation and Lighthouse Authorities approved) maybe attached to the buoy. The geographic coordinates of each corner marked by buoys should be recorded. Illustration of boundary markers for marine protected areas is hereto attached as **Annex F**.
- 5.2.4 Environmental conditions must be factored in with the selection of the mooring system to be used. The type of anchoring and buoy must be compatible with the environmental conditions of the area. Types of buoy systems that may be used for different substrate is hereto attached as **Annex G**.
- 5.2.5 In cases wherein the corner cannot be practically demarcated, two witness monuments shall be established, with its dimensions the same as the corner monuments. However, the inscriptions shall be replaced by the letters "WM" to signify its purpose as witness monument. WM shall be engraved at the top with a height of 3 cm using Arial font, followed by the bearing and distance from the monument to the corner of the PA with a height of 2 cm, using Arial font. The phrase "from this monument to" should be 1 cm high in Arial font and "NPbs" followed by the region number and its corresponding map number. The letters "C.N." should be followed by the corner number 2 cm high in Arial font. The center of which shall be marked by a circle with a radius of 0.5 cm, and an arrow pointing to the direction of the corner of the PA. The directions of these two witness monuments shall make an intersection where the true location of the corner lies as illustrated in **Annex H**.
- 5.2.6 All corners and important natural and man-made features shall be noted and recorded.

**Section 6. Demarcation of Previously Legislated Protected Areas.** The Regional Office shall review demarcation activities undertaken for previously legislated protected areas and ensure that herein guidelines are complied with accordingly.

**Section 7. Implementation Mechanism.** The NDDC created pursuant to DAO 2015-10 shall oversee the implementation of the demarcation activities.

The Regional Office shall issue corresponding Regional Special Order creating the RDDC and the RDDT, the functions of which are provided in DAO 2015-10.

The conduct of the survey shall only proceed after the enactment of the corresponding law by Congress adopting the final report of the RDDT as a result of their assessment/delineation of forestland boundary pursuant to DAO No. 2008-24 in consonance with Sec. 163, DENR Memorandum Circular No. 2010-13.


If the survey shall be undertaken through administration, the Survey Party shall be composed of Geodetic Engineers of the Regional Composite Survey Team (RCST) created pursuant to DENR Administrative Order No. 2005-13, Revised Guidelines for the Implementation of the Philippine Reference System of 1992 (PRS92) and at least two (2) members of the RDDT in accordance with Sec. 164, DMC 2010-13.

**Section 8. Budget Allocation.** Funds for the demarcation of protected areas shall be included in the regular budgetary allocation of the DENR. Additional funds may be sourced from other funding institutions.

Cost estimates for the conduct of demarcation activities are provided in **Annex I**.

**Section 9. Monitoring and Evaluation.** The Regional Office together with the Protected Area Management Board shall regularly monitor the installed monuments/markers to ensure their maintenance.

**Section 10. Effectivity.** This Technical Bulletin shall take effect immediately and shall be circulated for the information and guidance of all concerned.

  
**RICARDO L. CALDERON**  
OIC, Assistant Secretary for Staff Bureaus and  
Director in concurrent capacity



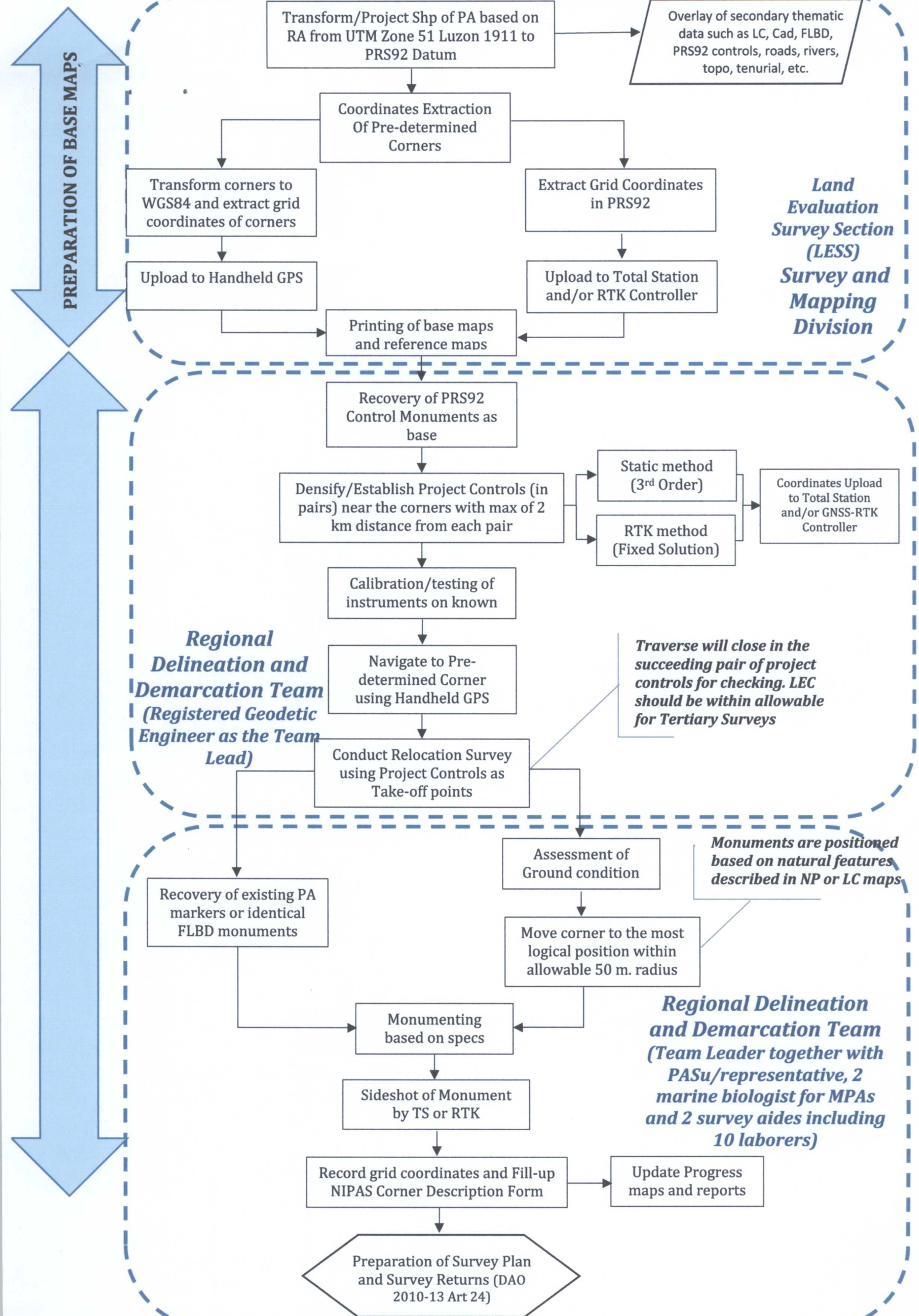
Republic of the Philippines  
Department of Environment and Natural Resources  
BIODIVERSITY MANAGEMENT BUREAU



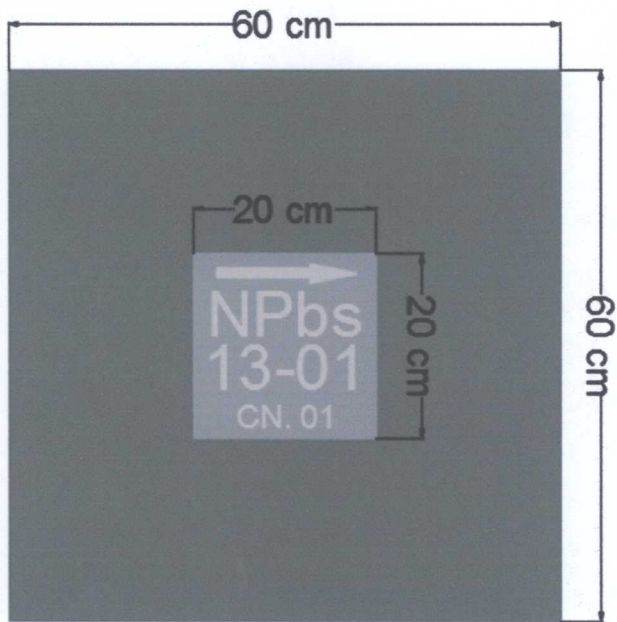
BMB201901697



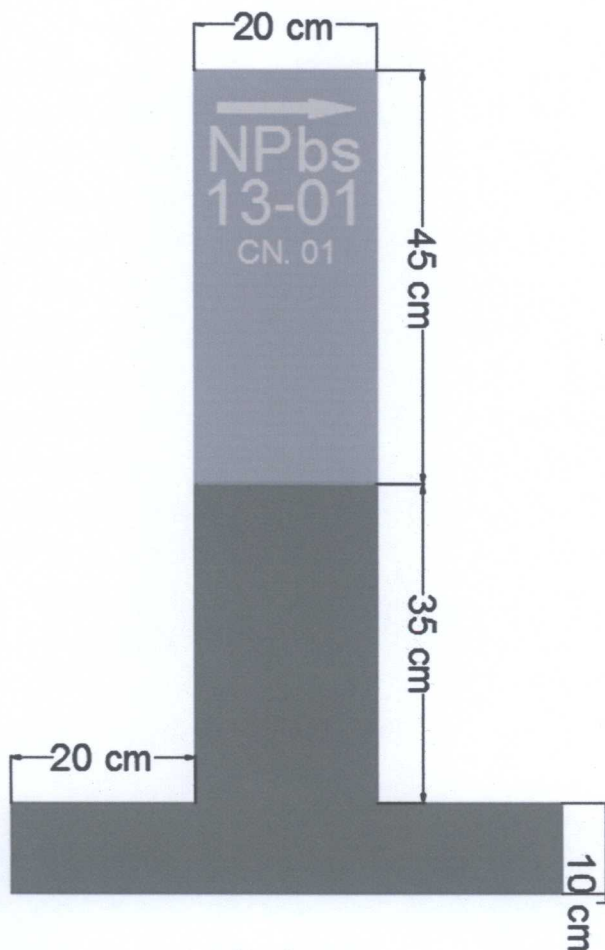
## RELOCATION SURVEY OF NIPAS BOUNDARIES



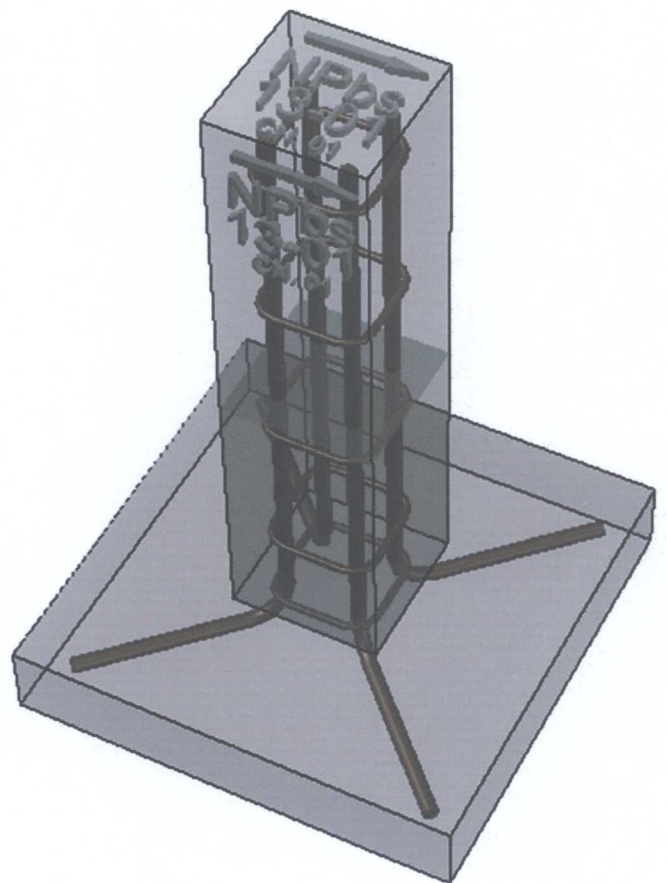
PROPOSED BOUNDARY MARKERS FOR  
TERRESTRIAL PROTECTED AREAS



TOP VIEW

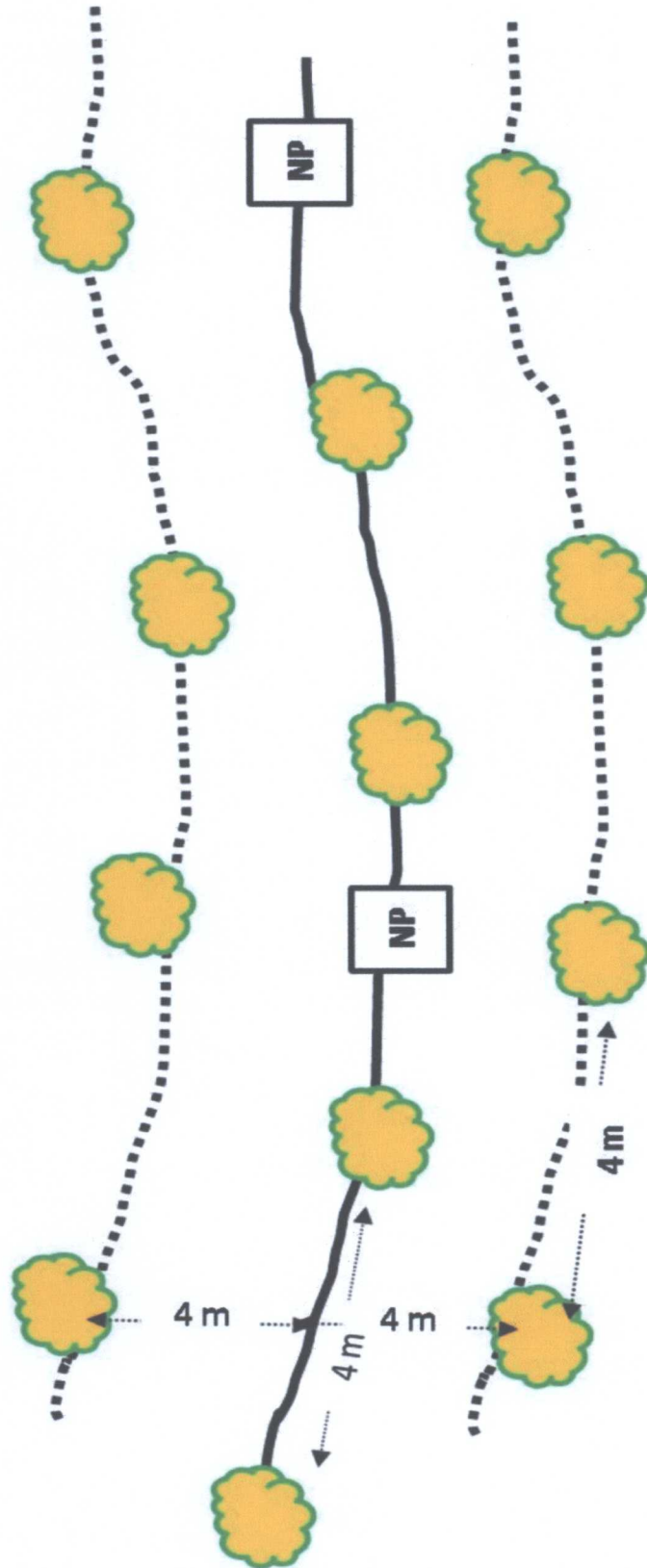


FRONT VIEW



ISOMETRIC VIEW

Quincunx



## MAP LAY OUT FOR NATIONAL PARKS

1. Paper : Mylar: HP Matte Film  
Film polyester transparent  
36 in. X 125 ft., 160 g/m<sup>2</sup>  
*(www.hp.com/go/designjet/supplies)*
2. Map Layout Size : **For areas 20,000 has. and above:**  
Portrait – 84.1 cm X 118.88 cm  
Landscape – 118.88 cm X 84.1 cm  
**For areas lesser than 20,000 has.:**  
Portrait – 80.00 cm X 80.00 cm  
Landscape – 100.00 cm X 80.00 cm
3. Map Layout Orientation : Portrait  
Landscape
- Note: Orientation of map layout would depend also in the orientation of the protected area.*
4. Title, Location and Area : Title should specify the name of the Protected Area as per Legislation (e.g. Agusan Marsh Wildlife Sanctuary).
- Location should specify the municipality/municipalities and or city/cities, as well as province/provinces covering the protected area.
- Indicate the area of the protected area as indicated in the legislation.
5. Spatial Information : Scale: For areas of 20,000 hectares and above, use the scale of 1:50,000. For areas less than 20,000 hectares, use an appropriate scale which will show the whole coverage of the protected area on the map while maintaining it's aesthetic.
- Datum: Philippine reference System of 1992 (PRS92)
- Projection: Universal Transverse Mercator (UTM) Zone 51 N
- Note: Scale values should be rounded of.*

6. Technical Description : Present the complete and detailed technical description showing the Bearing (in Degrees, Minutes, and Seconds), the Direction (i.e. NE, SW, SE and others), and Distance (in meters).

Indicate also the control/tie point (in PRS92) with its corresponding PRS92 number together with the location and its corresponding geographic coordinates (in Latitude and Longitude).

7. Map Features : Reflect in the map all natural and physical features such as roads, rivers and or creeks, lakes, caves, islands, islets, mountain peaks, and among others with proper label/labels based on available data and information (i.e. topo maps; google earth; and among others).

***Note: Head waters and river systems, must be identified if possible, this is in relation to the Presidential directive during the 36<sup>th</sup> Cabinet Meeting on 01 April 2019 for the short and long term solutions for El Niño and La Niña Phenomena.***

8. Disclaimer Statement : Use this statement:

**NOTE:**

*Political Boundaries depicted on the map are not authoritative.*

*This map accurately indicates the boundaries of the National Park based on a relocation survey conducted by the RDDTs per survey plan no. Rel-13-01, the original field notes and computations of which are on file in the DENR Region 13 Office.*

9. Map Number : The Map Number is the code assigned to a particular protected area in order to differentiate it from the other protected area maps. This will include the National Parks boundary survey (i.e. **NPbs**); then **13** stands for DENR Region 13; the serial number of the map (**01** = numbering of NP map should be in sequence and in order of its legislation), and to read as **"NPbs-13-01"**

***Note: for numerous PAs established in one legislation in a certain Region, the arrangement of numbering would be in alphabetical order of the names of the protected areas.***

10. Legend : This is a table or chart included on a map to indicate the meaning of the map's varied symbols such as rivers, creeks, road, trails, islands, islets, caves, geological forms and among others.

To include the base map of Defense Mapping of America (DMA) topographic map used within the coverage of the protected area.

11. Location Map : This is the diagrammatic representation of the location of the National Park in relation to the whole Regional area of jurisdiction in the Philippines.

***Note: Highlight the Regional coverage to include provincial boundaries.***

12. Certification : Use this statement:

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018.

These areas were delineated by the \_\_\_\_\_, DENR \_\_ in accordance with the standard procedures on survey and mapping of the DENR.

Specify date of approval of the map.

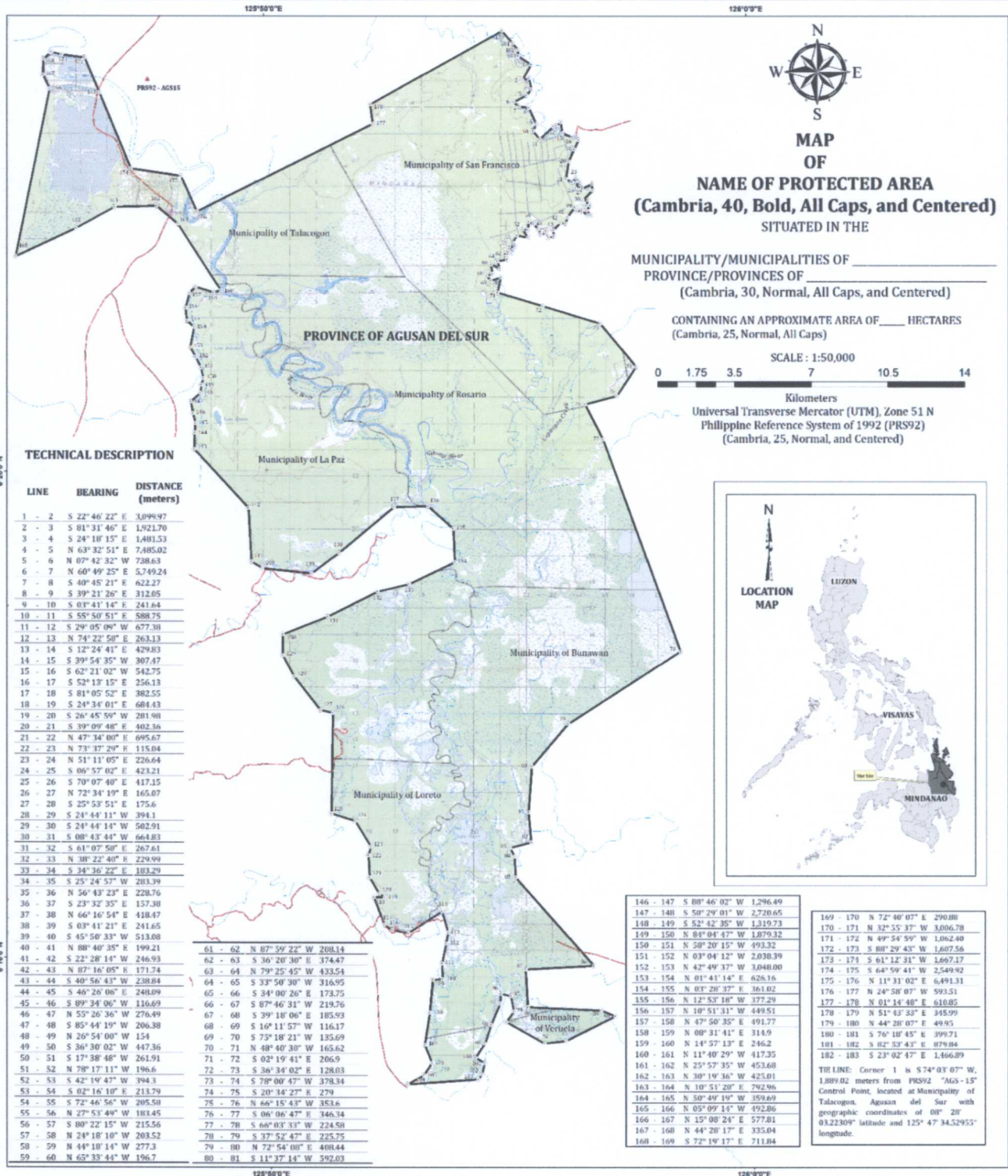
The certification is recommended by the Regional Executive Director of the DENR Field Office; Director of Biodiversity Management Bureau and the DENR Secretary.

13. Signatories : Signatories for the Regional Field Office would include the Cartographer (with GIS capability) who prepares the map layout; under the supervision of the Chiefs, Surveys and Mapping Division and Conservation and Development Division; Attested by the PENR Officer with initial from the CENRO; and Noted by the Assistant Regional Director for Technical Services.

# ANNEX D.1

For areas 20,000 has. and above  
Portrait – 84.1 cm X 118.88 cm

NPbs-13-01



**MAP OF**  
**NAME OF PROTECTED AREA**  
**(Cambria, 40, Bold, All Caps, and Centered)**  
**SITUATED IN THE**

MUNICIPALITY/MUNICIPALITIES OF \_\_\_\_\_  
PROVINCE/PROVINCES OF \_\_\_\_\_  
(Cambria, 30, Normal, All Caps, and Centered)

CONTAINING AN APPROXIMATE AREA OF \_\_\_\_\_ HECTARES  
(Cambria, 25, Normal, All Caps)

SCALE: 1:50,000  
0 1.75 3.5 7 10.5 14

Kilometers  
Universal Transverse Mercator (UTM), Zone 51 N  
Philippine Reference System of 1992 (PRS92)  
(Cambria, 25, Normal, and Centered)



**TECHNICAL DESCRIPTION**

LINE	BEARING	DISTANCE (meters)
1 - 2	S 22° 40' 22" E	3,099.97
2 - 3	S 81° 31' 46" E	1,921.70
3 - 4	S 24° 18' 15" E	1,481.53
4 - 5	N 63° 32' 51" E	7,885.02
5 - 6	N 07° 42' 32" W	738.63
6 - 7	N 60° 49' 25" E	5,749.24
7 - 8	S 40° 45' 21" E	622.27
8 - 9	S 39° 21' 26" E	312.05
9 - 10	S 01° 41' 14" E	241.64
10 - 11	S 55° 50' 51" E	588.75
11 - 12	S 29° 05' 09" W	677.38
12 - 13	N 74° 22' 58" E	263.13
13 - 14	S 12° 24' 41" E	429.83
14 - 15	S 39° 54' 35" W	367.47
15 - 16	S 62° 21' 02" W	542.75
16 - 17	S 52° 13' 15" E	256.13
17 - 18	S 81° 05' 52" E	382.55
18 - 19	S 24° 34' 01" E	684.43
19 - 20	S 26° 45' 59" W	281.98
20 - 21	S 39° 09' 48" E	402.36
21 - 22	N 47° 34' 00" E	695.67
22 - 23	N 73° 37' 29" E	115.04
23 - 24	N 51° 11' 05" E	226.64
24 - 25	S 06° 57' 02" E	423.21
25 - 26	S 70° 07' 40" E	417.15
26 - 27	N 72° 34' 19" E	165.07
27 - 28	S 25° 53' 51" E	175.6
28 - 29	S 24° 44' 11" W	394.1
29 - 30	S 24° 44' 14" W	502.91
30 - 31	S 08° 43' 44" W	664.83
31 - 32	S 61° 07' 50" E	267.61
32 - 33	N 38° 22' 40" E	229.99
33 - 34	S 34° 36' 22" E	183.29
34 - 35	S 25° 24' 57" W	283.39
35 - 36	N 56° 43' 23" E	228.76
36 - 37	S 23° 32' 35" E	157.38
37 - 38	N 66° 16' 54" E	418.47
38 - 39	S 03° 41' 21" E	241.65
39 - 40	S 45° 50' 33" W	513.08
40 - 41	N 88° 40' 35" E	199.21
41 - 42	S 22° 28' 14" W	246.93
42 - 43	N 87° 16' 05" E	171.74
43 - 44	S 40° 56' 43" W	238.84
44 - 45	S 40° 26' 06" E	248.09
45 - 46	S 89° 34' 06" W	116.69
46 - 47	N 55° 26' 36" W	276.49
47 - 48	S 85° 44' 19" W	206.38
48 - 49	N 20° 54' 00" W	154
49 - 50	S 36° 30' 02" W	447.36
50 - 51	S 17° 38' 48" W	261.91
51 - 52	N 78° 17' 11" W	196.6
52 - 53	S 42° 19' 47" W	394.3
53 - 54	S 02° 16' 10" E	213.79
54 - 55	S 72° 46' 56" W	205.50
55 - 56	N 27° 53' 44" W	181.45
56 - 57	S 80° 22' 15" W	215.56
57 - 58	N 24° 18' 10" W	203.52
58 - 59	N 44° 18' 14" W	277.3
59 - 60	N 65° 33' 44" W	196.7

Prepared by: **NAME**  
Cartographer

Under the Supervision of:

<b>NAME</b> Chief, Surveying and Mapping Division	<b>NAME</b> Chief, Conservation and Development Division
--	---

Attested:

**NAME**  
PNRR Officer (PNRR)

Noted:

**NAME**  
Assistant Regional Director for Technical Services

**LEGEND**

- PRR Control Point
- Protected Area Corner
- Road Network
- River System
- Provincial Boundary
- Protected Area To-Luar
- Protected Area Boundary
- Water Bodies/Wood Prime Areas
- Municipal Boundary

**NOTE**

Political Boundaries depicted on the map are not authoritative.

This map accurately indicates the boundaries of the NP based on a relocation survey conducted by the RDOs per survey plan no. **Rel - 13 - 01**, the original fieldnotes and computations of which are on file in the DENR Region 13 Office.

Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

**CERTIFICATION**

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11631 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018. These areas were delineated by the \_\_\_\_\_ DENR \_\_\_\_\_ in accordance with the standard procedures on survey and mapping of the DENR.

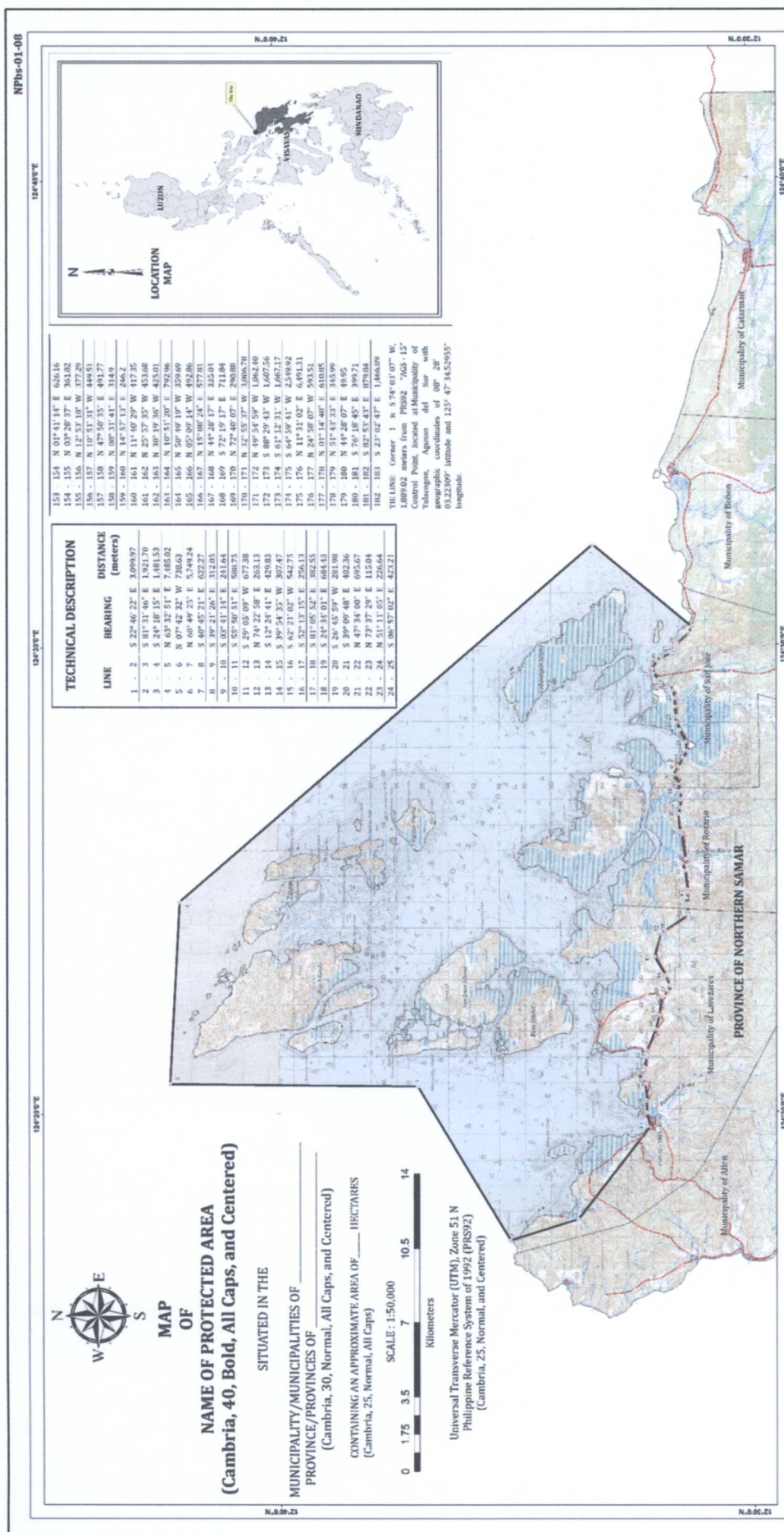
Date Approved: 09 May 2019

Recommended:

<b>NAME of Regional Executive Director</b> Regional Executive Director, DENR - _____	<b>NAME of Bureau Director</b> Director, Biodiversity Management Bureau
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**BOY A. CIMATU**  
Secretary

For areas 20,000 has. and above  
Landscape - 118.88 cm X 84.1 cm



**PREPARED BY:** \_\_\_\_\_  
NAME \_\_\_\_\_  
COMPANY/INSTITUTION \_\_\_\_\_

**UNDER THE SUPERVISION OF:** \_\_\_\_\_  
NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
DIVISION \_\_\_\_\_

**ATTENDED:** \_\_\_\_\_  
NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
DIVISION \_\_\_\_\_

**NOTED:** \_\_\_\_\_  
NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
DIVISION \_\_\_\_\_

**REPUBLIC OF THE PHILIPPINES**  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**  
**CERTIFICATION**

We hereby certify that this is the correct and true copy of the Proposed Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018. These areas were determined by the \_\_\_\_\_ DENR, in accordance with the standard procedure on survey and mapping of the DENR.

Recommended

**NAME of Bureau Director** \_\_\_\_\_  
Director, Biodiversity Management Bureau

**NAME of Regional Executive Director** \_\_\_\_\_  
Regional Executive Director DENR - \_\_\_\_\_

**ROY A. CRIVATO**  
Secretary

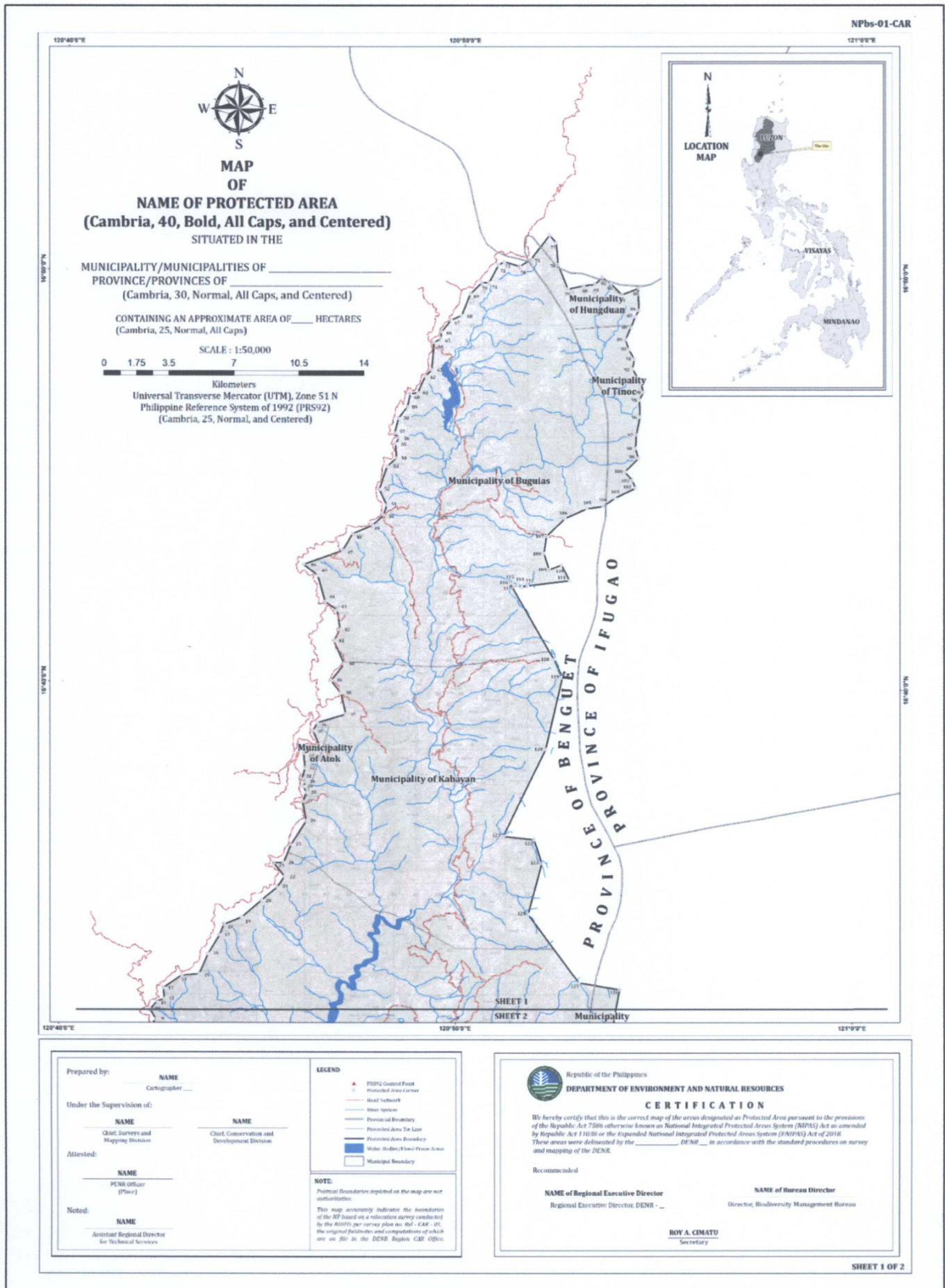
**LEGEND**

- ▲ PRS92 Control Point
- ▭ Protected Area Boundary
- ▭ Barangay Boundary
- ▭ Road Network
- ▭ River Network
- ▭ Protected Area Buffer
- ▭ Protected Area Core
- ▭ Protected Area Transition
- ▭ Water Body/Inland Water Areas
- ▭ Municipality Boundary

**NOTE:** Proposed boundaries depicted on this map are for reference only. The map accuracy reflects the boundaries of the areas as determined by the DENR in accordance with the provisions of the DENR Administrative Order (DAO) 11-02-2018. The original file and map are available in the DENR Region - I Office.



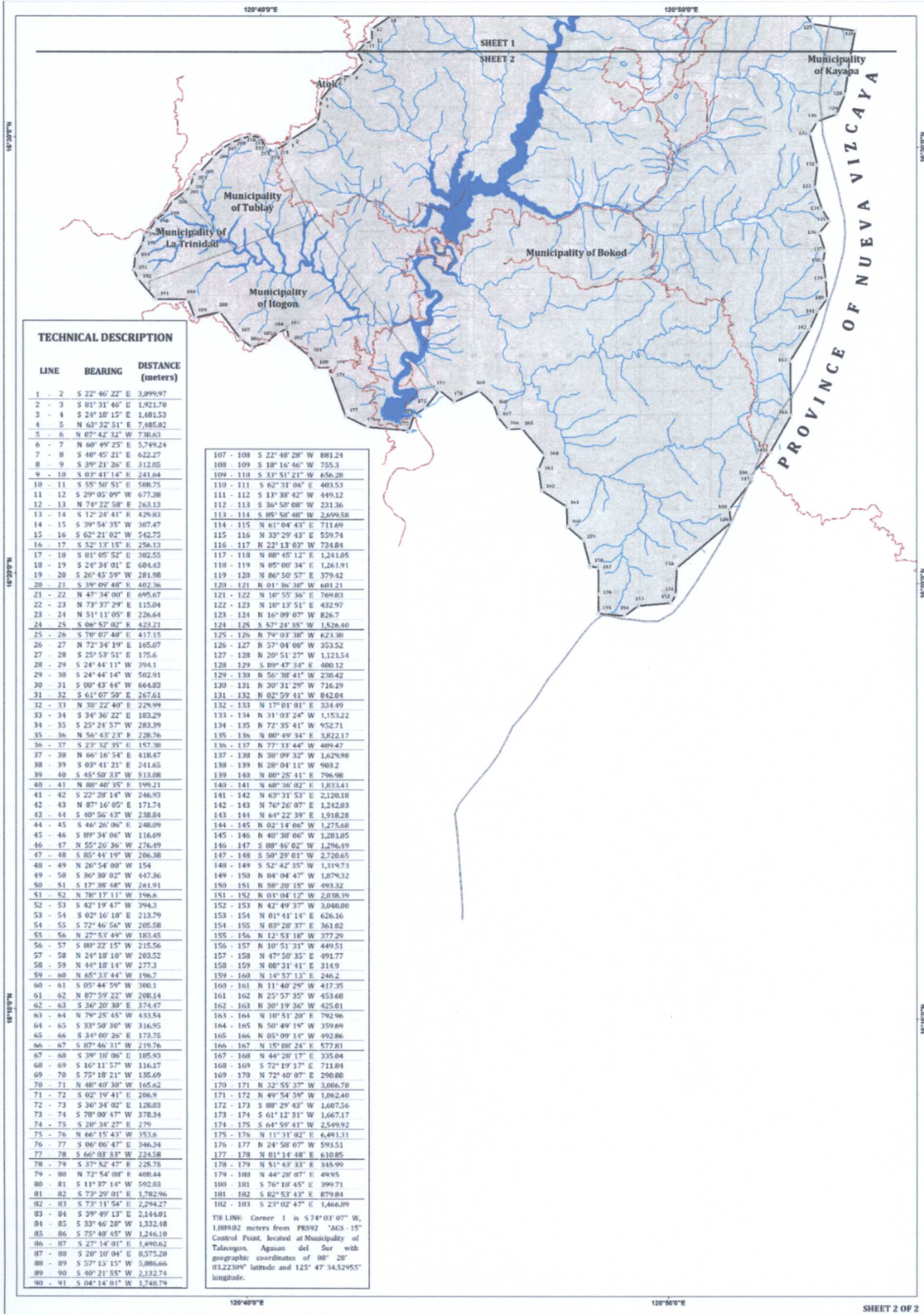
For areas 20,000 has. and above  
Portrait – 84.1 cm X 118.88 cm with adjoining Sheets



# ANNEX D.4

For areas 20,000 has. and above  
Portrait – 84.1 cm X 118.88 cm with adjoining Sheets

NPbs-01-CAR



### TECHNICAL DESCRIPTION

LINE	BEARING	DISTANCE (meters)
1 - 2	S 22° 46' 22" E	3,899.97
2 - 3	S 01° 31' 46" E	1,921.70
3 - 4	S 24° 18' 15" E	1,481.53
4 - 5	N 63° 32' 51" E	7,485.02
5 - 6	N 07° 42' 32" W	738.63
6 - 7	N 60° 49' 25" E	5,749.24
7 - 8	S 40° 45' 21" E	622.27
8 - 9	S 39° 21' 26" E	312.05
9 - 10	S 03° 41' 14" E	241.64
10 - 11	S 55° 50' 51" E	588.75
11 - 12	S 29° 05' 09" W	677.88
12 - 13	N 74° 22' 58" E	263.13
13 - 14	S 12° 24' 41" E	429.83
14 - 15	S 39° 54' 35" W	307.47
15 - 16	S 62° 21' 02" W	542.75
16 - 17	S 52° 13' 15" E	256.13
17 - 18	S 01° 05' 52" E	382.55
18 - 19	S 24° 34' 01" E	684.83
19 - 20	S 20° 45' 59" W	281.98
20 - 21	S 39° 09' 48" E	462.36
21 - 22	N 47° 34' 00" E	695.67
22 - 23	N 73° 37' 29" E	115.04
23 - 24	N 51° 11' 05" E	226.64
24 - 25	S 08° 57' 07" E	423.21
25 - 26	S 70° 07' 48" E	417.15
26 - 27	N 72° 34' 19" E	165.07
27 - 28	S 25° 53' 51" E	175.6
28 - 29	S 24° 44' 11" W	394.1
29 - 30	S 24° 44' 14" W	562.91
30 - 31	S 00° 43' 44" W	664.83
31 - 32	S 61° 07' 58" E	267.61
32 - 33	N 38° 22' 40" E	229.99
33 - 34	S 34° 36' 22" E	183.29
34 - 35	S 25° 24' 57" W	283.39
35 - 36	N 56° 43' 23" E	228.76
36 - 37	S 23° 32' 35" E	157.38
37 - 38	N 60° 16' 54" E	418.47
38 - 39	S 03° 41' 21" E	241.65
39 - 40	S 45° 50' 33" W	513.08
40 - 41	N 88° 40' 35" E	190.21
41 - 42	S 22° 28' 14" W	246.93
42 - 43	N 87° 16' 05" E	171.74
43 - 44	S 40° 56' 43" W	238.84
44 - 45	S 46° 26' 06" E	248.09
45 - 46	S 09° 34' 06" W	116.69
46 - 47	N 55° 26' 36" W	276.49
47 - 48	S 05° 44' 19" W	266.38
48 - 49	N 26° 54' 00" E	154
49 - 50	S 30° 30' 02" W	447.36
50 - 51	S 17° 38' 48" W	261.91
51 - 52	N 78° 17' 11" W	196.6
52 - 53	S 42° 19' 47" W	394.3
53 - 54	S 02° 16' 10" E	213.79
54 - 55	S 72° 46' 50" W	205.58
55 - 56	N 27° 53' 49" W	183.45
56 - 57	S 00° 22' 15" W	215.56
57 - 58	N 24° 18' 10" W	202.52
58 - 59	N 44° 18' 14" W	277.3
59 - 60	N 05° 33' 44" W	196.7
60 - 61	S 05° 44' 59" W	380.1
61 - 62	N 87° 59' 22" W	208.14
62 - 63	S 36° 20' 30" E	374.47
63 - 64	N 79° 25' 45" W	433.54
64 - 65	S 33° 50' 30" W	316.95
65 - 66	S 34° 00' 26" E	173.75
66 - 67	S 07° 46' 11" W	219.76
67 - 68	S 39° 10' 06" E	185.93
68 - 69	S 16° 11' 57" W	116.17
69 - 70	S 75° 18' 21" W	135.69
70 - 71	N 48° 40' 30" W	165.62
71 - 72	S 02° 19' 41" E	286.9
72 - 73	S 26° 34' 02" E	128.03
73 - 74	S 70° 00' 47" W	378.34
74 - 75	S 20° 34' 27" E	279
75 - 76	N 66° 15' 43" W	353.6
76 - 77	S 00° 00' 47" E	346.34
77 - 78	S 60° 03' 13" W	235.58
78 - 79	S 37° 52' 47" E	235.75
79 - 80	N 72° 54' 08" E	488.44
80 - 81	S 11° 37' 14" W	592.03
81 - 82	S 73° 29' 01" E	1,782.96
82 - 83	S 73° 11' 54" E	2,294.27
83 - 84	S 29° 49' 13" E	2,144.01
84 - 85	S 33° 46' 20" W	1,332.48
85 - 86	S 75° 40' 55" W	1,246.10
86 - 87	S 27° 14' 01" E	1,490.62
87 - 88	S 20° 10' 04" E	8,575.29
88 - 89	S 57° 15' 15" W	5,886.66
89 - 90	S 40° 55' 55" W	2,132.74
90 - 91	S 04° 14' 01" W	1,748.79

107 - 108	S 22° 48' 28" W	881.24
108 - 109	S 10° 16' 46" W	755.3
109 - 110	S 53° 51' 21" W	656.28
110 - 111	S 62° 31' 06" E	403.53
111 - 112	S 13° 38' 42" W	449.32
112 - 113	S 36° 50' 08" W	231.36
113 - 114	S 38° 52' 48" W	2,699.58
114 - 115	N 61° 04' 43" E	711.69
115 - 116	N 33° 29' 43" E	559.74
116 - 117	N 22° 13' 03" W	734.84
117 - 118	N 00° 45' 12" E	1,241.05
118 - 119	N 05° 00' 34" E	1,261.91
119 - 120	N 06° 50' 57" E	379.42
120 - 121	N 01° 36' 30" W	601.21
121 - 122	N 10° 55' 36" E	769.83
122 - 123	N 10° 13' 51" E	432.97
123 - 124	N 16° 09' 07" W	826.7
124 - 125	S 37° 24' 35" W	1,526.48
125 - 126	N 79° 03' 30" W	621.38
126 - 127	N 57° 04' 00" W	353.52
127 - 128	N 20° 51' 27" W	1,121.54
128 - 129	S 89° 47' 34" E	400.12
129 - 130	N 56° 38' 41" W	238.42
130 - 131	N 20° 31' 29" W	716.39
131 - 132	N 02° 59' 41" W	842.04
132 - 133	N 17° 01' 01" E	334.49
133 - 134	N 31° 03' 24" W	1,153.22
134 - 135	N 72° 35' 41" W	952.71
135 - 136	N 00° 49' 34" E	3,822.17
136 - 137	N 77° 33' 44" W	489.47
137 - 138	N 30° 39' 32" W	1,629.98
138 - 139	N 28° 04' 11" W	903.2
139 - 140	N 00° 25' 41" E	796.98
140 - 141	N 68° 36' 02" E	1,833.41
141 - 142	N 63° 31' 53" E	2,128.18
142 - 143	N 76° 26' 07" E	1,242.03
143 - 144	N 64° 22' 39" E	1,918.28
144 - 145	N 02° 14' 06" W	1,275.68
145 - 146	N 48° 38' 06" W	1,281.85
146 - 147	S 88° 46' 02" W	1,296.49
147 - 148	S 50° 29' 01" W	2,720.65
148 - 149	S 52° 42' 35" W	1,319.73
149 - 150	N 84° 04' 47" W	1,879.32
150 - 151	N 58° 20' 15" W	493.32
151 - 152	N 03° 04' 12" W	2,038.19
152 - 153	N 42° 49' 37" W	3,048.00
153 - 154	N 01° 41' 14" E	626.16
154 - 155	N 03° 28' 37" E	361.82
155 - 156	N 12° 53' 16" W	377.29
156 - 157	N 10° 51' 31" W	449.51
157 - 158	N 47° 50' 35" E	491.77
158 - 159	N 08° 31' 41" E	314.9
159 - 160	N 14° 57' 13" E	246.2
160 - 161	N 11° 40' 29" W	417.35
161 - 162	N 25° 57' 35" W	453.68
162 - 163	N 30° 19' 36" W	425.01
163 - 164	N 10° 51' 20" E	792.96
164 - 165	N 50° 49' 19" W	359.69
165 - 166	N 05° 09' 14" W	492.86
166 - 167	N 15° 06' 24" E	577.81
167 - 168	N 44° 28' 17" E	335.04
168 - 169	S 72° 19' 17" E	711.84
169 - 170	N 72° 40' 07" E	290.88
170 - 171	N 32° 55' 37" W	3,086.78
171 - 172	N 49° 54' 59" W	1,062.40
172 - 173	N 01° 14' 48" E	610.85
173 - 174	S 61° 12' 31" W	1,667.17
174 - 175	S 64° 59' 41" W	2,549.92
175 - 176	N 11° 31' 02" E	6,491.31
176 - 177	N 24° 58' 07" W	593.51
177 - 178	N 01° 14' 48" E	610.85
178 - 179	N 51° 43' 33" E	345.99
179 - 180	N 44° 28' 07" E	494.95
180 - 181	S 76° 18' 45" E	390.71
181 - 182	S 82° 53' 43" E	879.84
182 - 183	S 23° 02' 47" E	1,466.09

TR LINE: Corner 1 is S 74° 03' 07" W, 1,889.02 meters from PWS92 "ACS-15" Control Point, located at Municipality of Talacogon, Agusan del Sur with geographic coordinates of 08° 20' 03.22309" latitude and 125° 47' 34.52955" longitude.

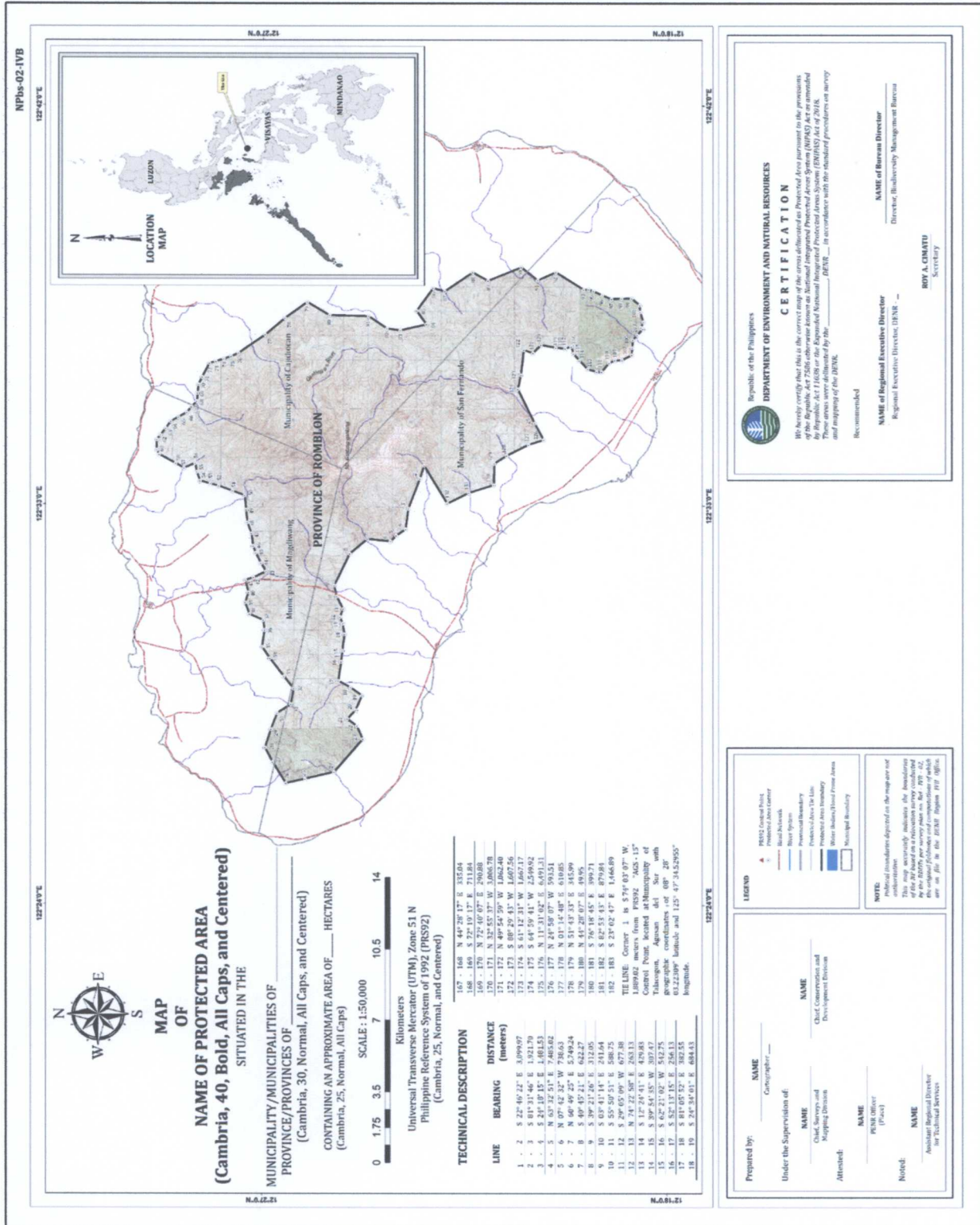
120°40'0"E

120°50'0"E

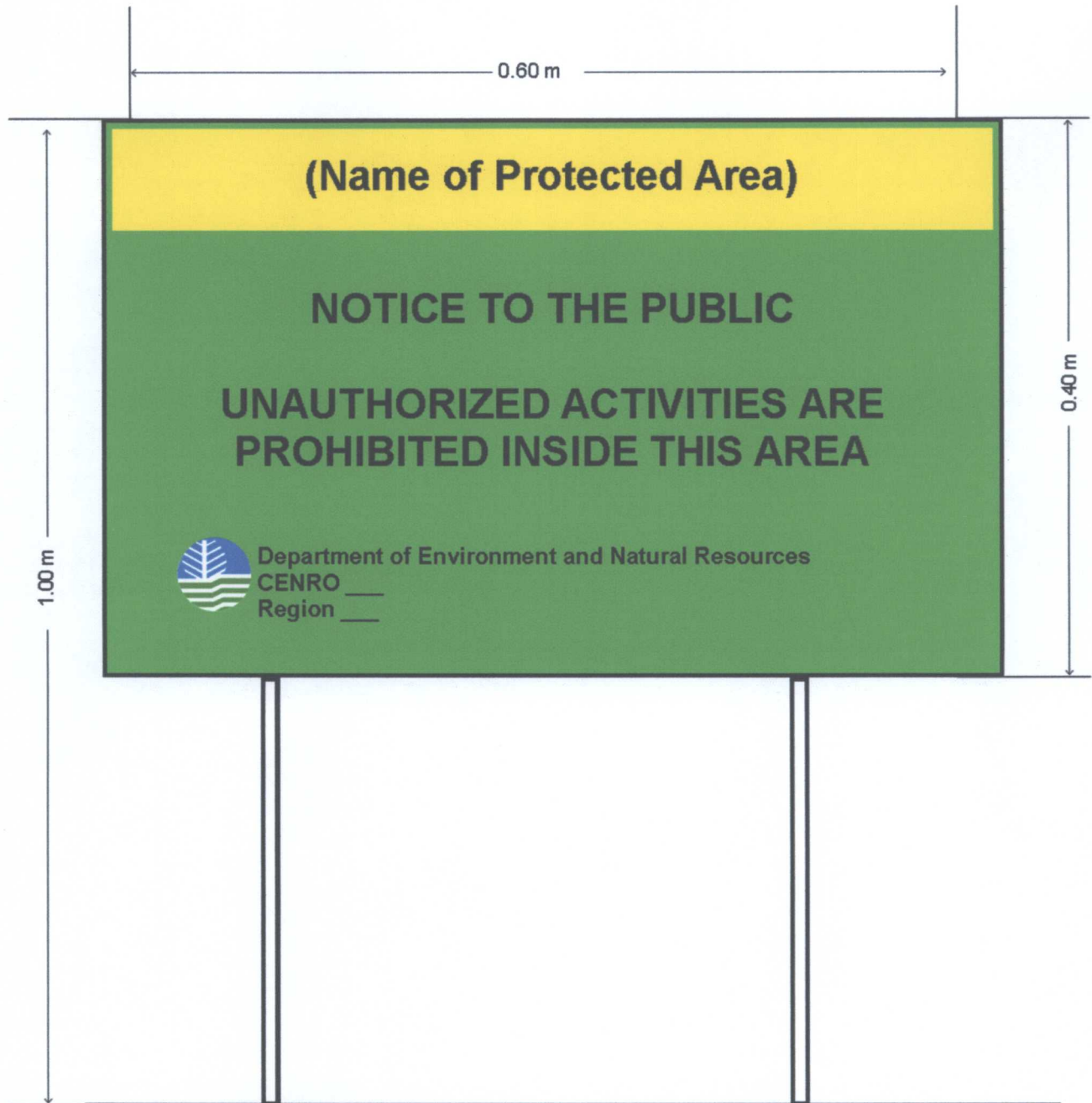
SHEET 2 OF 2



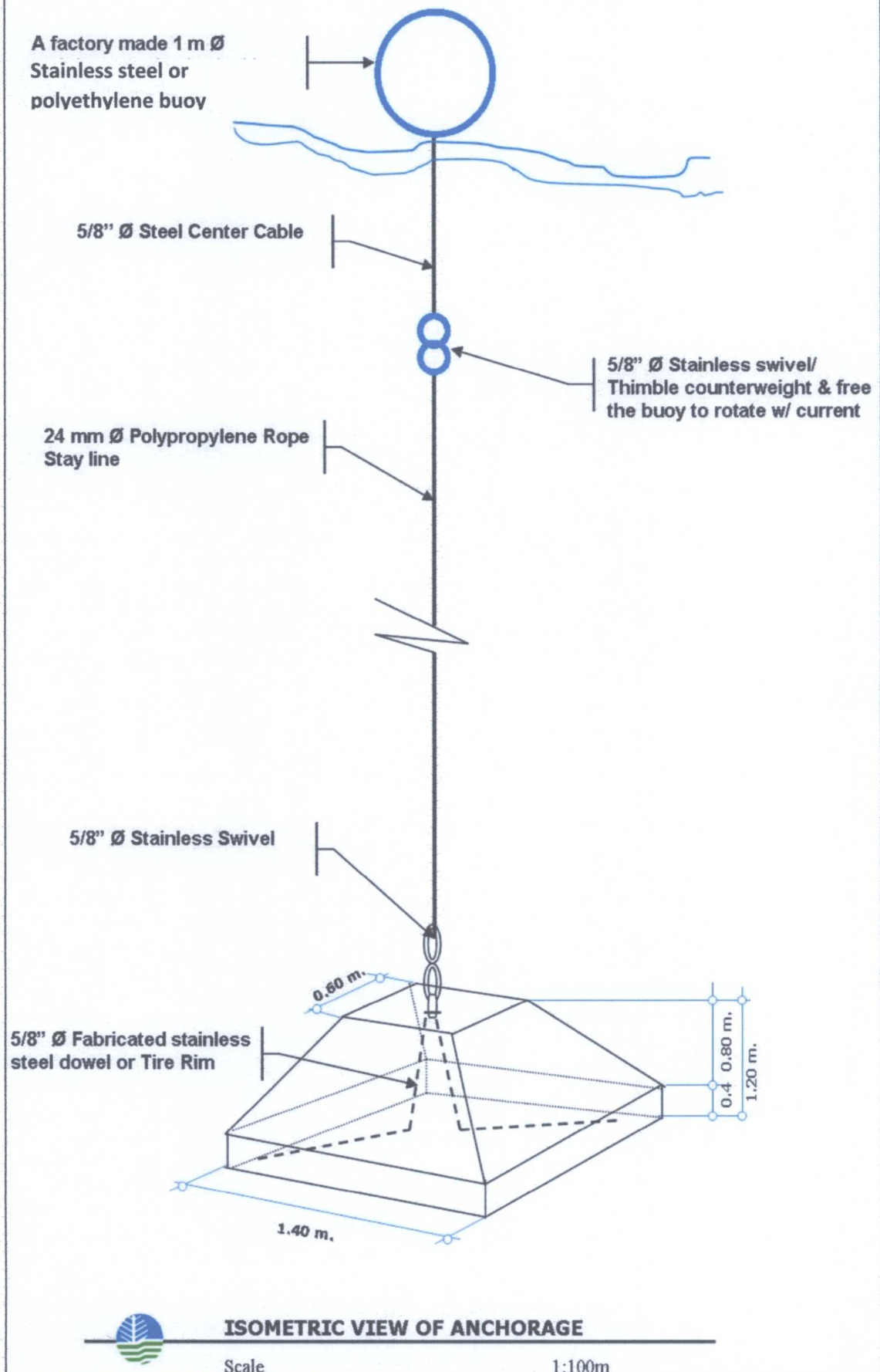
For areas lesser than 20,000 has.  
Landscape – 100.00 cm X 80.00 cm



**INTERMEDIATE SIGNAGES/MARKERS  
FOR TERRESTRIAL PROTECTED AREAS**



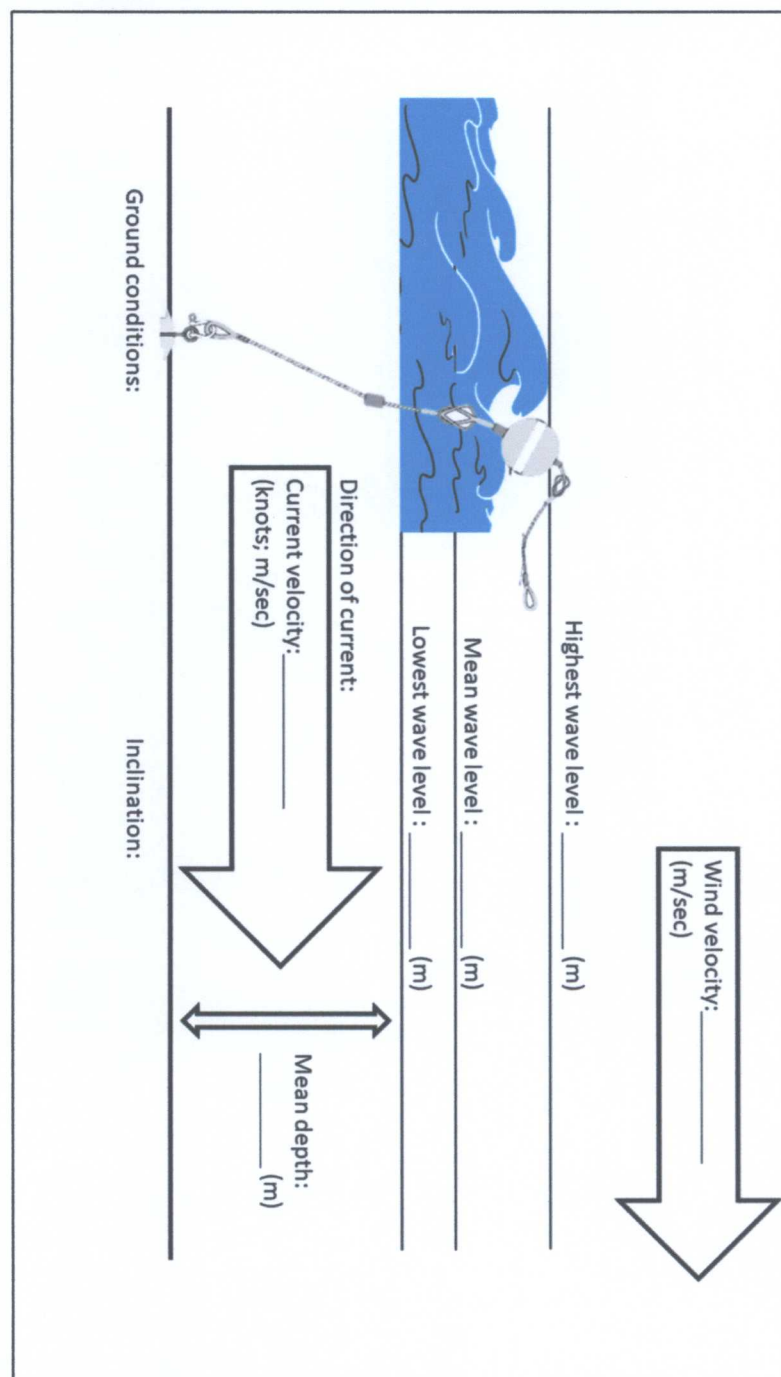
**PROPOSED BOUNDARY MARKERS  
FOR MARINE PROTECTED AREAS  
WITH 4 TONS CONCRETE SINKER**



## ANNEX G

### GUIDES IN SELECTING MOORING AND ANCHORING SYSTEMS

1. Location of Protected Area: *(Coordinates, Barangay, Municipality/City, Province, Region)*
2. Kind and size of watercraft/s being used: *(Motor boats, patrol boats, etc)*
3. Water depth;
4. Tidal range;
5. Ground conditions of the sea bottom;
6. Inclination of the sea bottom at the site;
7. Maximum wave height;
8. Maximum current at the site.
9. Wind velocity in the area;
10. Any other special equipment other than light and power system if required to be installed on the buoys. *(Such as radar reflectors, etc.)*

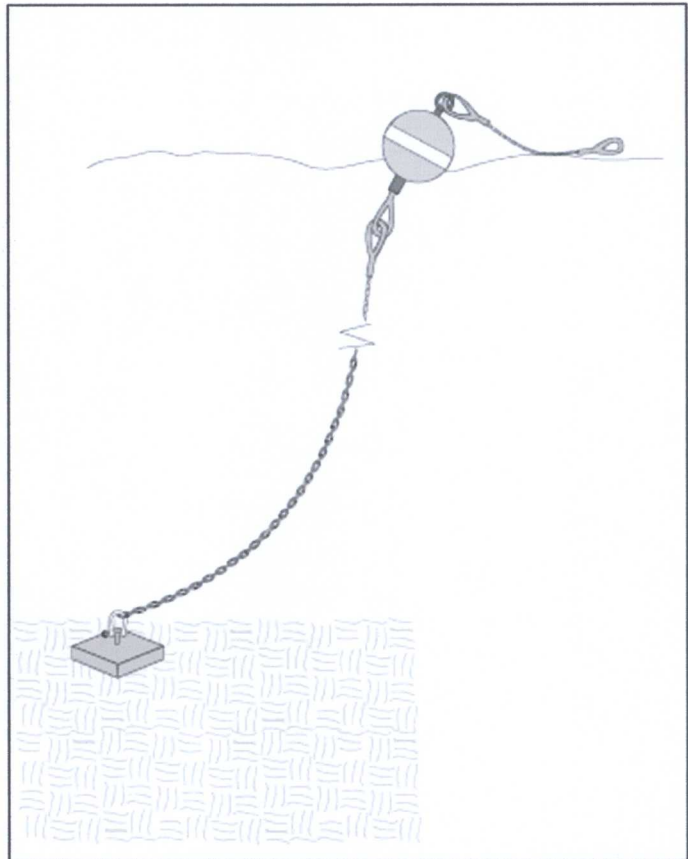


### TRADITIONAL MOORING SYSTEM

Traditional mooring systems typically consist of a floating buoy attached to a chain and heavy anchor, or a concrete block.

The block can be any heavy object sufficient to hold a boat. Most traditional mooring blocks are made from cast concrete shaped into a square pyramid, box, or drum. Metal rings are set into the concrete for attaching the anchor line.

The shape of the block depends on the holding conditions of the bottom. The holding power of any block not physically attached to the sea bottom is limited however, and dragging does occur.



### Anchoring Procedure:

Chain, rope, or polypropylene line can be used as an anchor line. Chain does not usually break and is difficult to cut. However, chain is heavy, difficult to transport, and can cause considerable structural damage to the bottom and sedimentation as it swings with the current. Rope is not as destructive as chain but can rot and break easily. The preferred anchor line, therefore, is made from polypropylene, material that is light, durable, and easily replaced if cut or lost.

To protect the line from chafing, splice a thimble (small metal strip) into each end of the line, or modifications can be adapted from the Halas system by splicing protective hose into the line. Attach one end of the line with a shackle to the mooring on the bottom. Attach the other end of the line to the bottom of the buoy at the water's surface. If rope or line is used as a down line, two rings should be set in the mooring block so that a replacement line can be attached before the other wears and breaks. Usually, a nylon line with greater flex than a polypropylene line is used as a down line. The length of rope or chain should be twice the depth of the water, with consideration given to local tide and sea conditions.



## ANNEX G.2

### HALAS ANCHORING SYSTEM

Halas mooring system consists of a stainless-steel eyebolt cemented into a hole drilled into the sea floor. A floating line shackled to the eyebolt extends to the surface and through a plastic buoy to a pickup line which attaches to the boat.

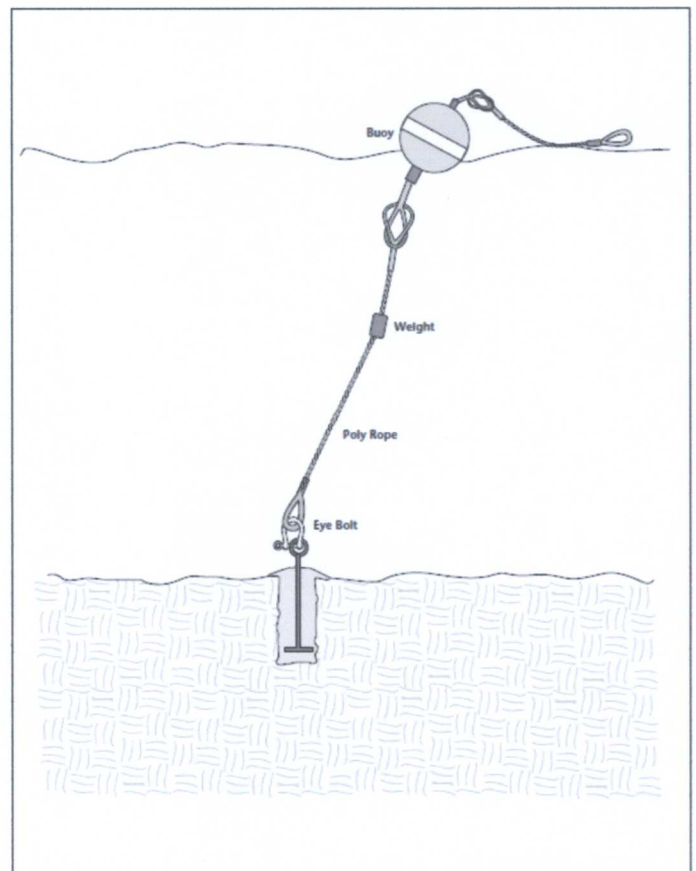
The Halas system is unique in that it uses a three-part rope system instead of one continuous rope. One line leads from the anchor pin at the bottom to the buoy at the surface. A second line runs through the buoy and is attached with a loop to the anchor line at one end, and at the other end is attached with a loop to the third pick-up line.

A three-part rope system eliminates need for shackles and thus decreases maintenance time and cost of the system.

#### Anchoring Procedure:

The key to success with the Halas system is locating proper substrate for drilling and cementing. The bottom substrate is what gives the system holding power. There are few known failures of individual components of the system, but have been cases of substrate failure where the entire cemented core has been pulled up and dragged across the bottom.

Flat, solid bedrock is the preferred substrate for the Halas system. Sand, coral rubble, or a combination of bottom types requires the manager to consider using alternative mooring systems, such as the Manta-Ray, in areas where the bottom will not hold a cemented eyebolt. Site selection must consider the surrounding area in addition to the bottom substrate.



## ANNEX G.3

### MANTA-RAY BUOY ANCHORING SYSTEM

The Manta-Ray anchor is a utility pole anchoring system adapted for underwater use. Sea bottom characteristics dictate the type of anchor system used for mooring buoys. Whereas the Halas system require a hard bottom to drill a core and cement an anchor pin, the Manta-Ray anchoring system can be used in mixed bottoms of clay, sand, gravel, broken bedrock, and coral rubble.

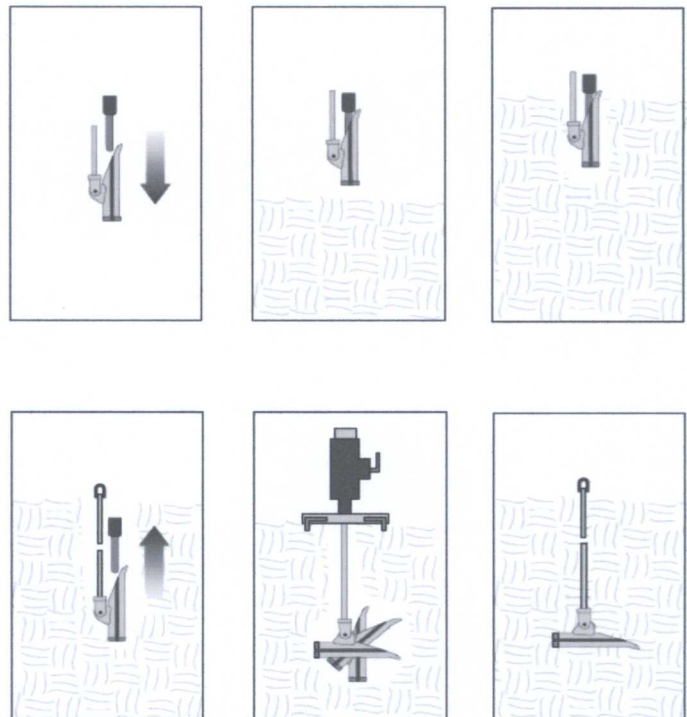
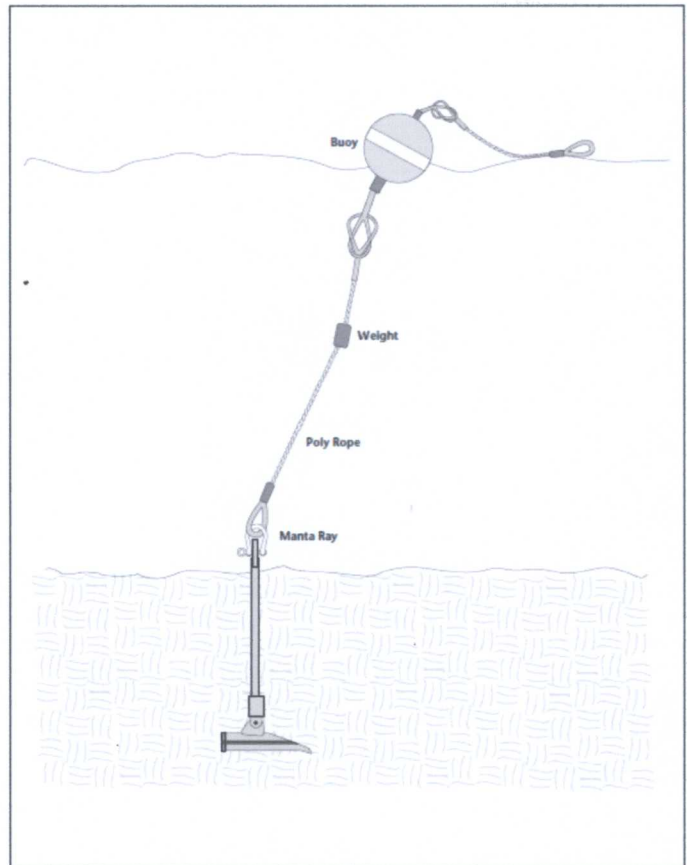
The Manta-Ray system consists of a utility anchor attached to an anchor rod that is driven under the sea bottom. A thimble eye nut is screwed into the end of the anchor rod for attachment of the buoy line.

#### Anchoring Procedure:

Anchor style and size installed depends on the sediment characteristics of the site. Probing the bottom prior to installation will give the operator an idea of the bottom conditions.

Lighter, smaller anchors are used in average sediment. The anchor should be driven deep enough that the anchor rod is not exposed above the bottom. Once the anchor and rod is in place the anchor is set and locked into a permanent position. To lock the anchor into place, an upward force must pull the anchor so that the anchor wing rotates and pivots into a locked position.

An anchor setting device, known as a load locker applies a force (measured in psi, (pound per square inch)) to put the anchor into locked position. An advantage of using a load locker to set the anchor is that the holding capacity of the anchor is immediately determined.



ANNEX G.4

The diagram shows a buoy with a white and grey float, a rope, and a mooring hook. The buoy is in a blue body of water with white-capped waves. Below the water, a horizontal line represents the ground. To the right of the buoy, there are three horizontal lines for wave level measurements. Below these are three large arrows: a downward-pointing arrow for wind velocity, a rightward-pointing arrow for current direction and velocity, and a double-headed vertical arrow for mean depth. The text 'Ground conditions:' is on the left and 'Inclination:' is on the right of the ground line.

Highest wave level : \_\_\_\_\_ (m)

Mean wave level : \_\_\_\_\_ (m)

Lowest wave level : \_\_\_\_\_ (m)

Wind velocity: \_\_\_\_\_ (m/sec)

Direction of current: \_\_\_\_\_

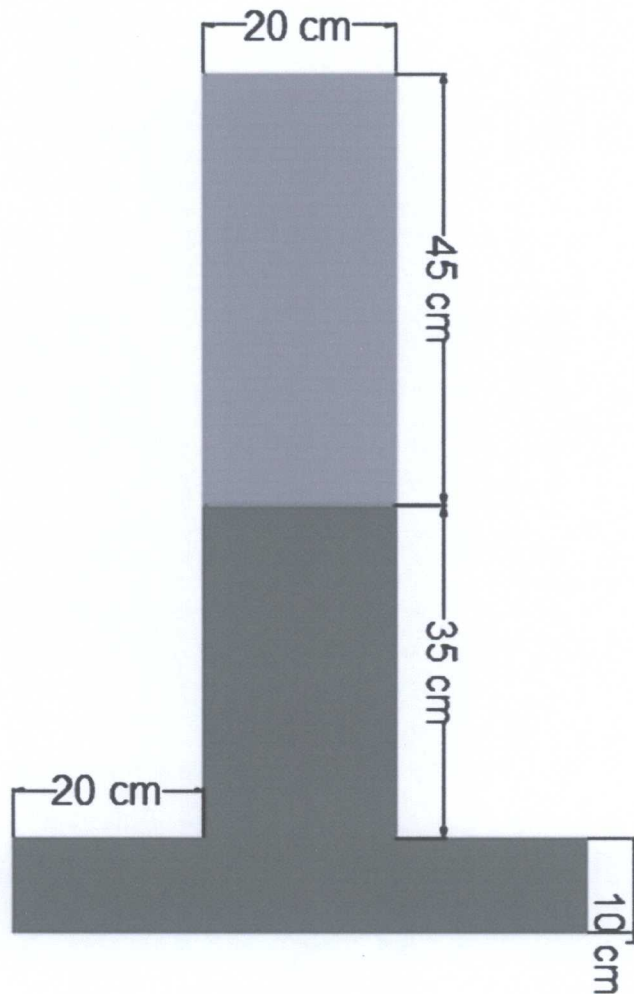
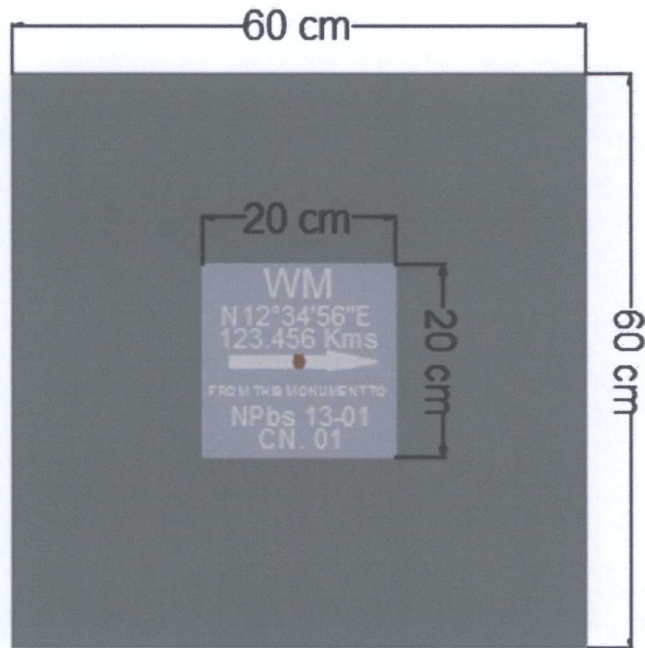
Current velocity: \_\_\_\_\_ (knots; m/sec)

Mean depth: \_\_\_\_\_ (m)

Ground conditions: \_\_\_\_\_

Inclination: \_\_\_\_\_

WITNESS MONUMENTS



## COST ESTIMATES

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>I. PREPARATORY ACTIVITIES</b>			
<b>A. Team Organization</b>			
1. Technical Meeting and Supervision	6,400/meeting (20 pax)	38,000.00	per PA 5 technical meetings
<b>B. Procurement of Supplies &amp; Materials</b>			
1. Plotter Paper (36" x 150 yards) 3" core	3,000/Ream	4,000.00	
2. Plotter paper Matte (36" x 50 yards)	6,000/Ream	6,000.00	
3. Plotter ink (Black, Cyan, Yellow, Magenta)	6,000/color	25,000.00	
4. Other supplies and materials (pens, paper, etc.)	5,000	5,000.00	
<b>C. Communication, Education &amp; Public Awareness (CEPA)</b>			
1. Coordination and CEPA with LGUs (including representatives from brgy. And stakeholders inside the PA)	10,000/municipality	10,000.00	per municipality

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>II. GROUND SURVEY</b>			
<b>A. TEV</b>			
1. One (1) Instrument Man (GE or Forester)	1,500/day	1,500.00	per day
2. Three (3) Survey Aide	1,500/day	4,500.00	per day
3. Ten (10) Laborers/haulers	800/day	8,000.00	per day
<b>B. CONVEYANCE</b>			
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day
<b>III. MONUMENTING/DEMARCATING</b>			
<b>A. TEV</b>			
1. Ten (10) Laborers	800/day	8,000.00	per day
<b>B. MATERIALS</b>			
1. One (1) bag of gravel	200/bag	200.00	per monument
2. Two (2) bags of white sand	200/bag	400.00	per monument
3. Cement	400/sack	400.00	per monument
4. ½ Plywood (1/2 inch tick)	2,000/plywood	1,000.00	per monument
5. 1 Kg. of common nails (#1, #2, #3)	200/kg	200.00	per monument
6. 2x2x8 good lumber	200/pc	500.00	per monument
7. 1 kg GI/tie wire (#14)	100/kg	100.00	per monument
8. Four (4) pc of 10 mm steel bar	300/steel bar	1,200.00	per monument
<b>C. SIGNAGE</b>			
1. Production and installation of signage	8,000/signage	8,000.00	per signage In between corners that are distant from one another (>250m); adjacent to threats and other land classification
<b>SURVEYING + MONUMENTING</b>			
		20,000.00	per monument

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>IV. Inspection, Verification, and Approval of Surveys (IVAS)</b>			
<b>A. TEV</b>			
1. One (1) Geodetic Engineer	1,500/day	1,500.00	per day
2. One (1) Survey Aide	1,500/day	1,500.00	per day
3. One (1) Cartographer	1,500/day	1,500.00	per day
<b>B. CONVEYANCE</b>			
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day

## CAPITAL OUTLAY (per Region)

Equipment	Unit Cost	Total Cost
3 RTK	1,500,000	4,500,000
5 Total Station	250,000	1,250,000
Map plotter	600,000	600,000
	2,350,000	6,350,000

## ANNEX I.1

Unit Cost for PA Boundary Demarcation (Marine)					
Component	No.	Unit of Price Measure	Unit Price Rate/Day	Amount	Total
A. Fabrication of Concrete Sinker (Sub-Total)					23,550.80
A.1 Materials for Concrete Sinker					16,822.00
1. 16mm Reinforcement bars	11	pcs.	437	4,807.00	
2. Portland/Fortune cement	12	bags	250	3,000.00	
3. Mixed gravel & sand	3	cu.m.	500	1,500.00	
4. # 16 G.I. Tie wire	5	kls.	85	425	
5. 10 pcs. 2"x 2"x12" Lumber	40	bd.ft.	45	1,800.00	
6. Marine Plywood # 1/2"	3	pcs.	840	2,520.00	
7. 4" Common nail	3	kls.	85	255	
8. 3" Common nail	3	kls.	85	255	
9. 2" Common nail	2	kls.	85	170	
10. 1" Common nail	1	kl.	90	90	
11. Stainless Steel # 5/8" (dowel)	10	ft	200	2,000.00	
A.2 Construction/fabrication Cost		(40% of the Material Cost)			6,728.80
B. Estimate of stay line rope, cables and its accessories (Sub-Total)					67,500.00
1. Polypropylene rope 24 mm x 660 m	2	rolls	29,850.00	59,700.00	
2. Steel center Cable # 3/8"	75	feet	50	3,750.00	
3. Stainless Swivel # 5/8"	2	pieces	1,500.00	3,000.00	
4. Thimbles # 5/8"	2	pieces	150	300	
5. Cable Clips # 5/8"	5	pieces	150	750	
C. Estimate of factory made buoy (Sub-Total)					64,800.00
C.1 Materials for Marker Buoy					60,800.00
1. Factory Made 1 m Ø stainless steel spherical buoy	1	piece	55000	55,000.00	
2. Stainless Steel Rod # 3/4"	5	pieces	1000	5,000.00	
3. Stainless steel sheet #1/8" x 12" x 10"	4	pieces	200	800	
C.2 Labor Cost in connecting accessories					4,000.00
D. Installation Cost (Sub-Total)					20,000.00
<b>TOTAL COST</b>					<b>175,850.80</b>
<b>CONTINGENCY COST</b>					<b>75,000.00</b>
<b>TOTAL COST PER MARKER SET</b>					<b>250,000.00</b>



**TECHNICAL BULLETIN**  
No. 2019 - 01

**JUL 15 2019**

**SUBJECT : CLARIFYING THE GUIDELINES AND PROCEDURES IN THE DEMARCATION OF BOUNDARIES OF LEGISLATED PROTECTED AREAS UNDER THE NATIONAL INTEGRATED PROTECTED AREAS SYSTEM (NIPAS)**

Pursuant to Section 4, Article XII of the 1987 Philippine Constitution, Section 5 of Republic Act No. 7586 or the National Integrated Protected Areas System (NIPAS) Act of 1992, as amended by R.A. 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018, and DENR Administrative Order No. 2019-05 or the Implementing Rules and Regulations (IRR) of the NIPAS Act, this Technical Bulletin is hereby issued for the guidance of all concerned.

**Section 1. Objective.** This Bulletin provides the specific guidelines and procedures for the survey and demarcation of boundaries of all legislated protected areas under the NIPAS.

**Section 2. Scope and Coverage.** This Bulletin shall apply to all legislated protected areas pursuant to the NIPAS Act, as amended by the ENIPAS Act of 2018 and other protected areas with specific legislations.

**Section 3. Definition of Terms.** As used in this Technical Bulletin, the following terms shall mean as defined hereunder:

1. Boundary markers - the monuments and markings such as concrete monuments, buoys or natural markers such as deciduous trees, big rocks/stones and the likes installed and painted to identify the corners of protected areas as described in the legislation;
2. Demarcation - the establishment of the boundaries of legislated protected areas using visible markers, monuments, buoys in case of marine areas, and known natural features or landmarks, among others, as a result of the actual ground delineation;
3. Digital Platform - geospatial software that is designed to capture, store, manipulate, analyze, manage and present all types of geographical data;
4. Final map - map generated from the relocation and demarcation of boundaries of protected areas as provided in the legislation using a scale of 1:50,000, or which may vary according to the size of the protected area;
5. Mooring Buoy - a type of buoy that is designed in a manner that there is a heavier weight located right in the bottom of the sea or anchored on an appropriate manner;
6. Preliminary map - initial map generated out of the technical description prescribed in the legislations prior to the actual boundary relocation;

W- 11/21/17/19  
P- 11/9/17  
C- 11/19/19  
M- 11/27/17  
T- 11/27/17

7. Strategic Places – vantage points adjacent to local communities, traverse in riverbanks and streams, roadsides and entry points where monitoring of illegal activities can take place.
8. Witness Monument – a monument indicating the appropriate survey symbols established along stable or non-ambulatory shorelines/river banks at the low tide level for corners that fall into the sea or any bodies of water that cannot be marked with regular monuments.

**Section 4. Installation of Monuments and/or Markers.** The demarcation of boundaries shall involve the actual relocation of corners and installation of concrete monuments and other prominent physical landmarks or features of the protected area to ensure its integrity from threats, deter other illegal activities and facilitate enforcement and monitoring.

The demarcation of boundaries shall involve the following:

*4.1 Preparatory Phase.* Prior to the conduct of the actual ground survey, the following activities shall be undertaken:

- 4.1.1 Prepare the preliminary map based on the technical description provided in RA 11038 or other specific legislations of protected areas. This will be used as reference for the actual boundary demarcation.
- 4.1.2 Conduct meeting of the Regional Delineation and Demarcation Committee (RDDC) together with the Regional Delineation and Demarcation Team (RDDT) to present the preliminary map and to provide technical guidance in preparation for the actual demarcation activities;
- 4.1.3 For marine protected areas, the RDDC shall be enjoined by the Philippine Coast Guard in order to determine whether markers would be applicable in the area;
- 4.1.4 Conduct coordination meetings and Communication, Education and Public Awareness (CEPA) involving the concerned municipalities and key stakeholders within the protected area.

The demarcation survey shall be conducted with prior written notice to the affected communities to be posted in the Barangay and Municipal Halls. The concerned Barangay and Municipal Officials shall be responsible for informing their constituents on this matter. The said survey shall commence not earlier than five (5) days upon receipt of such notice. If there are nearby or adjacent on-going survey projects, the Head of the Team/Party executing said survey shall be informed in writing for purposes of work coordination in consonance with Sec. 165.b, DENR Memorandum Circular No. 2010-13, the Manual on Land Survey Procedures.

The demarcation survey shall be undertaken in the same manner as an isolated survey pursuant to Sec. 165.c, DMC 2010-13.

The survey shall be at least in the 4th Order Accuracy. The existing corner points of titled/decreed properties and those areas covered by



previously approved surveys within and along the perimeter should be observed for connection and checking purposes pursuant to Sec. 165.d, DMC 2010-13.

*4.2 Implementation Phase.* The following steps shall be undertaken in the actual demarcation of PA boundaries:

- 4.2.1 Relocate on the ground the corners of the protected area using the preliminary map based on the technical description as provided in the Congressional Act. The lines and corners of the protected area shall be compliant with the Philippine Reference System of 1992 (PRS92) pursuant to E.O. 45 as amended by E.O. 280 and 321. The conduct of demarcation of PA boundaries shall be consistent with the DENR Administrative Order No. 2007-29 also known as the Revised Regulations on Land Surveys and DENR Memorandum Circular No. 2010-13. Process flow of the relocation survey of NIPAS boundaries as shown in **Annex A**.
- 4.2.2 The corners shall be marked with monuments and appropriate markers in accordance with the prescribed design and specification provided for in **Annex B**. In between corners, signage/markers must be installed in strategic places and/or every 250 m, if necessary.
- 4.2.3 For terrestrial protected areas, three (3) strips (quincunx) of suitable and fruit/flowering endemic tree species shall be planted along the boundary lines in between concrete monuments with spacing of 4 m x 4 m as illustrated in **Annex C**;
- 4.2.4 Physical markers such as buoys or floating signage aid in the management interventions, navigation and enforcement within MPAs. However, in some areas where physical demarcation may not be practically applicable due to external factors, boundaries should be demarcated on a digital platform. Generated geographical information shall then be submitted to NAMRIA for its integration on charted maps such as nautical charts;
- 4.2.5 On digitally demarcated MPAs, two witness monuments shall be established in a stable and non-ambulatory location on the nearest terrestrial feature adjacent to the demarcated area. Bearing and distance from the boundary corner shall be legibly and properly marked on each monument;
- 4.2.6 Use of precise survey instruments, marine navigational tools and other survey instruments as prescribed by the Land Management Bureau in all surveys;
- 4.2.7 Observations and information gathered during the field activities shall be recorded in the survey returns and form part of the final report of the RDDTs;
- 4.2.8 Corners that fall within settlements/communities should be duly noted and their exact location, marked on the ground and on the map;

4.2.9 The participation of representatives from the local communities especially those that will be affected by such activity will be encouraged during the conduct of the actual boundary demarcation; and

4.3 The following, unless otherwise stated, shall be done in the LMB prescribed forms and shall be included in the submission of survey returns in consonance with Sec. 184, DMC 2010-13:

4.3.1 References and Technical Documents:

4.3.1.1 GPS Field Sheets;

4.3.1.2 Approved Geographic Position of Reference Points;

4.3.1.3 Final List of Position;

4.3.1.4 Grid Distance Computation;

4.3.1.5 Monument Description Sheet(s); and

4.3.1.6 Location Monument Recovery Report

4.3.2 Digital and hard copy of maps printed in mylar drafting film;

4.4 Inspection, Verification and Approval of Surveys (IVAS). The Regional Survey and Mapping Division (RSMD) shall verify the correctness and technical accuracy of the survey returns covering national parks/protected areas boundary. The process of PA IVAS shall be done within the Land Administration and Management System (LAMS), the DENR computer-based verification of Survey Plans. The inspection, verification and approval of surveys shall be in accordance with DMC 2010-13;

Criteria and requirements in the undertaking of IVAS are as follows:

- a. Two survey controls, *at least 200 meters apart* shall be established on stable ground near the approximate location of every boundary monument to be constructed.
- b. The positions of the survey controls near the boundary corners locations shall be established using survey grade dual frequency GPS/GNSS Satellite Receivers with reference to existing NAMRIA PRS92 survey controls within or near the project site by using uniform coordinate system.
- c. The survey controls shall be at least of 4<sup>th</sup> order accuracy.
- d. Two witness monuments shall be established in a stable location for every corner boundary location that falls within the creek, river or body of water.
- e. The bearing and distance from each witness monument to the boundary corner location shall be legibly and properly marked on each witness monument.

- f. The coordinate system of the boundary corners shall be with same system of the established survey controls prior to the setting of boundary monuments.
- g. The boundary corner location shall be set and checked using the established survey controls near each boundary location. One of the two survey controls shall be used for stake-out while the other survey control shall be used for checking.
- h. All surveying and mapping activities shall be with reference to R.A.8560 otherwise known as the Philippine Geodetic Engineering Act of 1988 and the latest revised Manual of Land Surveying in the Philippines.

#### 4.5 Approval Phase.

- 4.5.1 The final map of the protected area shall be prepared in accordance to the template provided in **Annex D**;
- 4.5.2 The RDDT shall submit the map for further review by the RDDC through the PASu and the Conservation and Development Division Chief of the Regional Office for further review and endorsement to the National Delineation and Demarcation Committee (NDDC);
- 4.5.3 The Regional Executive Director (RED), as Chair of the RDDC, shall certify the correctness and authenticity of the map. The RED shall sign and endorse the said map to the Secretary through the NDDC Chair, Undersecretary for Field Operations and BMB for final approval;
- 4.5.4 The DENR Secretary shall inform the Congress of any proposed amendment to the law of the concerned PA; and
- 4.5.5 The copy of the approved PA map shall also be furnished to the Chief, Survey and Mapping Division (SMD) of the DENR Regional Offices for updating of LAMS.

**Section 5. Standard Design and Specifications of Boundary Markers.** Permanent markers such as monuments, buoys and alternative markers shall be installed using the standard design and specifications as provided herein:

#### 5.1 For Terrestrial Protected Areas

- 5.1.1 Concrete monuments shall have a minimum dimension of 20.00 cm x 20.00 cm x 90.00 cm. The materials to be used shall be Class A (1:2:4) concrete, longitudinally reinforced with four 10.00 mm diameter standard deformed steel bar, properly embedded on the four corners. A footing of 20 cm on all sides of the monument and 10 cm high starting from the base of the monument shall be included.
- 5.1.2 The boundary markers shall bear the letters "NPbs" which means "National Park boundary survey"; respective Regional Number i.e. "13"; Map Number i.e. "01"; and the corner numbers "CN.\_" engraved at the center on top and front of the monuments. The letter should be 05.00 cm high in arial font and the "corner number" in 2.5 cm diameter

(Corner No. 1). The said monuments should be installed vertically and as accurately as possible where the corner points of the protected area are located on the ground. The monument shall be implanted 45.00 cm deep on the ground.

- 5.1.3 The signage/markers shall be installed in built-up areas and strategic places in every 250 m along the boundary. These shall have the markings as provided for in DAO No. 2009-09 dated August 20, 2009, and should be stated in English and in the local dialect as shown in **Annex E**.
- 5.1.4 Should there be corners located in spots where the use of concrete monuments are not applicable, permanent features on the ground such as boulders or rock surfaces, with an exposed surface of at least one (1) meter, can serve as alternative markers. They shall be marked with the Corner Number (CN), the letter "NPbs" and the Survey Plan Number. The font size of which is 10.00 cm arial font. These shall be painted red with at least three (3) coatings. A 15 cm x 15 cm square box shall also be painted with the same paint and coatings to enclose the markings and the corner number at its center. The geographic coordinates of each corner should be recorded.
- 5.1.5 Large deciduous trees with at least one (1) meter in diameter at breast height (DBH) may also be used as an alternative marker.

## 5.2 For Marine Protected Areas

- 5.2.1 Buoy systems to be used for a particular MPA will be determined by the system considerations and the site location. Such considerations are as follows:
- 5.2.1.1 **Water depth:** This shall be the main consideration in determining which particular buoy system can be used for a given site. This information is usually obtained from a nautical chart for design purposes and then verified on scene during ground validation.
- 5.2.1.2 **Current:** Surface current and deep ocean currents must also be taken into consideration in determining whether the area is suitable for physical demarcation. Further, currents must also be factored in to determine the appropriate materials and anchoring systems to be used.
- 5.2.1.3 **Bottom Conditions:** The type of bottom may also be of concern to the type of mooring and anchoring system. In MPAs with coralline substrate, a special anchoring system may be required in order not to damage the ecosystem present in the area.
- 5.2.1.4 **Buoy hull:** The designation of a particular hull for a selected mooring site will aid in determining which mooring system should be used. Smaller hulls have limited buoyancy that may limit the size or amount of line and/or chain being used

in the mooring in deep water. The type of buoy hull will also determine the mooring component sizes through strength requirements; larger hulls exert a greater load on the mooring and thus require greater mooring strength, which is essentially accomplished through component size increases;

- 5.2.1.5 **Special Considerations:** Special consideration would include proximity to sea lanes or fishing areas. If located on shipping lanes, the buoy hull may have to be reduced in order to keep the buoy clear from possible collisions.
- 5.2.2 The survey party shall coordinate with the Philippine Coast Guard for the preparatory activities and during the installation of the buoys. Survey parties must ensure that the materials and installation procedure shall be in consonance with PCG Memorandum Circular 01-05.
- 5.2.3 If the corner points are located on the sea or in any water body, the use of yellow factory made stainless or polyethylene buoys with 30.48 cm minimum diameter can be used, provided, that the letters "NPbs" (5.00 cm high, Arial font) and the corner number (1cm) are painted using marine-grade paint around the buoy. The said buoys with sinker should be properly chained and anchored. However, damage to under water resources such as corals, sea grasses, and the likes should be avoided. A solar powered blinker (International Association of Marine Aids to Navigation and Lighthouse Authorities approved) maybe attached to the buoy. The geographic coordinates of each corner marked by buoys should be recorded. Illustration of boundary markers for marine protected areas is hereto attached as **Annex F**.
- 5.2.4 Environmental conditions must be factored in with the selection of the mooring system to be used. The type of anchoring and buoy must be compatible with the environmental conditions of the area. Types of buoy systems that may be used for different substrate is hereto attached as **Annex G**.
- 5.2.5 In cases wherein the corner cannot be practically demarcated, two witness monuments shall be established, with its dimensions the same as the corner monuments. However, the inscriptions shall be replaced by the letters "WM" to signify its purpose as witness monument. WM shall be engraved at the top with a height of 3 cm using Arial font, followed by the bearing and distance from the monument to the corner of the PA with a height of 2 cm, using Arial font. The phrase "from this monument to" should be 1 cm high in Arial font and "NPbs" followed by the region number and its corresponding map number. The letters "C.N." should be followed by the corner number 2 cm high in Arial font. The center of which shall be marked by a circle with a radius of 0.5 cm, and an arrow pointing to the direction of the corner of the PA. The directions of these two witness monuments shall make an intersection where the true location of the corner lies as illustrated in **Annex H**.
- 5.2.6 All corners and important natural and man-made features shall be noted and recorded.

**Section 6. Demarcation of Previously Legislated Protected Areas.** The Regional Office shall review demarcation activities undertaken for previously legislated protected areas and ensure that herein guidelines are complied with accordingly.

**Section 7. Implementation Mechanism.** The NDDC created pursuant to DAO 2015-10 shall oversee the implementation of the demarcation activities.

The Regional Office shall issue corresponding Regional Special Order creating the RDDC and the RDDT, the functions of which are provided in DAO 2015-10.

The conduct of the survey shall only proceed after the enactment of the corresponding law by Congress adopting the final report of the RDDT as a result of their assessment/delineation of forestland boundary pursuant to DAO No. 2008-24 in consonance with Sec. 163, DENR Memorandum Circular No. 2010-13.

If the survey shall be undertaken through administration, the Survey Party shall be composed of Geodetic Engineers of the Regional Composite Survey Team (RCST) created pursuant to DENR Administrative Order No. 2005-13, Revised Guidelines for the Implementation of the Philippine Reference System of 1992 (PRS92) and at least two (2) members of the RDDT in accordance with Sec. 164, DMC 2010-13.

**Section 8. Budget Allocation.** Funds for the demarcation of protected areas shall be included in the regular budgetary allocation of the DENR. Additional funds may be sourced from other funding institutions.

Cost estimates for the conduct of demarcation activities are provided in **Annex I**.

**Section 9. Monitoring and Evaluation.** The Regional Office together with the Protected Area Management Board shall regularly monitor the installed monuments/markers to ensure their maintenance.

**Section 10. Effectivity.** This Technical Bulletin shall take effect immediately and shall be circulated for the information and guidance of all concerned.

**RICARDO L. CALDERON**

OIC, Assistant Secretary for Staff Bureaus and  
Director in concurrent capacity

DP

## RELOCATION SURVEY OF NIPAS BOUNDARIES

PREPARATION OF BASE MAPS

Transform/Project Shp of PA based on RA from UTM Zone 51 Luzon 1911 to PRS92 Datum

Overlay of secondary thematic data such as LC, Cad, FLBD, PRS92 controls, roads, rivers, topo, tenorial, etc.

Coordinates Extraction Of Pre-determined Corners

Transform corners to WGS84 and extract grid coordinates of corners

Extract Grid Coordinates in PRS92

Upload to Handheld GPS

Upload to Total Station and/or RTK Controller

Printing of base maps and reference maps

*Land Evaluation Survey Section (LESS) Survey and Mapping Division*

Recovery of PRS92 Control Monuments as base

Densify/Establish Project Controls (in pairs) near the corners with max of 2 km distance from each pair

Static method (3<sup>rd</sup> Order)

RTK method (Fixed Solution)

Coordinates Upload to Total Station and/or GNSS-RTK Controller

Calibration/testing of instruments on known

*Regional Delineation and Demarcation Team (Registered Geodetic Engineer as the Team Lead)*

Navigate to Pre-determined Corner using Handheld GPS

*Traverse will close in the succeeding pair of project controls for checking. LEC should be within allowable for Tertiary Surveys*

Conduct Relocation Survey using Project Controls as Take-off points

Assessment of Ground condition

*Monuments are positioned based on natural features described in NP or LC maps*

Recovery of existing PA markers or identical FLBD monuments

Move corner to the most logical position within allowable 50 m. radius

*Regional Delineation and Demarcation Team (Team Leader together with PASu/representative, 2 marine biologist for MPAs and 2 survey aides including 10 laborers)*

Monumenting based on specs

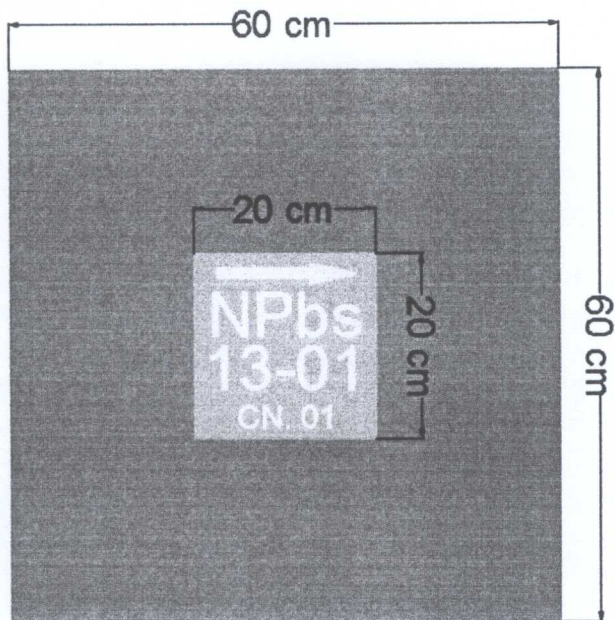
Sideshot of Monument by TS or RTK

Record grid coordinates and Fill-up NIPAS Corner Description Form

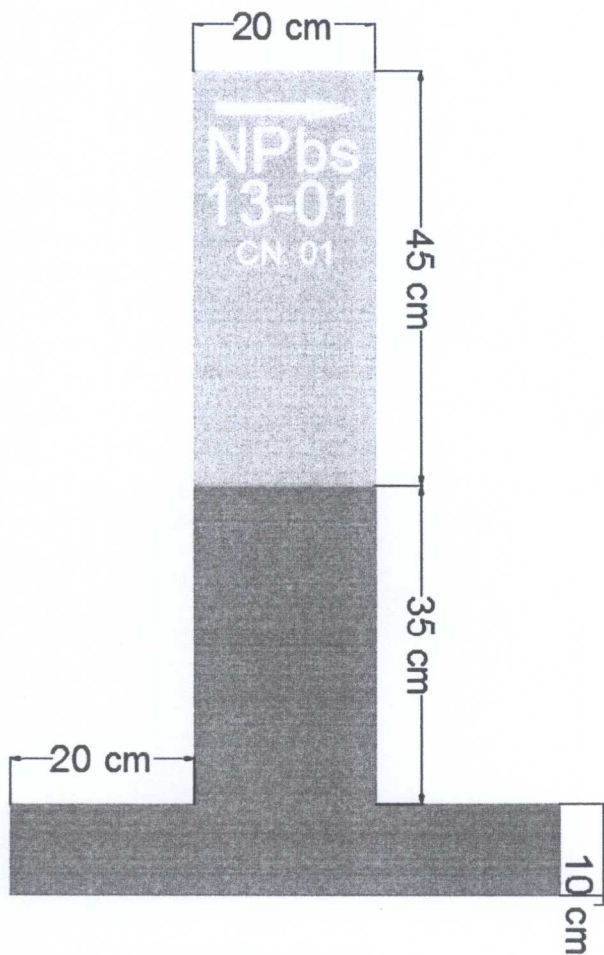
Update Progress maps and reports

Preparation of Survey Plan and Survey Returns (DAO 2010-13 Art 24)

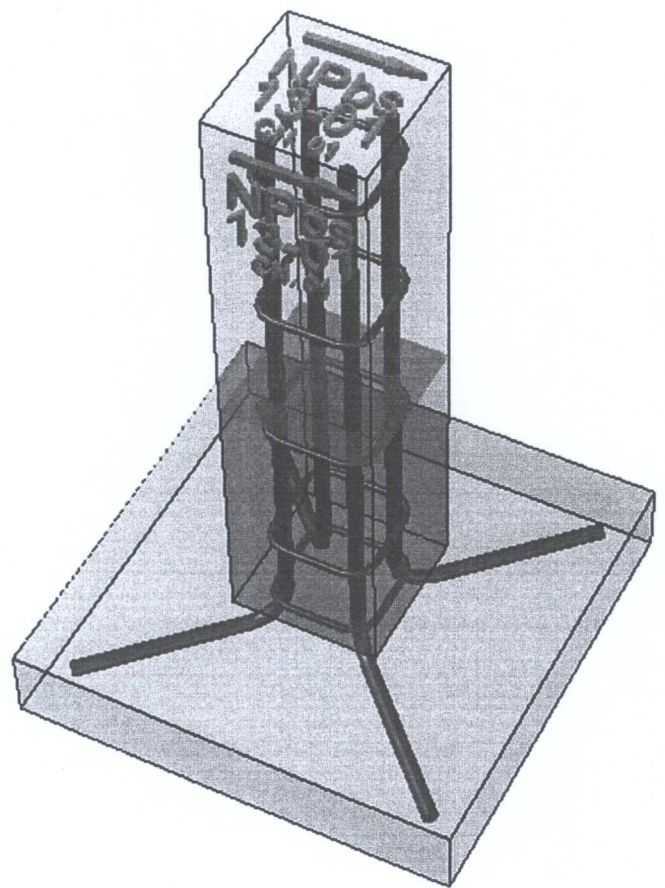
**PROPOSED BOUNDARY MARKERS FOR  
TERRESTRIAL PROTECTED AREAS**



**TOP VIEW**



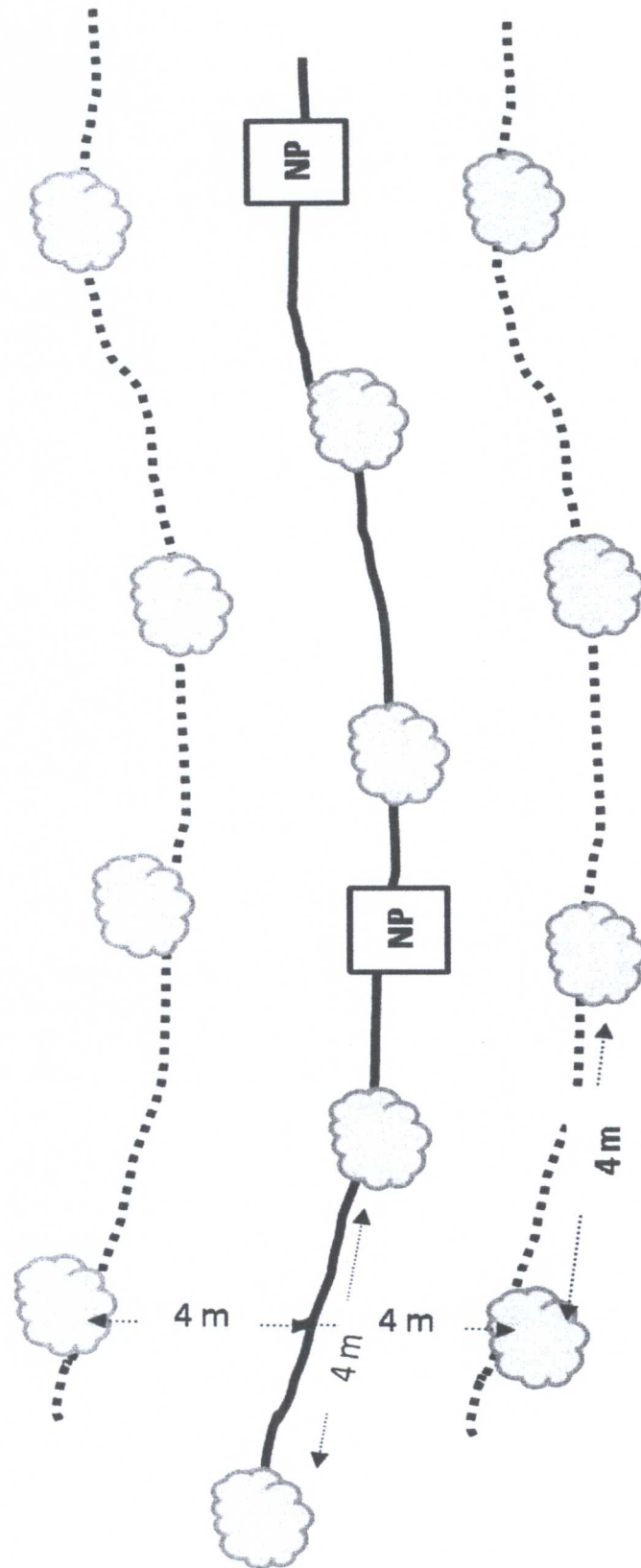
**FRONT VIEW**



**ISOMETRIC VIEW**



Quincunx



## MAP LAY OUT FOR NATIONAL PARKS

1. Paper : Mylar: HP Matte Film  
Film polyester transparent  
36 in. X 125 ft., 160 g/m<sup>2</sup>  
*(www.hp.com/go/designjet/supplies)*
2. Map Layout Size : **For areas 20,000 has. and above:**  
Portrait – 84.1 cm X 118.88 cm  
Landscape – 118.88 cm X 84.1 cm  
**For areas lesser than 20,000 has.:**  
Portrait – 80.00 cm X 80.00 cm  
Landscape – 100.00 cm X 80.00 cm
3. Map Layout Orientation : Portrait  
Landscape
- Note: Orientation of map layout would depend also in the orientation of the protected area.*
4. Title, Location and Area : Title should specify the name of the Protected Area as per Legislation (e.g. Agusan Marsh Wildlife Sanctuary).
- Location should specify the municipality/municipalities and or city/cities, as well as province/provinces covering the protected area.
- Indicate the area of the protected area as indicated in the legislation.
5. Spatial Information : Scale: For areas of 20,000 hectares and above, use the scale of 1:50,000. For areas less than 20,000 hectares, use an appropriate scale which will show the whole coverage of the protected area on the map while maintaining it's aesthetic.
- Datum: Philippine reference System of 1992 (PRS92)
- Projection: Universal Transverse Mercator (UTM) Zone 51 N

*Note: Scale values should be rounded of.*

6. Technical Description : Present the complete and detailed technical description showing the Bearing (in Degrees, Minutes, and Seconds), the Direction (i.e. NE, SW, SE and others), and Distance (in meters).
- Indicate also the control/tie point (in PRS92) with its corresponding PRS92 number together with the location and its corresponding geographic coordinates (in Latitude and Longitude).
7. Map Features : Reflect in the map all natural and physical features such as roads, rivers and or creeks, lakes, caves, islands, islets, mountain peaks, and among others with proper label/labels based on available data and information (i.e. topo maps; google earth; and among others).
- Note: Head waters and river systems, must be identified if possible, this is in relation to the Presidential directive during the 36<sup>th</sup> Cabinet Meeting on 01 April 2019 for the short and long term solutions for El Niño and La Niña Phenomena.*
8. Disclaimer Statement : Use this statement:
- NOTE:**  
*Political Boundaries depicted on the map are not authoritative.*
- This map accurately indicates the boundaries of the National Park based on a relocation survey conducted by the RDDTs per survey plan no. Rel-13-01, the original field notes and computations of which are on file in the DENR Region 13 Office.*
9. Map Number : The Map Number is the code assigned to a particular protected area in order to differentiate it from the other protected area maps. This will include the National Parks boundary survey (i.e. **NPbs**); then **13** stands for DENR Region 13; the serial number of the map (**01** = numbering of NP map should be in sequence and in order of its legislation), and to read as "**NPbs-13-01**"
- Note: for numerous PAs established in one legislation in a certain Region, the arrangement of numbering would be in alphabetical order of the names of the protected areas.*
10. Legend : This is a table or chart included on a map to indicate the meaning of the map's varied symbols such as rivers, creeks, road, trails, islands, islets, caves, geological forms and among others.

To include the base map of Defense Mapping of America (DMA) topographic map used within the coverage of the protected area.

11. Location Map : This is the diagrammatic representation of the location of the National Park in relation to the whole Regional area of jurisdiction in the Philippines.

***Note: Highlight the Regional coverage to include provincial boundaries.***

12. Certification : Use this statement:

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018.

These areas were delineated by the \_\_\_\_\_, DENR \_\_ in accordance with the standard procedures on survey and mapping of the DENR.

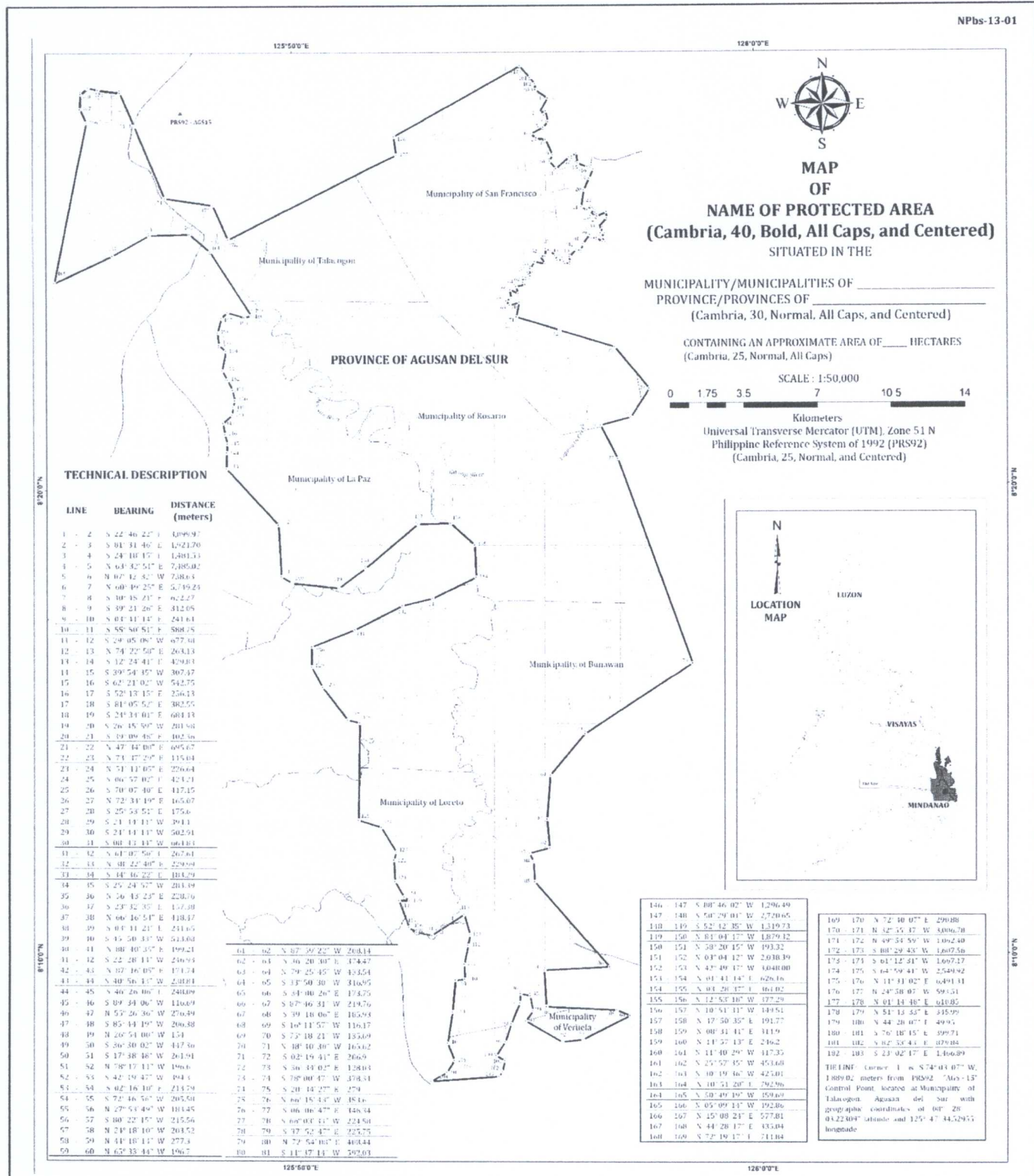
Specify date of approval of the map.

The certification is recommended by the Regional Executive Director of the DENR Field Office; Director of Biodiversity Management Bureau and the DENR Secretary.

13. Signatories : Signatories for the Regional Field Office would include the Cartographer (with GIS capability) who prepares the map layout; under the supervision of the Chiefs, Surveys and Mapping Division and Conservation and Development Division; Attested by the PENR Officer with initial from the CENRO; and Noted by the Assistant Regional Director for Technical Services.

For areas 20,000 has. and above  
Portrait – 84.1 cm X 118.88 cm

NPbs-13-01



Prepared by: NAME, Category

Under the Supervision of: NAME, NAME, Check Survey and Mapping Division, Check Conservation and Development Division

Attested: NAME, MRB Office (Place)

Noted: NAME, Assistant Regional Director for Technical Services

**LEGEND**

- PRSN Control Point (Indicated by coordinates)
- Local Subarea
- Subarea
- Province Boundary
- Protected Area Boundary
- Natural Boundary

**NOTE:**  
Parties to the boundary negotiation must sign and approve the map.

This map is a technical document. It is a condition of the PRSN that no part of this map may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of the DENR Region 13 Office.

Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

**CERTIFICATION**

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7596 otherwise known as National Integrated Protected Areas System (NIPAS), as amended by Republic Act 11010 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018. These areas were delineated by the \_\_\_\_\_, DENR, in accordance with the standard procedures on survey and mapping of the DENR.

Date Approved: 09 May 2019

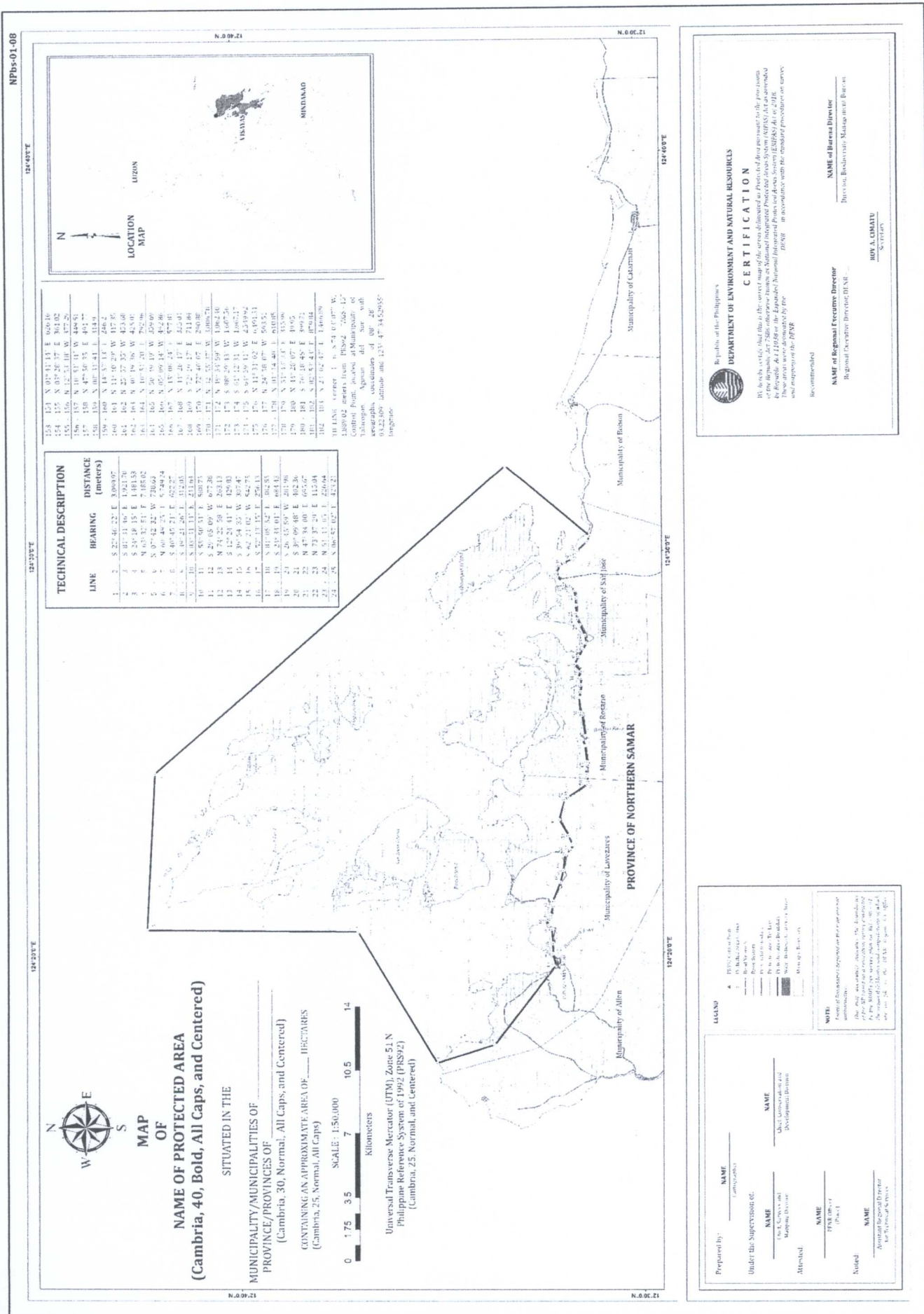
Recommended:

NAME of Regional Executive Director  
Regional Executive Director, DENR

NAME of Bureau Director  
Director, Biodiversity Management Bureau

RUI A. CIMATH  
Secretary

For areas 20,000 has. and above  
Landscape - 118.88 cm X 84.1 cm



Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**  
**CERTIFICATION**

We hereby certify that this is the correct and true map of the area described in the title hereon, prepared in accordance with the provisions of the Republic Act 11138 for the Enhanced National Integrated Protected Areas System (ENIPAS) Act as amended by Republic Act 11188 for the Expanded National Integrated Protected Areas System (ENIPAS) Act (a.o. 2) RC 11188, in accordance with the appropriate procedures and survey and map prepared by the DENR.

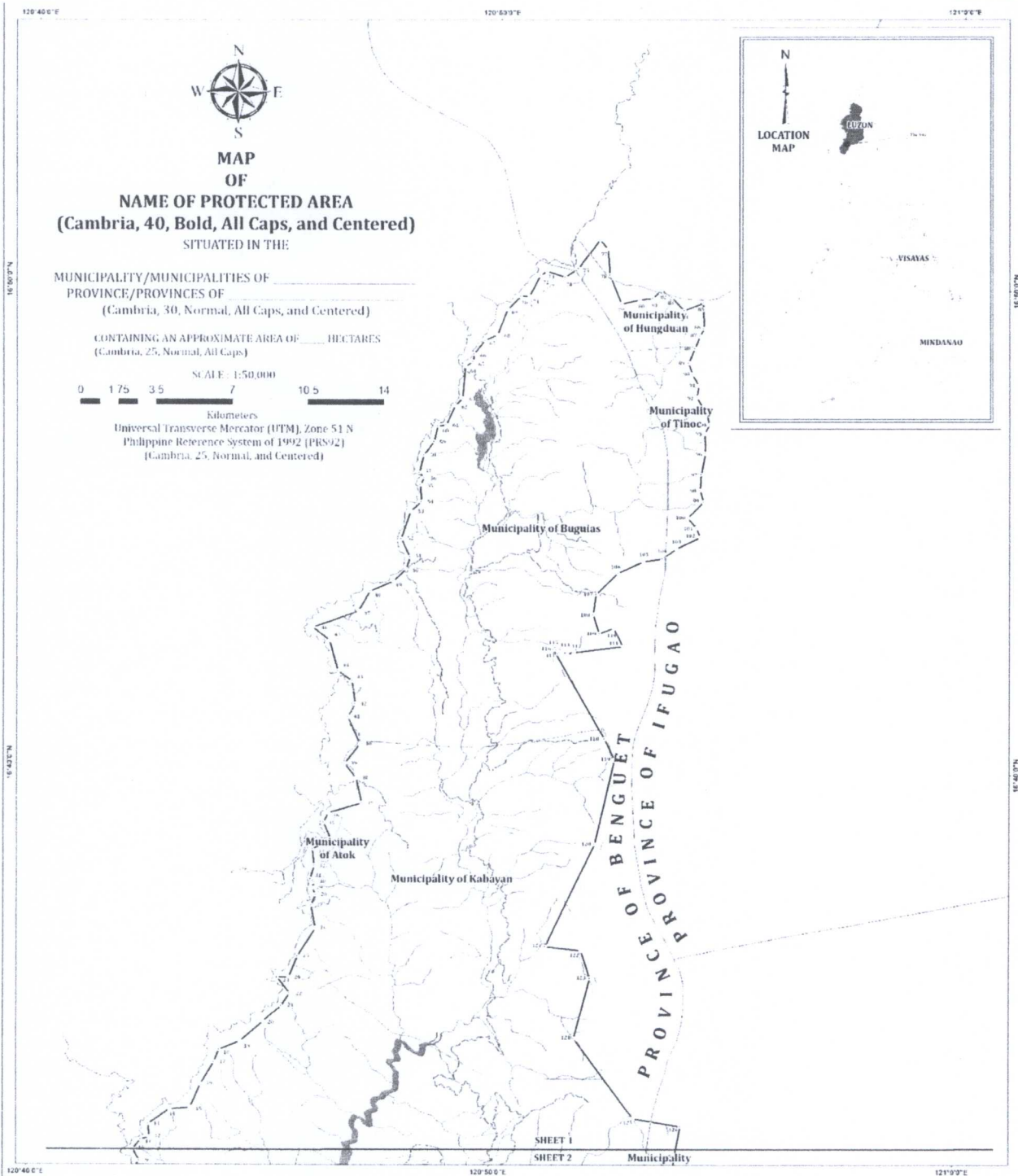
Recommended:

**NAME of Bureau Director**  
Division, Board, or Management Bureau  
**ROSA GIMAY**  
Secretary

**NAME of Regional Executive Director**  
Regional Executive Director (DENR-\_\_\_\_\_)

For areas 20,000 has. and above  
Portrait – 84.1 cm X 118.88 cm with adjoining Sheets

NPBs-01-CAR



Prepared by: **NAME**  
[Blank space]

Under the supervision of:  
**NAME** (Director) and **NAME** (Assistant Director)  
 [Blank space]

Attested:  
**NAME**  
 [Blank space]

Noted:  
**NAME**  
 [Blank space]

**LEGEND**

- Protected Area Boundary
- Province Boundary
- Municipality Boundary

**NOTE:**  
 This map is prepared in accordance with the provisions of the National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7641) and the expanded National Integrated Protected Areas System (NIPAS) Act of 2018 (RA 11038) in accordance with the standard procedures of survey and mapping of the DENR.

Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

**CERTIFICATION**

We hereby certify that this is the correct map of the area designated as Protected Area pursuant to the provisions of the Republic Act 7641 known as National Integrated Protected Areas System (NIPAS) Act of 1992 and the expanded National Integrated Protected Areas System (NIPAS) Act of 2018. These areas were delineated in accordance with the standard procedures of survey and mapping of the DENR.

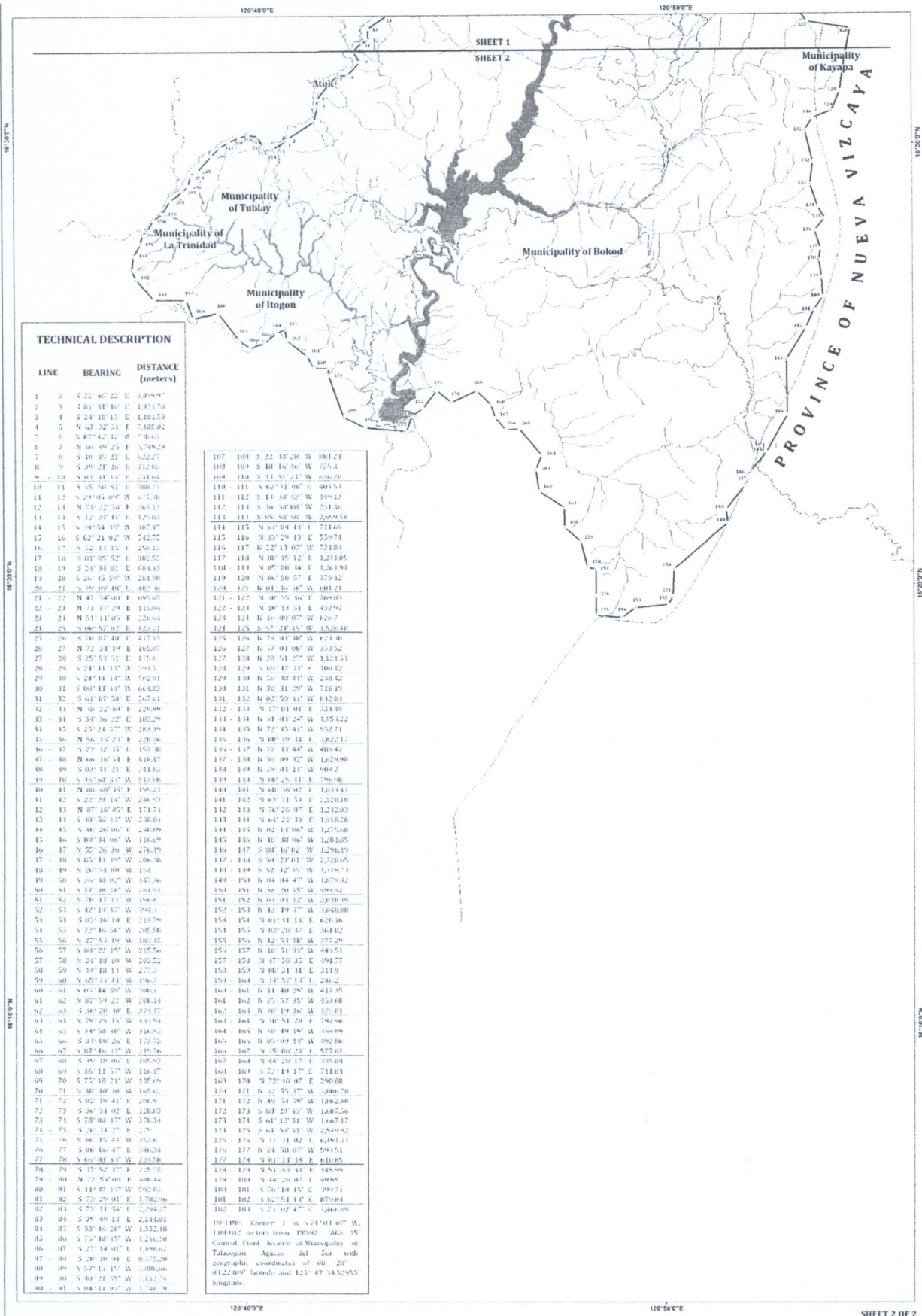
Recommended:  
**NAME of Regional Executive Director**  
 Regional Executive Director, DENR - [Blank space]

**NAME of Bureau Director**  
 Director, Biodiversity Management Bureau

**ROY A. CIMATU**  
 Secretary

For areas 20,000 has. and above  
Portrait - 84.1 cm X 118.88 cm with adjoining Sheets

NPbs-01-CAR



TECHNICAL DESCRIPTION

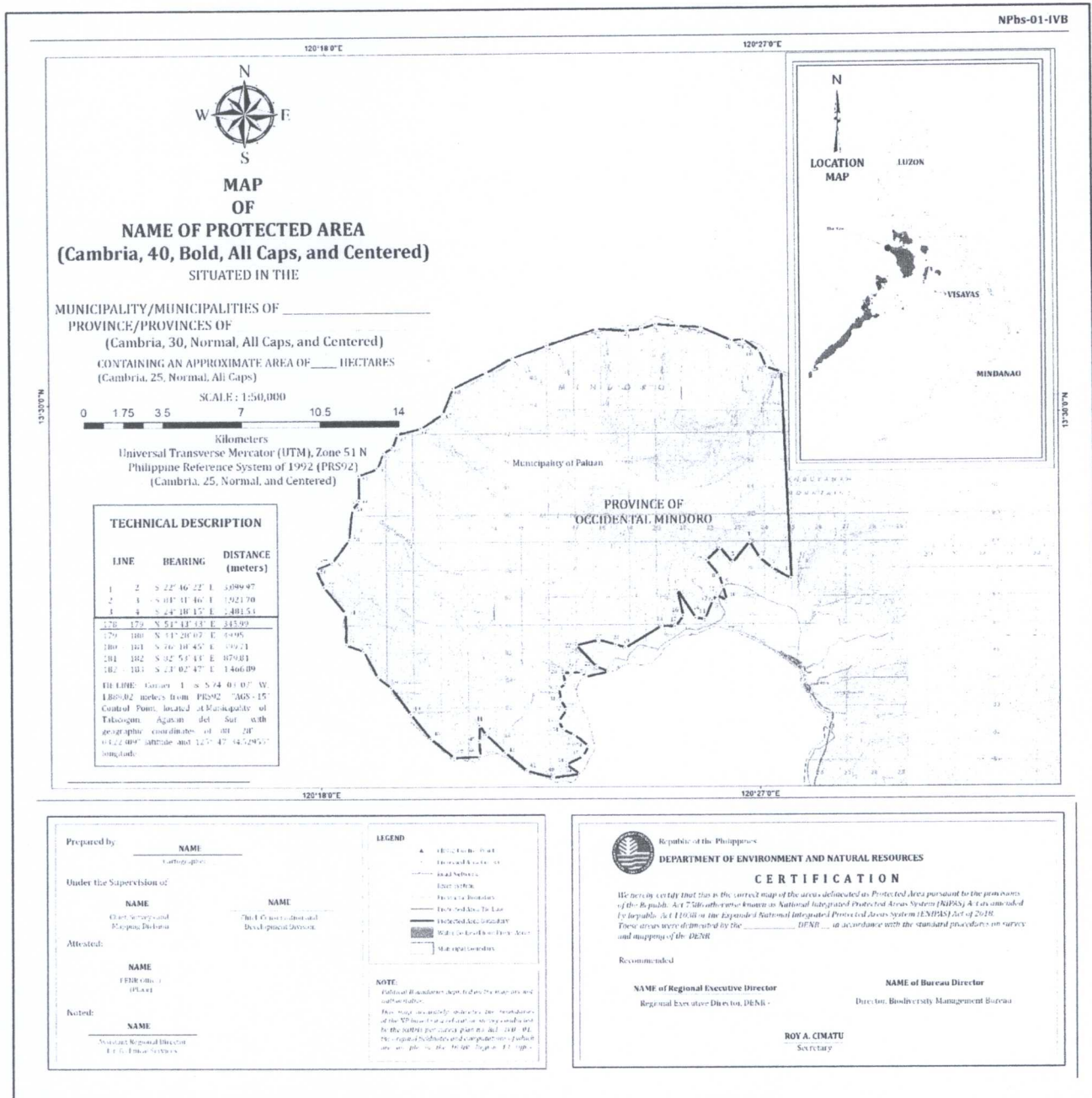
LINE	BEARING	DISTANCE (meters)
1	S 22° 40' 22\"	3,899.97
2	S 01° 31' 16\"	1,921.70
3	S 24° 18' 15\"	1,183.23
4	N 43° 22' 24\"	7,185.82
5	S 87° 42' 32\"	7,043.33
6	N 60° 49' 25\"	5,749.24
7	S 10° 45' 21\"	6,222.27
8	S 39° 21' 26\"	3,121.93
9	S 03° 33' 13\"	231.66
10	S 35° 58' 51\"	588.75
11	S 29° 05' 09\"	675.40
12	N 73° 22' 58\"	263.13
13	S 12° 32' 01\"	3,259.83
14	S 89° 54' 30\"	107.47
15	S 62° 21' 02\"	242.72
16	S 52° 31' 15\"	1,561.13
17	S 01° 19' 52\"	382.55
18	S 24° 34' 01\"	694.13
19	S 26° 15' 59\"	261.98
20	S 09° 49' 48\"	483.36
21	N 47° 34' 00\"	695.67
22	N 33° 39' 28\"	1,150.84
23	N 51° 11' 05\"	2,286.84
24	S 08° 52' 02\"	1,226.21
25	S 70° 07' 48\"	417.15
26	N 72° 34' 19\"	1,650.97
27	S 25° 53' 11\"	1,376.6
28	S 24° 11' 17\"	1,991.1
29	N 24° 14' 14\"	592.91
30	S 60° 13' 14\"	644.02
31	S 61° 07' 29\"	267.61
32	N 40° 22' 40\"	2,290.98
33	S 34° 36' 22\"	1,032.29
34	S 25° 21' 57\"	1,823.39
35	N 66° 14' 17\"	1,287.36
36	S 23° 12' 15\"	1,571.41
37	N 66° 16' 11\"	418.47
38	S 03° 41' 21\"	2,511.62
39	S 45° 50' 43\"	513.08
40	N 40° 46' 15\"	1,991.21
41	S 22° 08' 17\"	2,460.95
42	N 47° 16' 05\"	1,713.74
43	S 10° 56' 13\"	2,380.84
44	S 46° 26' 06\"	2,480.99
45	S 89° 34' 06\"	1,166.89
46	S 55° 26' 36\"	2,764.19
47	S 02° 11' 18\"	2,061.36
48	N 26° 54' 00\"	158
49	S 26° 50' 02\"	1,573.86
50	S 12° 58' 28\"	2,614.93
51	S 78° 17' 11\"	1,866.6
52	S 42° 14' 17\"	1,991.21
53	S 62° 16' 18\"	2,123.76
54	S 22° 16' 56\"	2,057.50
55	N 22° 53' 49\"	1,013.45
56	S 101° 22' 15\"	2,155.56
57	N 24° 18' 19\"	2,032.52
58	S 18° 18' 11\"	2,773.3
59	N 155° 11' 11\"	1,967.27
60	S 01° 44' 59\"	3,061.1
61	N 87° 59' 22\"	2,081.19
62	S 46° 20' 48\"	3,344.37
63	S 74° 25' 15\"	4,533.54
64	S 44° 58' 46\"	3,161.52
65	S 41° 08' 26\"	1,713.76
66	S 82° 46' 11\"	1,191.76
67	S 39° 10' 06\"	1,055.93
68	S 16° 11' 57\"	1,244.17
69	S 72° 18' 21\"	1,256.69
70	S 40° 30' 48\"	1,657.62
71	S 42° 39' 41\"	2,061.36
72	S 46° 34' 02\"	1,280.03
73	S 70° 09' 17\"	1,781.34
74	S 20° 18' 27\"	2,791.1
75	S 46° 15' 43\"	1,513.6
76	S 06° 40' 47\"	2,461.36
77	S 66° 48' 43\"	2,291.36
78	S 17° 52' 17\"	2,281.72
79	N 72° 54' 00\"	4,081.44
80	S 11° 37' 14\"	592.65
81	S 73° 29' 01\"	1,782.96
82	S 73° 11' 54\"	2,592.27
83	S 29° 49' 17\"	2,114.01
84	S 53° 16' 26\"	1,332.10
85	S 72° 18' 15\"	1,216.10
86	S 27° 18' 01\"	1,499.62
87	S 28° 10' 04\"	657.520
88	S 52° 14' 15\"	1,886.66
89	S 30° 21' 55\"	1,112.74
90	S 04° 14' 01\"	1,741.9

107	108	S 22° 10' 28\"	1,881.24
109	109	S 10° 19' 56\"	755.4
109	110	S 11° 51' 21\"	636.29
110	111	S 82° 51' 06\"	6,003.94
111	112	S 14° 44' 42\"	499.12
112	113	S 36° 50' 08\"	2,514.36
113	114	S 85° 50' 30\"	2,009.38
114	115	S 61° 04' 41\"	711.69
115	116	N 35° 29' 13\"	559.73
116	117	N 22° 13' 07\"	731.04
117	118	N 100° 35' 12\"	1,231.05
118	119	N 40° 05' 14\"	1,261.91
119	120	N 46° 50' 57\"	379.42
120	121	N 61° 26' 48\"	601.21
121	122	N 10° 55' 56\"	769.83
122	123	N 10° 18' 51\"	452.92
123	124	N 16° 09' 07\"	826.77
124	125	S 37° 21' 45\"	1,528.40
125	126	N 79° 01' 06\"	674.40
126	127	N 77° 01' 06\"	353.52
127	128	N 20° 51' 27\"	1,121.24
128	129	S 89° 17' 21\"	380.12
129	130	N 56° 18' 41\"	2,381.42
130	131	N 30° 31' 29\"	716.19
131	132	N 62° 59' 41\"	812.01
132	133	N 17° 01' 01\"	334.19
133	134	N 41° 01' 24\"	1,315.22
134	135	N 72° 35' 41\"	952.71
135	136	N 88° 09' 44\"	1,812.17
136	137	N 77° 11' 44\"	489.42
137	138	N 39° 09' 32\"	1,629.98
138	139	N 28° 04' 11\"	904.2
139	140	N 60° 25' 11\"	796.98
140	141	N 46° 06' 42\"	1,311.41
141	142	N 67° 14' 51\"	2,120.18
142	143	N 76° 26' 07\"	1,212.63
143	144	N 67° 22' 39\"	1,918.28
144	145	N 62° 14' 06\"	1,275.68
145	146	N 43° 48' 06\"	1,201.05
146	147	S 88° 16' 42\"	1,296.19
147	148	S 59° 29' 01\"	2,720.65
148	149	S 52° 42' 55\"	1,419.71
149	150	N 84° 04' 47\"	1,028.42
150	151	N 56° 20' 15\"	494.52
151	152	N 61° 04' 12\"	2,591.19
152	153	N 12° 49' 17\"	1,048.08
153	154	N 61° 01' 11\"	626.16
154	155	N 60° 26' 17\"	361.82
155	156	N 42° 53' 18\"	377.29
156	157	N 10° 51' 31\"	449.51
157	158	N 47° 50' 35\"	391.77
158	159	N 66° 21' 11\"	311.9
159	160	N 13° 57' 11\"	246.2
160	161	N 11° 40' 29\"	417.35
161	162	N 25° 57' 35\"	453.68
162	163	N 30° 19' 36\"	325.01
163	164	N 10° 51' 20\"	792.96
164	165	N 30° 49' 15\"	1,590.89
165	166	N 65° 09' 14\"	902.86
166	167	N 15° 08' 21\"	527.81
167	168	N 44° 20' 17\"	1,055.04
168	169	S 72° 19' 17\"	711.81
169	170	N 72° 40' 07\"	2,502.88
170	171	N 42° 55' 37\"	3,086.78
171	172	N 49° 24' 04\"	1,862.48
172	173	S 61° 29' 43\"	1,687.56
173	174	S 61° 12' 31\"	1,667.17
174	175	N 61° 59' 51\"	2,549.92
175	176	N 11° 41' 02\"	1,449.11
176	177	N 44° 58' 07\"	594.54
177	178	N 61° 14' 18\"	810.85
178	179	N 51° 43' 41\"	648.99
179	180	N 49° 26' 07\"	494.85
180	181	S 76° 18' 15\"	399.71
181	182	S 82° 51' 14\"	679.84
182	183	S 23° 02' 47\"	1,466.88

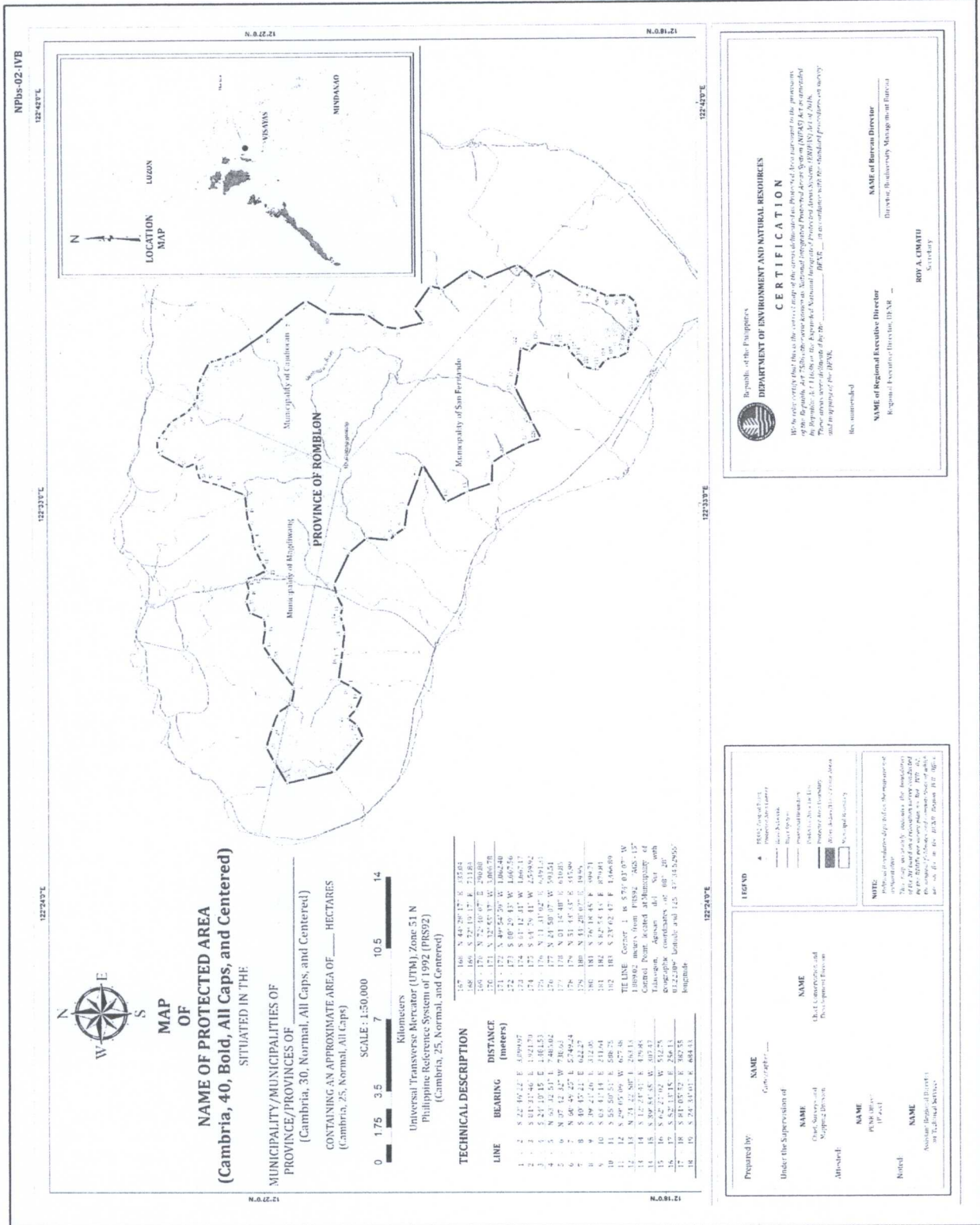
PP-1886 Center 1 is 874' 01\" W, 1,083' 12\" north from PRS2 - 263.15' Control Point located at Municipality of Tubogon Agawan del Sur with geographic coordinates of 90 28' 01.22\" E and 125 47' 14.52\" N



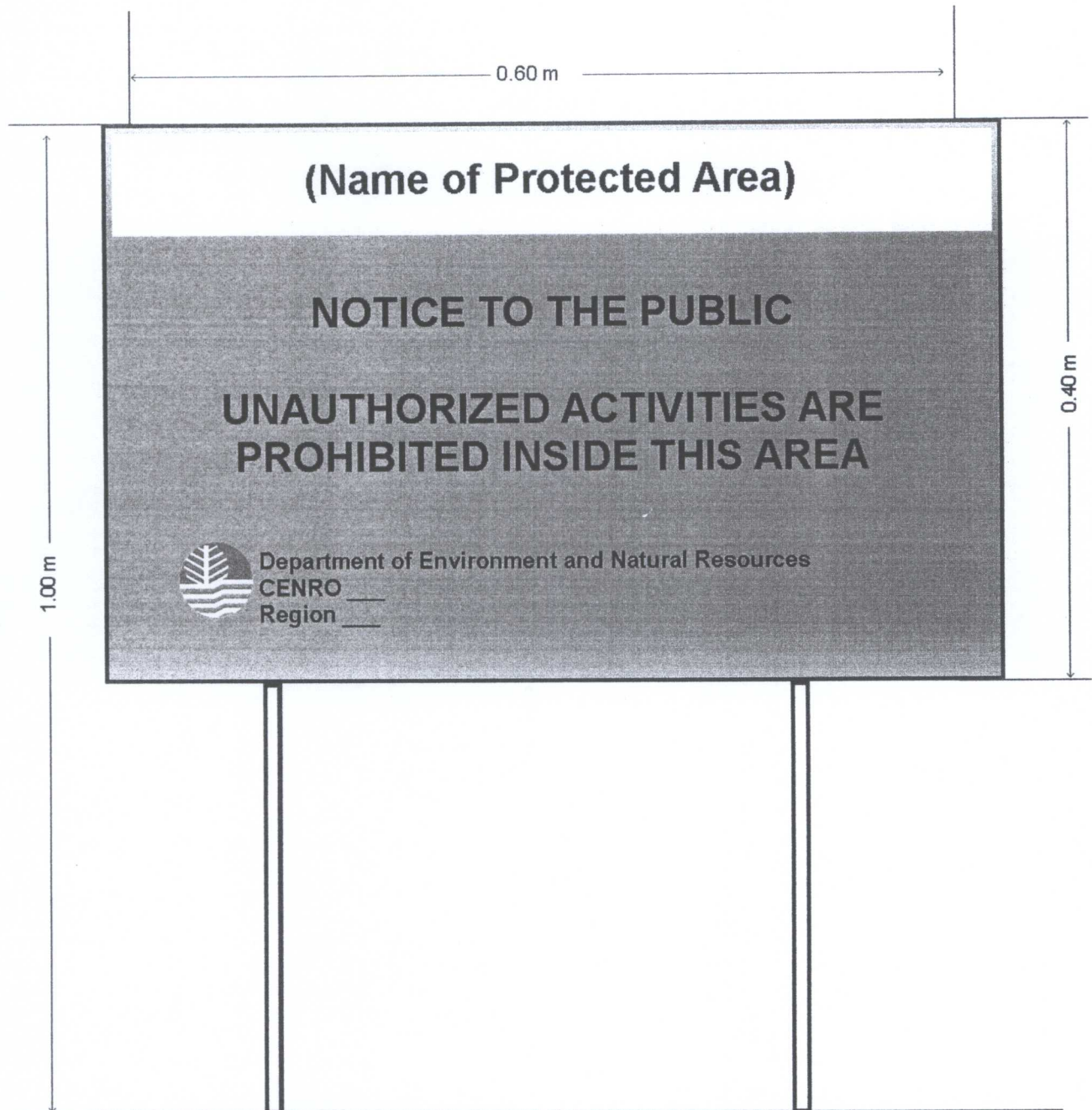
For areas lesser than 20,000 has.  
Portrait – 80.00 cm X 80.00 cm



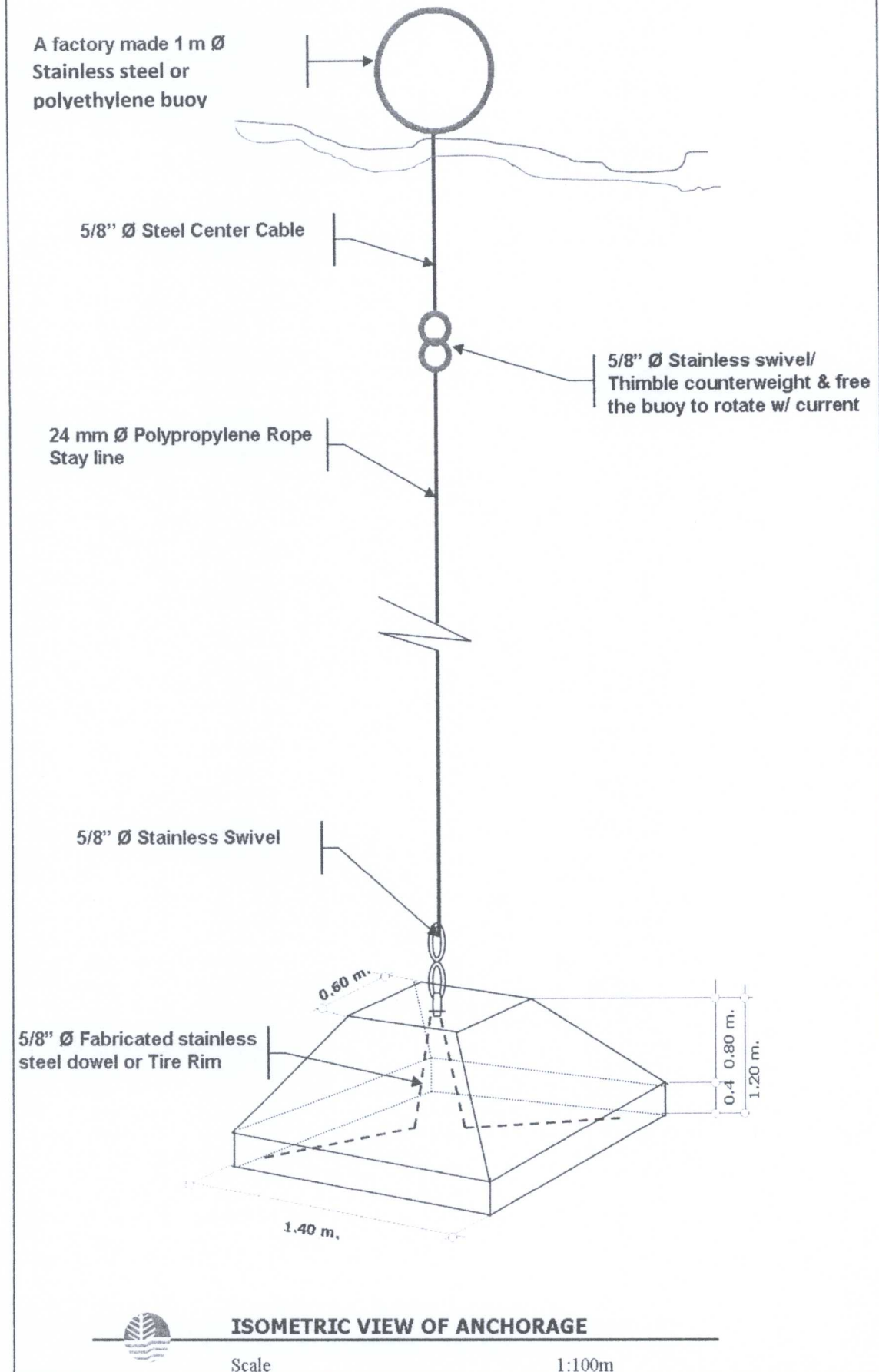
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Landscape – 100.00 cm X 80.00 cm



**INTERMEDIATE SIGNAGES/MARKERS  
FOR TERRESTRIAL PROTECTED AREAS**



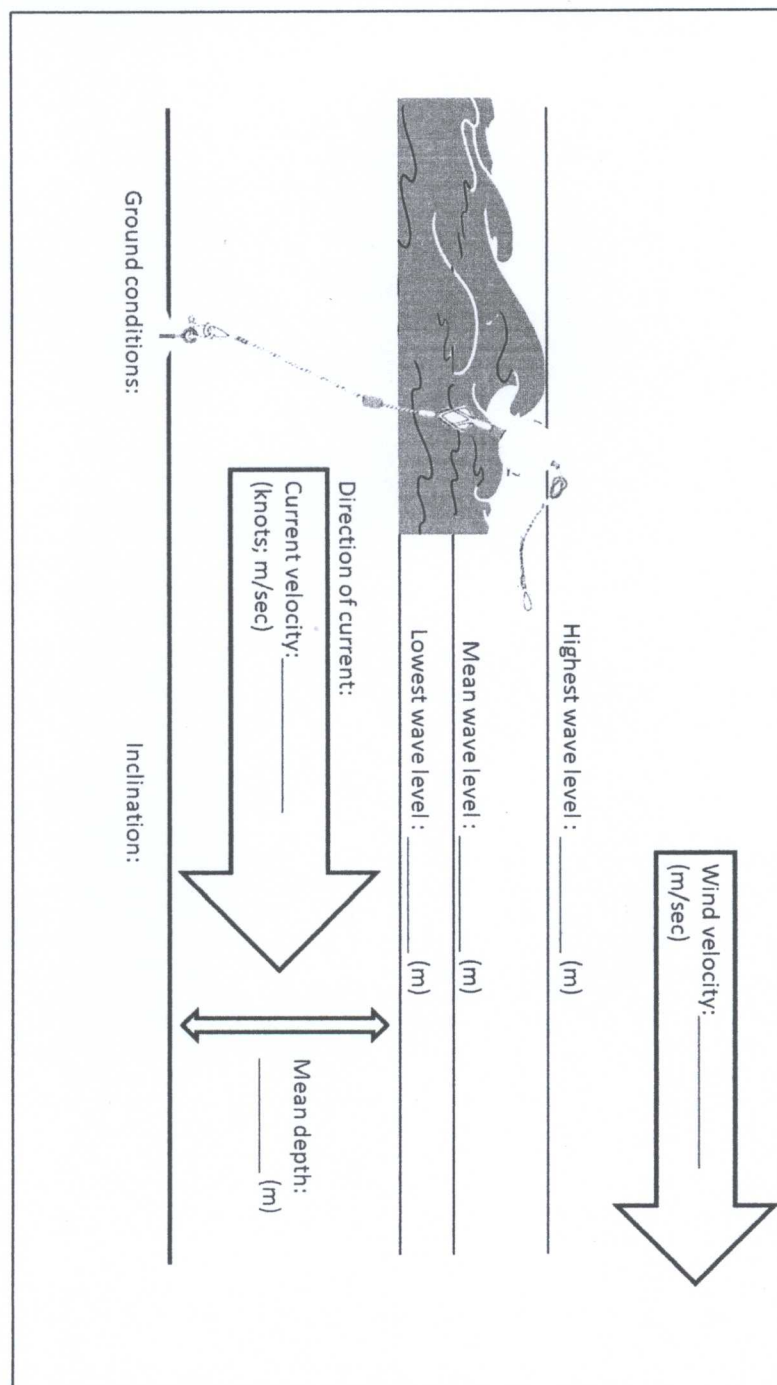
**PROPOSED BOUNDARY MARKERS  
FOR MARINE PROTECTED AREAS  
WITH 4 TONS CONCRETE SINKER**



## ANNEX G

### GUIDES IN SELECTING MOORING AND ANCHORING SYSTEMS

1. Location of Protected Area: *(Coordinates, Barangay, Municipality/City, Province, Region)*
2. Kind and size of watercraft/s being used: *(Motor boats, patrol boats, etc)*
3. Water depth;
4. Tidal range;
5. Ground conditions of the sea bottom;
6. Inclination of the sea bottom at the site;
7. Maximum wave height;
8. Maximum current at the site.
9. Wind velocity in the area;
10. Any other special equipment other than light and power system if required to be installed on the buoys. *(Such as radar reflectors, etc.)*

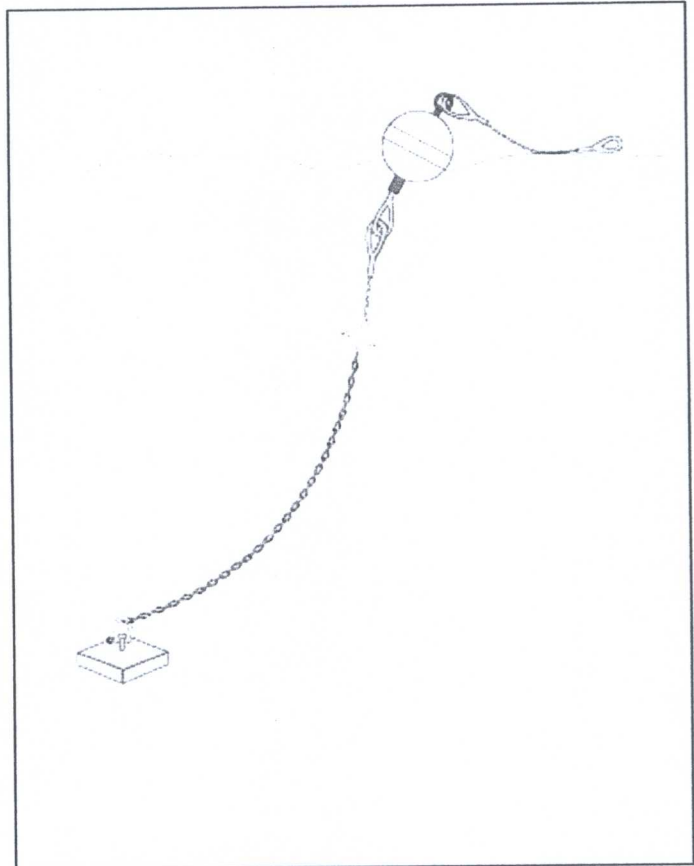


### TRADITIONAL MOORING SYSTEM

Traditional mooring systems typically consist of a floating buoy attached to a chain and heavy anchor, or a concrete block.

The block can be any heavy object sufficient to hold a boat. Most traditional mooring blocks are made from cast concrete shaped into a square pyramid, box, or drum. Metal rings are set into the concrete for attaching the anchor line.

The shape of the block depends on the holding conditions of the bottom. The holding power of any block not physically attached to the sea bottom is limited however, and dragging does occur.



### Anchoring Procedure:

Chain, rope, or polypropylene line can be used as an anchor line. Chain does not usually break and is difficult to cut. However, chain is heavy, difficult to transport, and can cause considerable structural damage to the bottom and sedimentation as it swings with the current. Rope is not as destructive as chain but can rot and break easily. The preferred anchor line, therefore, is made from polypropylene, material that is light, durable, and easily replaced if cut or lost.

To protect the line from chafing, splice a thimble (small metal strip) into each end of the line, or modifications can be adapted from the Halas system by splicing protective hose into the line. Attach one end of the line with a shackle to the mooring on the bottom. Attach the other end of the line to the bottom of the buoy at the water's surface. If rope or line is used as a down line, two rings should be set in the mooring block so that a replacement line can be attached before the other wears and breaks. Usually, a nylon line with greater flex than a polypropylene line is used as a down line. The length of rope or chain should be twice the depth of the water, with consideration given to local tide and sea conditions.

## ANNEX G.2

### HALAS ANCHORING SYSTEM

Halas mooring system consists of a stainless-steel eyebolt cemented into a hole drilled into the sea floor. A floating line shackled to the eyebolt extends to the surface and through a plastic buoy to a pickup line which attaches to the boat.

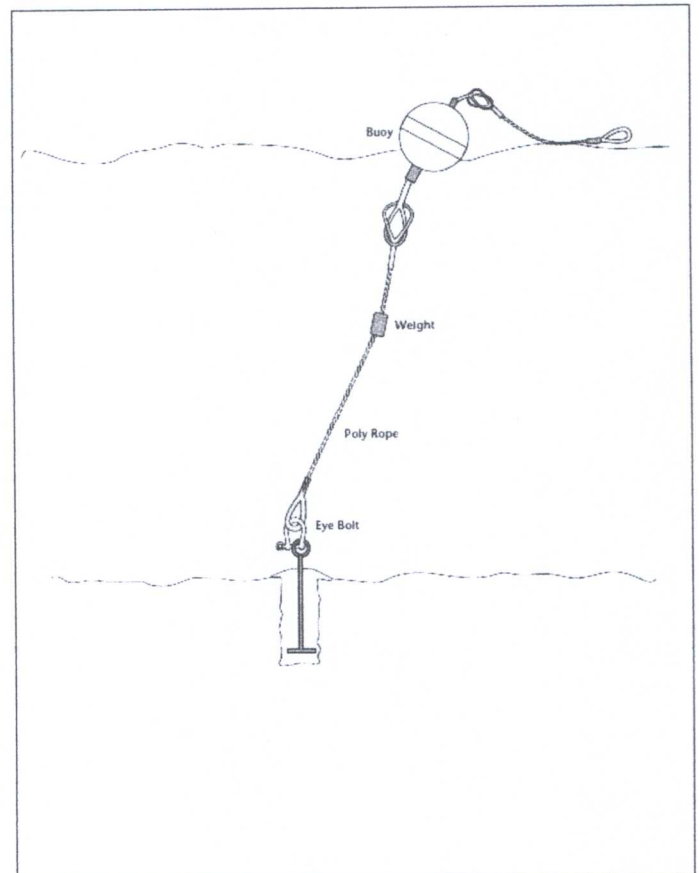
The Halas system is unique in that it uses a three-part rope system instead of one continuous rope. One line leads from the anchor pin at the bottom to the buoy at the surface. A second line runs through the buoy and is attached with a loop to the anchor line at one end, and at the other end is attached with a loop to the third pick-up line.

A three-part rope system eliminates need for shackles and thus decreases maintenance time and cost of the system.

#### Anchoring Procedure:

The key to success with the Halas system is locating proper substrate for drilling and cementing. The bottom substrate is what gives the system holding power. There are few known failures of individual components of the system, but have been cases of substrate failure where the entire cemented core has been pulled up and dragged across the bottom.

Flat, solid bedrock is the preferred substrate for the Halas system. Sand, coral rubble, or a combination of bottom types requires the manager to consider using alternative mooring systems, such as the Manta-Ray, in areas where the bottom will not hold a cemented eyebolt. Site selection must consider the surrounding area in addition to the bottom substrate.



**MANTA-RAY BUOY ANCHORING SYSTEM**

The Manta-Ray anchor is a utility pole anchoring system adapted for underwater use. Sea bottom characteristics dictate the type of anchor system used for mooring buoys. Whereas the Halas system require a hard bottom to drill a core and cement an anchor pin, the Manta-Ray anchoring system can be used in mixed bottoms of clay, sand, gravel, broken bedrock, and coral rubble.

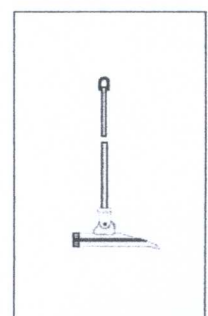
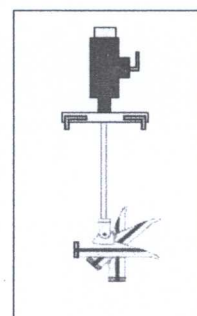
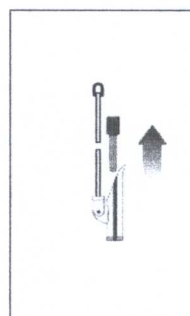
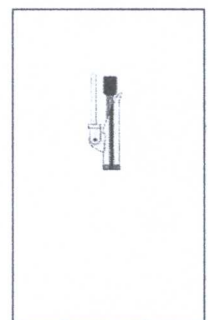
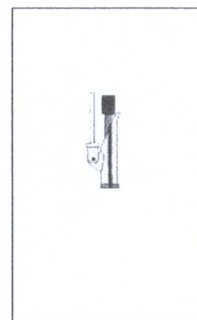
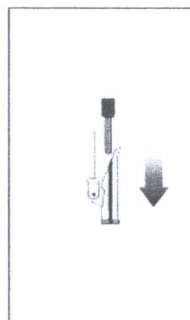
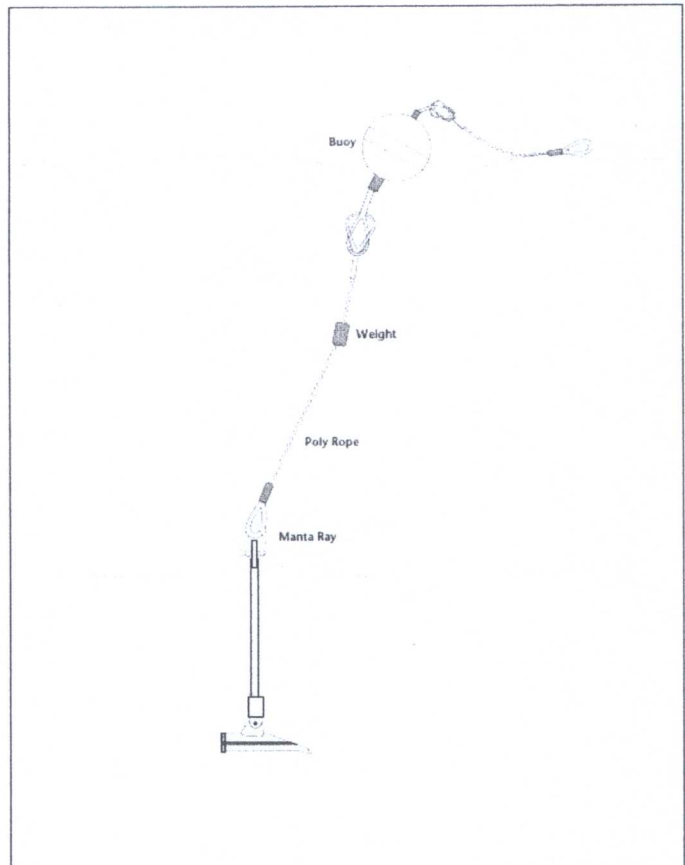
The Manta-Ray system consists of a utility anchor attached to an anchor rod that is driven under the sea bottom. A thimble eye nut is screwed into the end of the anchor rod for attachment of the buoy line.

**Anchoring Procedure:**

Anchor style and size installed depends on the sediment characteristics of the site. Probing the bottom prior to installation will give the operator an idea of the bottom conditions.

Lighter, smaller anchors are used in average sediment. The anchor should be driven deep enough that the anchor rod is not exposed above the bottom. Once the anchor and rod is in place the anchor is set and locked into a permanent position. To lock the anchor into place, an upward force must pull the anchor so that the anchor wing rotates and pivots into a locked position.

An anchor setting device, known as a load locker applies a force (measured in psi, (pound per square inch)) to put the anchor into locked position. An advantage of using a load locker to set the anchor is that the holding capacity of the anchor is immediately determined.





ANNEX G.4

The diagram shows a boat on the water surface. A current meter is suspended from the boat by a chain and is positioned in the water. A depth sounder is also suspended from the boat and is positioned in the water. The water surface is shown with waves. The boat is labeled with '1' and '2'.

Highest wave level : \_\_\_\_\_ (m)

Mean wave level : \_\_\_\_\_ (m)

Lowest wave level : \_\_\_\_\_ (m)

Direction of current:

Current velocity: \_\_\_\_\_  
(knots; m/sec)

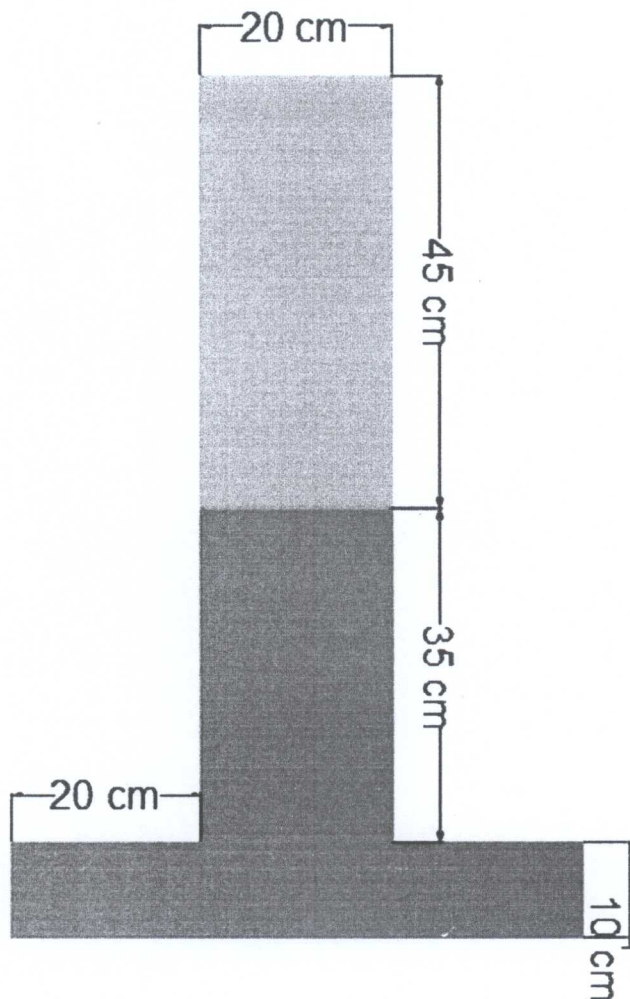
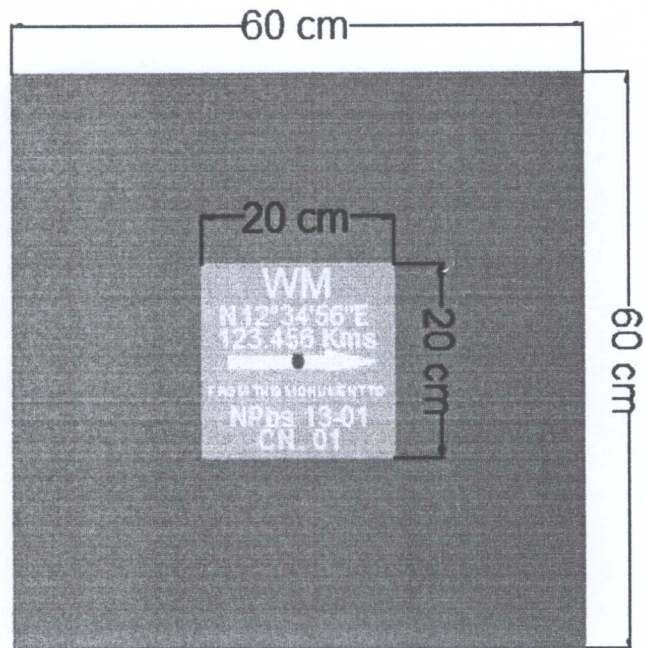
Mean depth: \_\_\_\_\_ (m)

Wind velocity: \_\_\_\_\_  
(m/sec)

Ground conditions: \_\_\_\_\_

Inclination: \_\_\_\_\_

WITNESS MONUMENTS



## ANNEX I

### COST ESTIMATES

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>I. PREPARATORY ACTIVITIES</b>			
<b>A. Team Organization</b>			
1. Technical Meeting and Supervision	6,400/meeting (20 pax)	38,000.00	per PA 5 technical meetings
<b>B. Procurement of Supplies &amp; Materials</b>			
1. Plotter Paper (36" x 150 yards) 3" core	3,000/Ream	4,000.00	
2. Plotter paper Matte (36" x 50 yards)	6,000/Ream	6,000.00	
3. Plotter ink (Black, Cyan, Yellow, Magenta)	6,000/color	25,000.00	
4. Other supplies and materials (pens, paper, etc.)	5,000	5,000.00	
<b>C. Communication, Education &amp; Public Awareness (CEPA)</b>			
1. Coordination and CEPA with LGUs (including representatives from brgy. And stakeholders inside the PA)	10,000/municipality	10,000.00	per municipality

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>II. GROUND SURVEY</b>			
<b>A. TEV</b>			
		7,000.00	per monument minimum of 2 monuments may be established in 1 day
1. One (1) Instrument Man (GE or Forester)	1,500/day	1,500.00	per day
2. Three (3) Survey Aide	1,500/day	4,500.00	per day
3. Ten (10) Laborers/haulers	800/day	8,000.00	per day
<b>B. CONVEYANCE</b>			
		5,000.00	per monument minimum of 2 monuments may be established in 1 day
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day
<b>III. MONUMENTING/DEMARCATING</b>			
		8,000.00	per monument
<b>A. TEV</b>			
		4,000.00	per monument minimum of 2 monuments may be established in 1 day
1. Ten (10) Laborers	800/day	8,000.00	per day
<b>B. MATERIALS</b>			
		4,000.00	per monument
1. One (1) bag of gravel	200/bag	200.00	per monument
2. Two (2) bags of white sand	200/bag	400.00	per monument
3. Cement	400/sack	400.00	per monument
4. ½ Plywood (1/2 inch tick)	2,000/plywood	1,000.00	per monument
5. 1 Kg. of common nails (#1, #2, #3)	200/kg	200.00	per monument
6. 2x2x8 good lumber	200/pc	500.00	per monument
7. 1 kg Gl/tie wire (#14)	100/kg	100.00	per monument
8. Four (4) pc of 10 mm steel bar	300/steel bar	1,200.00	per monument
<b>C. SIGNAGE</b>			
		8,000.00	per signage
1. Production and installation of signage	8,000/signage	8,000.00	per signage In between corners that are distant from one another (>250m); adjacent to threats and other land classification
<b>SURVEYING + MONUMENTING</b>		<b>20,000.00</b>	<b>per monument</b>

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>IV. Inspection, Verification, and Approval of Surveys (IVAS)</b>			
		3,625.00	per monument
<b>A. TEV</b>			
		1,125.00	per monument minimum of 4 monuments may be validated in 1 day
1. One (1) Geodetic Engineer	1,500/day	1,500.00	per day
2. One (1) Survey Aide	1,500/day	1,500.00	per day
3. One (1) Cartographer	1,500/day	1,500.00	per day
<b>B. CONVEYANCE</b>			
		2,500.00	per monument minimum of 4 monuments may be validated in 1 day
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day

### CAPITAL OUTLAY (per Region)

Equipment	Unit Cost	Total Cost
3 RTK	1,500,000	4,500,000
5 Total Station	250,000	1,250,000
Map plotter	600,000	600,000
	<b>2,350,000</b>	<b>6,350,000</b>

## ANNEX I.1

Unit Cost for PA Boundary Demarcation (Marine)					
Component	No.	Unit of Price Measure	Unit Price Rate/Day	Amount	Total
A. Fabrication of Concrete Sinker (Sub-Total)					23,550.80
A.1 Materials for Concrete Sinker					16,822.00
1. 16mm Reinforcement bars	11	pcs.	437	4,807.00	
2. Portland/Fortune cement	12	bags	250	3,000.00	
3. Mixed gravel & sand	3	cu.m.	500	1,500.00	
4. # 16 G.I. Tie wire	5	kls.	85	425	
5. 10 pcs. 2"x 2"x12" Lumber	40	bd.ft.	45	1,800.00	
6. Marine Plywood # 1/2"	3	pcs.	840	2,520.00	
7. 4" Common nail	3	kls.	85	255	
8. 3" Common nail	3	kls.	85	255	
9. 2" Common nail	2	kls.	85	170	
10. 1" Common nail	1	kl.	90	90	
11. Stainless Steel # 5/8" (dowel)	10	ft	200	2,000.00	
A.2 Construction/fabrication Cost		(40% of the Material Cost)			6,728.80
B. Estimate of stay line rope, cables and its accessories (Sub-Total)					67,500.00
1. Polypropylene rope 24 mm x 660 m	2	rolls	29,850.00	59,700.00	
2. Steel center Cable # 3/8"	75	feet	50	3,750.00	
3. Stainless Swivel # 5/8"	2	pieces	1,500.00	3,000.00	
4. Thimbles # 5/8"	2	pieces	150	300	
5. Cable Clips # 5/8"	5	pieces	150	750	
C. Estimate of factory made buoy (Sub-Total)					64,800.00
C.1 Materials for Marker Buoy					60,800.00
1. Factory Made 1 m Ø stainless steel spherical buoy	1	piece	55000	55,000.00	
2. Stainless Steel Rod # 3/4"	5	pieces	1000	5,000.00	
3. Stainless steel sheet #1/8" x 12" x 10"	4	pieces	200	800	
C.2 Labor Cost in connecting accessories					4,000.00
D. Installation Cost (Sub-Total)					20,000.00
<b>TOTAL COST</b>					<b>175,850.80</b>
<b>CONTINGENCY COST</b>					<b>75,000.00</b>
<b>TOTAL COST PER MARKER SET</b>					<b>250,000.00</b>



Republic of the Philippines

**Department of Environment and Natural Resources**

**BIODIVERSITY MANAGEMENT BUREAU**

Ninoy Aquino Parks and Wildlife Center

Quezon Avenue, Diliman, Quezon City

Tel. Nos.: (632) 924-6031 to 35 Fax: (632) 924-0109, (632) 920-4417

Website: <http://www.bmb.gov.ph> E-mail: [bmb@bmb.gov.ph](mailto:bmb@bmb.gov.ph)

## MEMORANDUM

FOR : The OIC, Assistant Secretary for Staff Bureaus and  
Director in Concurrent Capacity

THRU : The OIC, Assistant Director/  
Chair, Technical Review Committee

FROM : The Chief, National Parks Division

SUBJECT : **DRAFT TECHNICAL BULLETIN ON CLARIFYING THE  
GUIDELINES AND PROCEDURES IN THE DEMARCATION OF  
BOUNDARIES OF LEGISLATED PROTECTED AREAS UNDER  
THE NATIONAL INTEGRATED PROTECTED AREAS SYSTEM  
(NIPAS)**

We are pleased to submit the enclosed draft Technical Bulletin on Clarifying the Guidelines and Procedures in the Demarcation of Boundaries of Legislated Protected Areas under the NIPAS. Kindly be informed that the comments and recommendations of Geodetic Engineers in the Philippines, Inc. (GEPI), Land Management Bureau (LMB), National Mapping and Resource Information Authority (NAMRIA) and Coastal and Marine Division (CMD) of this Bureau were already solicited and have been integrated in the current draft based on the discussions during the meetings held on 11 June 2019 and 27 June 2019.

For review/consideration and approval.

  
**MERIDEN E. MARANAN**

**TECHNICAL BULLETIN**  
**No. 2019 - \_\_\_\_\_**

**SUBJECT : CLARIFYING THE GUIDELINES AND PROCEDURES IN THE DEMARCATION OF BOUNDARIES OF LEGISLATED PROTECTED AREAS UNDER THE NATIONAL INTEGRATED PROTECTED AREAS SYSTEM (NIPAS)**

Pursuant to Section 4, Article XII of the 1987 Philippine Constitution, Section 5 of Republic Act No. 7586 or the National Integrated Protected Areas System (NIPAS) Act of 1992, as amended by R.A. 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018, and DENR Administrative Order No. 2019-05 or the Implementing Rules and Regulations (IRR) of the NIPAS Act, this Technical Bulletin is hereby issued for the guidance of all concerned.

**Section 1. Objective.** This Bulletin provides the specific guidelines and procedures for the survey and demarcation of boundaries of all legislated protected areas under the NIPAS.

**Section 2. Scope and Coverage.** This Bulletin shall apply to all legislated protected areas pursuant to the NIPAS Act, as amended by the ENIPAS Act of 2018 and other protected areas with specific legislations.

**Section 3. Definition of Terms.** As used in this Technical Bulletin, the following terms shall mean as defined hereunder:

1. Boundary markers - the monuments and markings such as concrete monuments, buoys or natural markers such as deciduous trees, big rocks/stones and the likes installed and painted to identify the corners of protected areas as described in the legislation;
2. Demarcation - the establishment of the boundaries of legislated protected areas using visible markers, monuments, buoys in case of marine areas, and known natural features or landmarks, among others, as a result of the actual ground delineation;
3. Digital Platform - geospatial software that is designed to capture, store, manipulate, analyze, manage and present all types of geographical data;
4. Final map - map generated from the relocation and demarcation of boundaries of protected areas as provided in the legislation using a scale of 1 :50,000, or which may vary according to the size of the protected area;
5. Mooring Buoy - a type of buoy that is designed in a manner that there is a heavier weight located right in the bottom of the sea or anchored on an appropriate manner;
6. Preliminary map - initial map generated out of the technical description prescribed in the legislations prior to the actual boundary relocation;
7. Strategic Places - vantage points adjacent to local communities, traverse in riverbanks and streams, roadsides and entry points where monitoring of



illegal activities can take place.

8. Witness Monument - a monument indicating the appropriate survey symbols established along stable or non-ambulatory shorelines/river banks at the low tide level for corners that fall into the sea or any bodies of water that cannot be marked with regular monuments.

**Section 4. Installation of Monuments and/or Markers.** The demarcation of boundaries shall involve the actual relocation of corners and installation of concrete monuments and other prominent physical landmarks or features of the protected area to ensure its integrity from threats, deter other illegal activities and facilitate enforcement and monitoring.

The demarcation of boundaries shall involve the following:


*4.1 Preparatory Phase.* Prior to the conduct of the actual ground survey, the following activities shall be undertaken:

- 4.1.1 Prepare the preliminary map based on the technical description provided in RA 11038 or other specific legislations of protected areas. This will be used as reference for the actual boundary demarcation.
- 4.1.2 Conduct meeting of the Regional Delineation and Demarcation Committee (RDDC) together with the Regional Delineation and Demarcation Team (RDDT) to present the preliminary map and to provide technical guidance in preparation for the actual demarcation activities; and
- 4.1.3 Conduct coordination meetings and Communication, Education and Public Awareness (CEPA) involving the concerned municipalities and key stakeholders within the protected area.

The demarcation survey shall be conducted with prior written notice to the affected communities to be posted in the Barangay and Municipal Halls. The concerned Barangay and Municipal Officials shall be responsible for informing their constituents on this matter. The said survey shall commence not earlier than five (5) days upon receipt of such notice. If there are nearby or adjacent on-going survey projects, the Head of the Team/Party executing said survey shall be informed in writing for purposes of work coordination in consonance with Sec. 165.b, DENR Memorandum Circular No. 2010-13, the Manual on Land Survey Procedures.

The demarcation survey shall be undertaken in the same manner as an isolated survey pursuant to Sec. 165.c, DMC 2010-13.

The survey shall be at least in the 4th Order Accuracy. The existing corner points of titled/decreed properties and those areas covered by previously approved surveys within and along the perimeter should be observed for connection and checking purposes pursuant to Sec. 165.d, DMC 2010-13.



**4.2 Implementation Phase.** The following steps shall be undertaken in the actual demarcation of PA boundaries:

- 4.2.1 Relocate on the ground the corners of the protected area using the preliminary map based on the technical description as provided in the Congressional Act. The lines and corners of the protected area shall be compliant with the Philippine Reference System of 1992 (PRS92) pursuant to E.O. 45 as amended by E.O. 280 and 321. The conduct of demarcation of PA boundaries shall be consistent with the DENR Administrative Order No. 2007-29 also known as the Revised Regulations on Land Surveys and DENR Memorandum Circular No. 2010-13. Process flow of the relocation survey of NIPAS boundaries as shown in **Annex A**.
- 4.2.2 The corners shall be marked with monuments and appropriate markers in accordance with the prescribed design and specification provided for in **Annex B**. In between corners, signage/markers must be installed in strategic places and/or every 250 m, if necessary.
- 4.2.3 For terrestrial protected areas, three (3) strips (quincunx) of suitable and fruit/flowering endemic tree species shall be planted along the boundary lines in between concrete monuments with spacing of 4 m x 4 m as illustrated in **Annex C**;
- 4.2.4 Physical markers such as buoys or floating signage aid in the management interventions, navigation and enforcement within MPAs. However, in some areas where physical demarcation may not be practically applicable due to external factors, boundaries should be demarcated on a digital platform. Generated geographical information shall then be submitted to NAMRIA for its integration on charted maps such as nautical charts;
- 4.2.5 On digitally demarcated MPAs, two witness monuments shall be established in a stable and non-ambulatory location on the nearest terrestrial feature adjacent to the demarcated area. Bearing and distance from the boundary corner shall be legibly and properly marked on each monument;
- 4.2.6 Use of precise survey instruments, marine navigational tools and other survey instruments as prescribed by the Land Management Bureau in all surveys;
- 4.2.7 Observations and information gathered during the field activities shall be recorded in the survey returns and form part of the final report of the RDDTs;
- 4.2.8 Corners that fall within settlements/communities should be duly noted and their exact location, marked on the ground and on the map;
- 4.2.9 The participation of representatives from the local communities especially those that will be affected by such activity will be encouraged during the



conduct of the actual boundary demarcation; and

4.3 The following, unless otherwise stated, shall be done in the LMB prescribed forms and shall be included in the submission of survey returns in consonance with Sec. 184, DMC 2010-13:

4.3.1 References and Technical Documents:

4.3.1.1 GPS Field Sheets;

4.3.1.2 Approved Geographic Position of Reference Points;

4.3.1.3 Final List of Position;

4.3.1.4 Grid Distance Computation;

4.3.1.5 Monument Description Sheet(s); and

4.3.1.6 Location Monument Recovery Report

4.3.2 Digital and hard copy of maps printed in mylar drafting film;

4.4 Inspection, Verification and Approval of Surveys (IVAS). The Regional Survey and Mapping Division (RSMD) shall verify the correctness and technical accuracy of the survey returns covering national parks/protected areas boundary. The process of PA IVAS shall be done within the Land Administration and Management System (LAMS), the DENR computer-based verification of Survey Plans. The inspection, verification and approval of surveys shall be in accordance with DMC 2010-13;

Criteria and requirements in the undertaking of IVAS are as follows:

- a. Two survey controls, *at least 200 meters apart* shall be established on stable ground near the approximate location of every boundary monument to be constructed.
- b. The positions of the survey controls near the boundary corners locations shall be established using survey grade dual frequency GPS/GNSS Satellite Receivers with reference to existing NAMRIA PRS92 survey controls within or near the project site by using uniform coordinate system.
- c. The survey controls shall be at least of 4<sup>th</sup> order accuracy.
- d. Two witness monuments shall be established in a stable location for every corner boundary location that falls within the creek, river or body of water.
- e. The bearing and distance from each witness monument to the boundary corner location shall be legibly and properly marked on each witness monument.
- f. The coordinate system of the boundary corners shall be with same

system of the established survey controls prior to the setting of boundary monuments.


- g. The boundary corner location shall be set and checked using the established survey controls near each boundary location. One of the two survey controls shall be used for stake-out while the other survey control shall be used for checking.
- h. All surveying and mapping activities shall be with reference to R.A.8560 otherwise known as the Philippine Geodetic Engineering Act of 1988 and the latest revised Manual of Land Surveying in the Philippines.

#### 4.5 Approval Phase.

- 4.5.1 The final map of the protected area shall be prepared in accordance to the template provided in **Annex D**;
- 4.5.2 The RDDT shall submit the map for further review by the RDDC through the PASu and the Conservation and Development Division Chief of the Regional Office for further review and endorsement to the National Delineation and Demarcation Committee (NDDC);
- 4.5.3 The Regional Executive Director (RED), as Chair of the RDDC, shall certify the correctness and authenticity of the map. The RED shall sign and endorse the said map to the Secretary through the NDDC Chair, Undersecretary for Field Operations and BMB for final approval;
- 4.5.4 The DENR Secretary shall inform the Congress of any proposed amendment to the law of the concerned PA; and
- 4.5.5 The copy of the approved PA map shall also be furnished to the Chief, Survey and Mapping Division (SMD) of the DENR Regional Offices for updating of LAMS.

**Section 5. Standard Design and Specifications of Boundary Markers.** Permanent markers such as monuments, buoys and alternative markers shall be installed using the standard design and specifications as provided herein:

#### 5.1 For Terrestrial Protected Areas

- 5.1.1 Concrete monuments shall have a minimum dimension of 20.00 cm x 20.00 cm x 90.00 cm. The materials to be used shall be Class A (1:2:4) concrete, longitudinally reinforced with four 10.00 mm diameter standard deformed steel bar, properly embedded on the four corners. A footing of 20 cm on all sides of the monument and 10 cm high starting from the base of the monument shall be included.
  - 5.1.2 The boundary markers shall bear the letters "NPbs" which means "National Park boundary survey"; respective Regional Number i.e. "13"; Map Number i.e. "01"; and the corner numbers "CN. \_" engraved at the center on top and front of the monuments. The letter should be 05.00 cm high in arial font and the "corner number" in 2.5 cm diameter
- 

buoyancy that may limit the size or amount of line and/or chain being used in the mooring in deep water. The type of buoy hull will also determine the mooring component sizes through strength requirements; larger hulls exert a greater load on the mooring and thus require greater mooring strength, which is essentially accomplished through component size increases;

5.2.1.5 **Special Considerations:** Special consideration would include proximity to sea lanes or fishing areas. If located on shipping lanes, the buoy hull may have to be reduced in order to keep the buoy clear from possible collisions.

5.2.2 If the corner points are located on the sea or in any water body, the use of red factory made stainless spherical buoys with 30.48 cm minimum diameter can be used, provided, that the letters "NPbs" (5.00 cm high, Arial font) and the corner number (1cm) are engraved on a metal plate resistant to seawater and firmly attached at the top. The said buoys with sinker should be properly chained and anchored. However, damage to under water resources such as corals, sea grasses, and the likes should be avoided. A solar powered blinker maybe attached to the buoy. The geographic coordinates of each corner marked by buoys should be recorded. Illustration of boundary markers for marine protected areas is hereto attached as **Annex F**.

5.2.3 Environmental conditions must be factored in with the selection of the mooring system to be used. The type of anchoring and buoy must be compatible with the environmental conditions of the area. Types of buoy systems that may be used for different substrate is hereto attached as **Annex G**.

5.2.4 In cases wherein the corner cannot be practically demarcated, two witness monuments shall be established, with its dimensions the same as the corner monuments. However, the inscriptions shall be replaced by the letters "WM" to signify its purpose as witness monument. WM shall be engraved at the top with a height of 3 cm using Arial font, followed by the bearing and distance from the monument to the corner of the PA with a height of 2 cm, using Arial font. The phrase "from this monument to" should be 1 cm high in Arial font and "NPbs" followed by the region number and its corresponding map number. The letters "C.N." should be followed by the corner number 2 cm high in Arial font. The center of which shall be marked by a circle with a radius of 0.5 cm, and an arrow pointing to the direction of the corner of the PA. The directions of these two witness monuments shall make an intersection where the true location of the corner lies as illustrated in **Annex H**.

5.2.5 All corners and important natural and man-made features shall be noted and recorded.



(Corner No. 1). The said monuments should be installed vertically and as accurately as possible where the corner points of the protected area are located on the ground. The monument shall be implanted 45.00 cm deep on the ground.

5.1.3 The signage/markers shall be installed in built-up areas and strategic places in every 250 m along the boundary. These shall have the markings as provided for in DAO No. 2009-09 dated August 20, 2009, and should be stated in English and in the local dialect as shown in **Annex E**.

5.1.4 Should there be corners located in spots where the use of concrete monuments are not applicable, permanent features on the ground such as boulders or rock surfaces, with an exposed surface of at least one (1) meter, can serve as alternative markers. They shall be marked with the Corner Number (CN), the letter "NPbs" and the Survey Plan Number. The font size of which is 10.00 cm arial font. These shall be painted red with at least three (3) coatings. A 15 cm x 15 cm square box shall also be painted with the same paint and coatings to enclose the markings and the corner number at its center. The geographic coordinates of each corner should be recorded.

5.1.5 Large deciduous trees with at least one (1) meter in diameter at breast height (DBH) may also be used as an alternative marker.

## 5.2 For Marine Protected Areas


5.2.1 Mooring systems to be used for a particular MPA will be determined by the system considerations and the site location. Such considerations are as follows:

5.2.1.1 **Water depth:** This shall be the main consideration in determining which particular mooring system can be used for a given site. This information is usually obtained from a nautical chart for design purposes and then verified on scene during ground validation.

5.2.1.2 **Current:** Surface current and deep ocean currents must also be taken into consideration in determining whether the area is suitable for physical demarcation. Further, currents must also be factored in to determine the appropriate materials and anchoring systems to be used.

5.2.1.3 **Bottom Conditions:** The type of bottom may also be of concern to the type of mooring and anchoring system. In MPAs with coralline substrate, a special anchoring system may be required in order not to damage the ecosystem present in the area.

5.2.1.4 **Buoy hull:** The designation of a particular hull for a selected mooring site will aid in determining which mooring system should be used. Smaller hulls have limited



**Section 6. Demarcation of Previously Legislated Protected Areas.** The Regional Office shall review demarcation activities undertaken for previously legislated protected areas and ensure that herein guidelines are complied with accordingly.

**Section 7. Implementation Mechanism.** The NDDC created pursuant to DAO 2015-10 shall oversee the implementation of the demarcation activities.

The Regional Office shall issue corresponding Regional Special Order creating the RDDC and the RDDT, the functions of which are provided in DAO 2015-10.

The conduct of the survey shall only proceed after the enactment of the corresponding law by Congress adopting the final report of the RDDT as a result of their assessment/delineation of forestland boundary pursuant to DAO No. 2008-24 in consonance with Sec. 163, DENR Memorandum Circular No. 2010-13.


If the survey shall be undertaken through administration, the Survey Party shall be composed of Geodetic Engineers of the Regional Composite Survey Team (RCST) created pursuant to DENR Administrative Order No. 2005-13, Revised Guidelines for the Implementation of the Philippine Reference System of 1992 (PRS92) and at least two (2) members of the RDDT in accordance with Sec. 164, DMC 2010-13.

**Section 8. Budget Allocation.** Funds for the demarcation of protected areas shall be included in the regular budgetary allocation of the DENR. Additional funds may be sourced from other funding institutions.

Cost estimates for the conduct of demarcation activities are provided in **Annex I**.

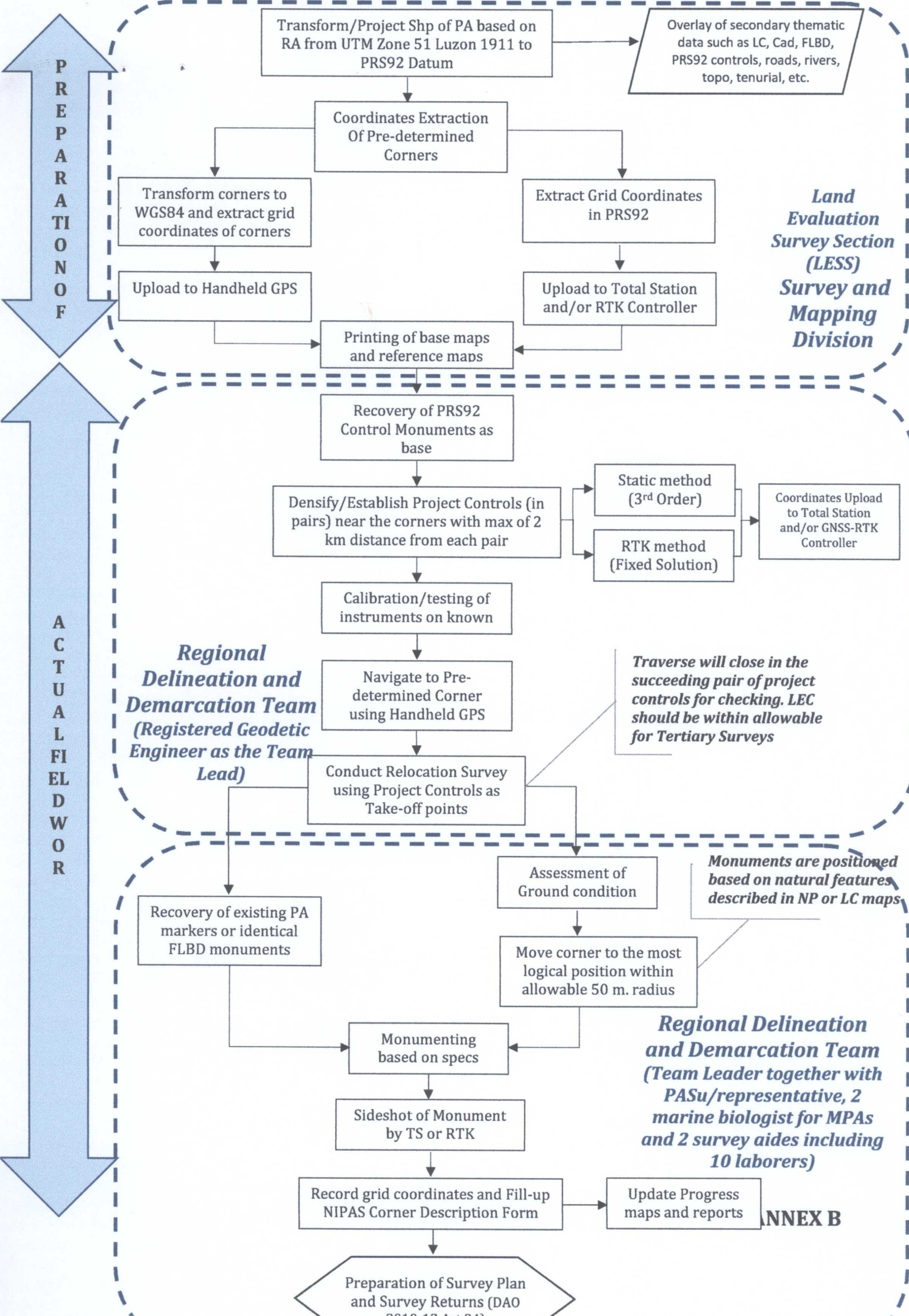
**Section 9. Monitoring and Evaluation.** The Regional Office together with the Protected Area Management Board shall regularly monitor the installed monuments/markers to ensure their maintenance.

**Section 10. Effectivity.** This Technical Bulletin shall take effect immediately and shall be circulated for the information and guidance of all concerned.

  
**RICARDO L. CALDERON**  
OIC, Assistant Secretary for Staff Bureaus and  
Director in concurrent capacity

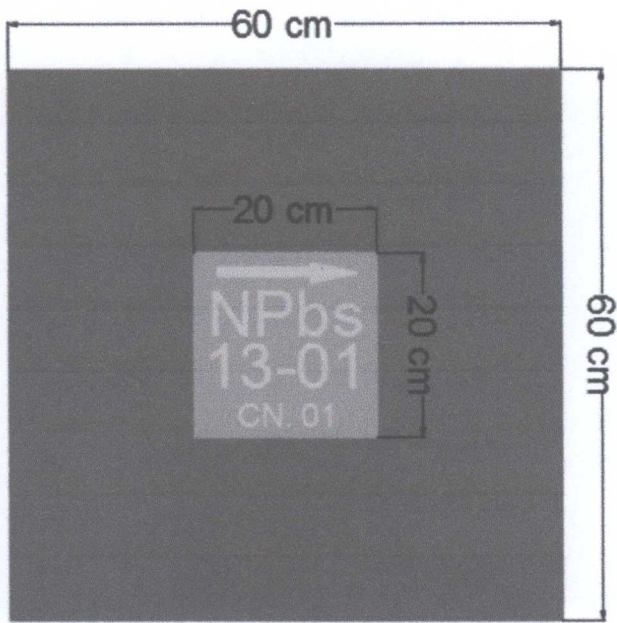


**RELOCATION SURVEY OF NIPAS BOUNDARIES**

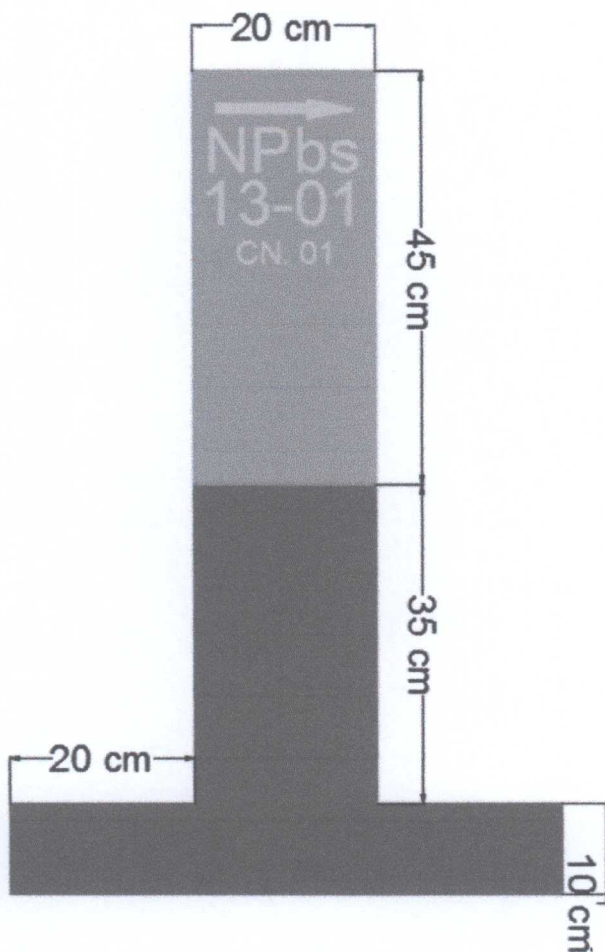


Preparation of Survey Plan and Survey Returns (DAO 2010 12 14 2011)

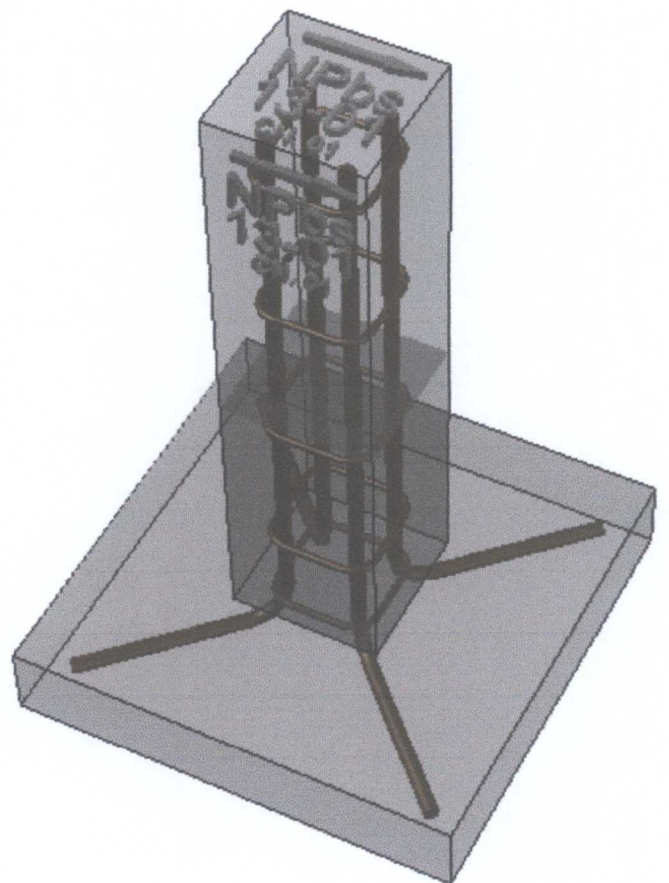
PROPOSED BOUNDARY MARKERS FOR  
TERRESTRIAL PROTECTED AREAS



TOP VIEW

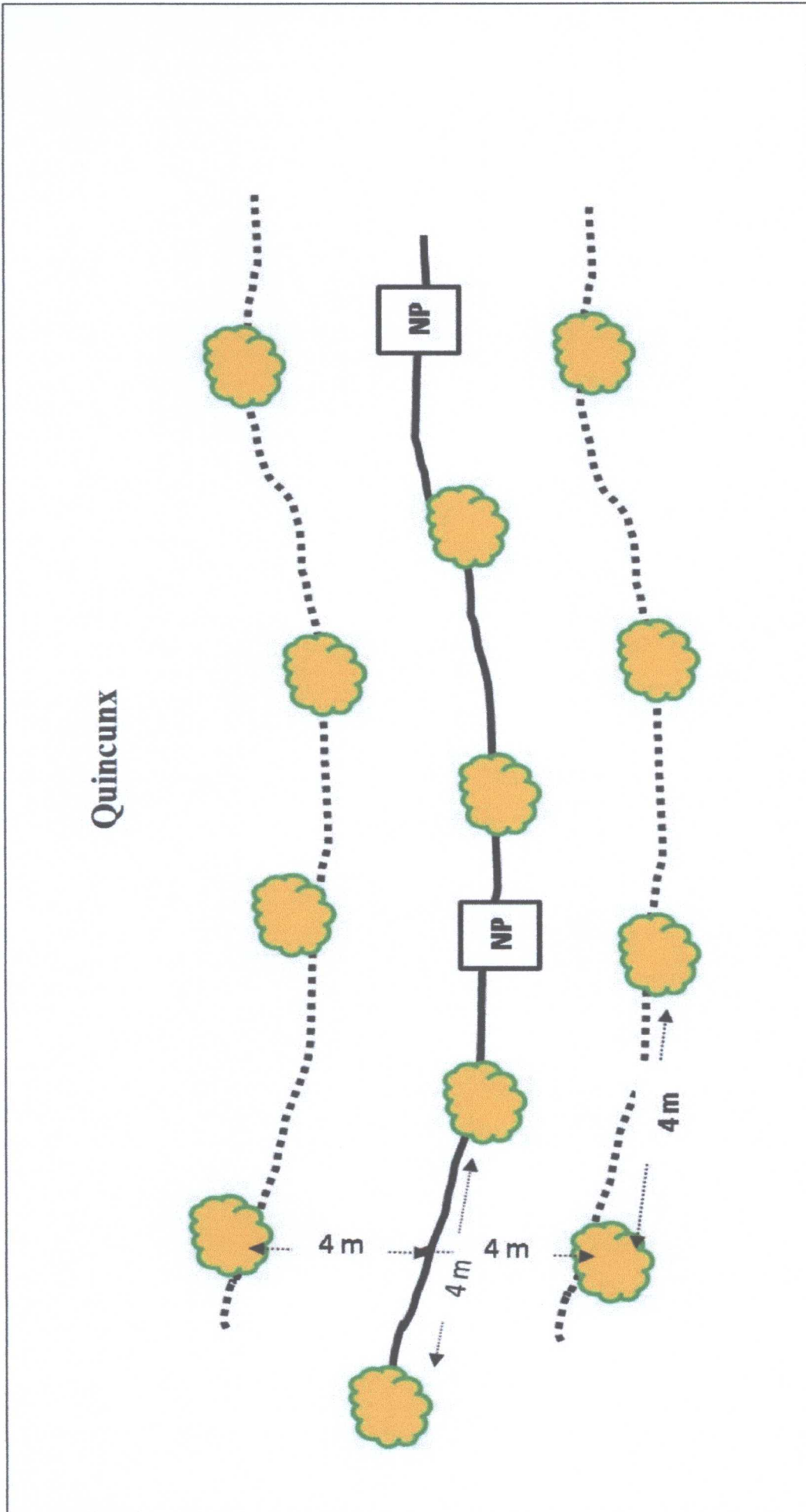


FRONT VIEW



ISOMETRIC VIEW

Quincunx





## MAP LAY OUT FOR NATIONAL PARKS

1. Paper : Mylar: HP Matte Film  
Film polyester transparent  
36 in. X 125 ft., 160 g/m<sup>2</sup>  
*(www.hp.com/go/designjet/supplies)*
2. Map Layout Size : **For areas 20,000 has. and above:**  
Portrait – 84.1 cm X 118.88 cm  
Landscape – 118.88 cm X 84.1 cm  
**For areas lesser than 20,000 has.:**  
Portrait – 80.00 cm X 80.00 cm  
Landscape – 100.00 cm X 80.00 cm
3. Map Layout Orientation : Portrait  
Landscape
- Note: Orientation of map layout would depend also in the orientation of the protected area.*
4. Title, Location and Area Protected : Title should specify the name of the  
Area as per Legislation (e.g. Agusan Marsh Wildlife Sanctuary).  
Location should specify the municipality/municipalities and or city/cities, as well as province/provinces covering the protected area.  
Indicate the area of the protected area as indicated in the legislation.
5. Spatial Information use : Scale: For areas of 20,000 hectares and above, the scale of 1:50,000. For areas less than 20,000 hectares, use an appropriate scale which will show the whole coverage of the protected area on the map while maintaining it's aesthetic.  
Datum: Philippine reference System of 1992 (PRS92)  
Projection: Universal Transverse Mercator (UTM) Zone 51 N
- Note: Scale values should be rounded of.*

6. Technical Description : Present the complete and detailed technical description showing the Bearing (in Degrees, Minutes, and Seconds), the Direction (i.e. NE, SW, SE and others), and Distance (in meters).
- Indicate also the control/tie point (in PRS92) with its corresponding PRS92 number together with the location and its corresponding geographic coordinates (in Latitude and Longitude).
7. Map Features features : Reflect in the map all natural and physical such as roads, rivers and or creeks, lakes, caves, islands, islets, mountain peaks, and among others with proper label/labels based on available data and information (i.e. topo maps; google earth; and among others).
- Note: Head waters and river systems, must be identified if possible, this is in relation to the Presidential directive during the 36<sup>th</sup> Cabinet Meeting on 01 April 2019 for the short and long term solutions for El Niño and La Niña Phenomena.*
8. Disclaimer Statement : Use this statement:
- NOTE:**  
*Political Boundaries depicted on the map are not authoritative.*
- This map accurately indicates the boundaries of the National Park based on a relocation survey conducted by the RDDTs per survey plan no. Rel-13-01, the original field notes and computations of which are on file in the DENR Region 13 Office.*
9. Map Number particular : The Map Number is the code assigned to a protected area in order to differentiate it from the other protected area maps. This will include the National Parks boundary survey (i.e. **NPbs**); then **13** stands for DENR Region 13; the serial number of the map (**01** = numbering of NP map should be in sequence and in order of its legislation), and to read as "**NPbs-13-01**"
- Note: for numerous PAs established in one legislation in a certain Region, the arrangement of numbering would be in alphabetical order of the names of the protected areas.*

10. Legend to : This is a table or chart included on a map indicate the meaning of the map's varied symbols such as rivers, creeks, road, trails, islands, islets, caves, geological forms and among others.

To include the base map of Defense Mapping of America (DMA) topographic map used within the coverage of the protected area.

11. Location Map the : This is the diagrammatic representation of location of the National Park in relation to the whole Regional area of jurisdiction in the Philippines.

**Note: Highlight the Regional coverage to include provincial boundaries.**

12. Certification : Use this statement:

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11038 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018.

These areas were delineated by the \_\_\_\_\_, DENR \_\_ in accordance with the standard procedures on survey and mapping of the DENR.

Specify date of approval of the map.

The certification is recommended by the Regional Executive Director of the DENR Field Office; Director of Biodiversity Management Bureau and the DENR Secretary.

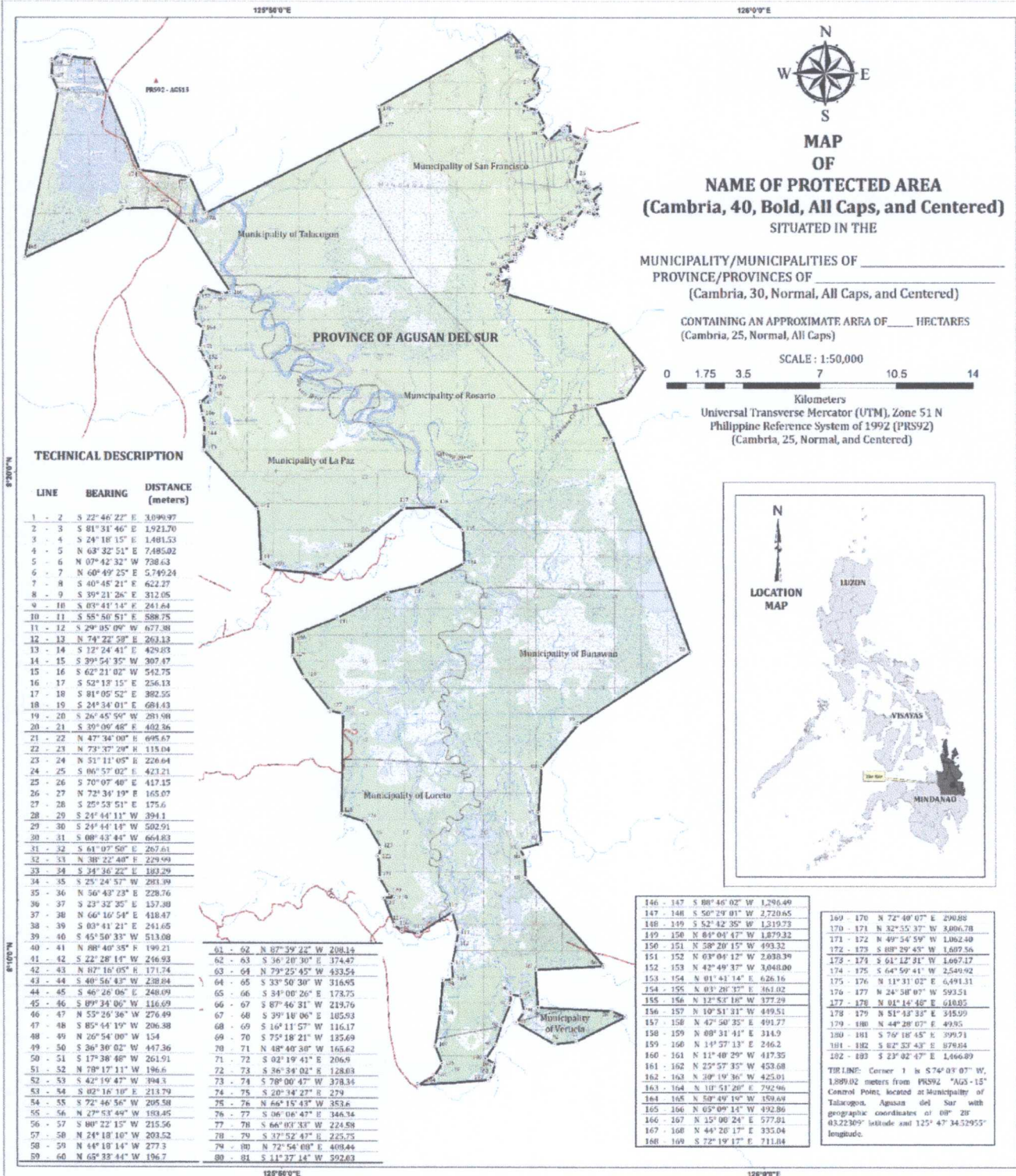
13. Signatories would : Signatories for the Regional Field Office

include the Cartographer (with GIS capability) who prepares the map layout; under the supervision of the Chiefs, Surveys and Mapping Division and Conservation and Development Division; Attested by the PENR Officer with initial from the CENRO; and Noted by the Assistant Regional Director for Technical Services.

# ANNEX D.1

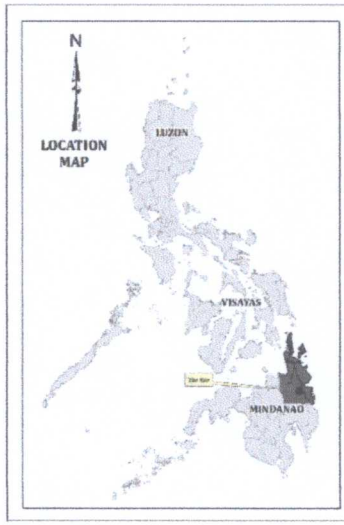
For areas 20,000 has. and above  
Portrait - 84.1 cm X 118.88 cm

NPbs-13-01



### TECHNICAL DESCRIPTION

LINE	BEARING	DISTANCE (meters)
1 - 2	S 22° 46' 22" E	3,099.97
2 - 3	S 81° 31' 46" E	1,923.70
3 - 4	S 24° 18' 15" E	1,481.53
4 - 5	N 63° 32' 51" E	7,485.02
5 - 6	N 07° 42' 32" W	738.63
6 - 7	N 60° 49' 25" E	5,749.24
7 - 8	S 40° 48' 21" E	622.27
8 - 9	S 39° 21' 26" E	312.05
9 - 10	S 05° 41' 14" E	241.64
10 - 11	S 55° 50' 51" E	588.75
11 - 12	S 29° 05' 09" W	677.38
12 - 13	N 74° 22' 58" E	263.13
13 - 14	S 17° 24' 41" E	429.83
14 - 15	S 39° 54' 35" W	307.47
15 - 16	S 62° 21' 02" W	542.75
16 - 17	S 52° 13' 15" E	256.13
17 - 18	S 01° 05' 52" E	382.55
18 - 19	S 24° 34' 01" E	681.43
19 - 20	S 26° 45' 50" W	281.98
20 - 21	S 30° 09' 48" E	402.36
21 - 22	N 47° 34' 00" E	695.67
22 - 23	N 73° 37' 29" E	115.04
23 - 24	N 31° 13' 05" E	226.64
24 - 25	S 06° 57' 02" E	423.21
25 - 26	S 70° 07' 40" E	417.15
26 - 27	N 72° 34' 19" E	165.07
27 - 28	S 25° 53' 51" E	175.6
28 - 29	S 24° 44' 11" W	394.1
29 - 30	S 24° 14' 14" W	502.91
30 - 31	S 08° 43' 44" W	664.83
31 - 32	S 61° 07' 50" E	267.61
32 - 33	N 30° 22' 40" E	279.99
33 - 34	S 34° 36' 22" E	183.29
34 - 35	S 25° 24' 57" W	283.39
35 - 36	N 50° 43' 23" E	228.76
36 - 37	S 23° 32' 35" E	137.38
37 - 38	N 66° 16' 54" E	418.47
38 - 39	S 03° 41' 21" E	241.65
39 - 40	S 45° 56' 33" W	513.08
40 - 41	N 88° 40' 55" E	196.21
41 - 42	S 22° 28' 14" W	246.93
42 - 43	N 02° 16' 05" E	171.74
43 - 44	S 40° 56' 43" W	238.84
44 - 45	S 46° 26' 06" E	248.09
45 - 46	S 89° 34' 06" W	116.69
46 - 47	N 53° 26' 36" W	276.49
47 - 48	S 85° 44' 19" W	206.38
48 - 49	N 20° 54' 08" W	154
49 - 50	S 26° 30' 02" W	447.36
50 - 51	S 17° 38' 40" W	261.91
51 - 52	N 78° 17' 11" W	196.6
52 - 53	S 42° 19' 47" W	394.3
53 - 54	S 02° 16' 10" E	213.79
54 - 55	S 72° 46' 56" W	205.58
55 - 56	N 27° 53' 46" W	193.45
56 - 57	S 80° 22' 15" W	215.56
57 - 58	N 24° 18' 10" W	203.52
58 - 59	N 44° 18' 14" W	277.3
59 - 60	N 65° 33' 44" W	196.7
60 - 61	S 87° 39' 22" W	208.14
61 - 62	S 36° 28' 30" E	374.47
62 - 63	S 33° 50' 30" W	316.95
63 - 64	S 79° 25' 45" W	433.54
64 - 65	S 34° 00' 26" E	173.75
65 - 66	S 87° 46' 31" W	219.76
66 - 67	S 39° 18' 06" E	105.93
67 - 68	S 16° 11' 57" W	116.17
68 - 69	S 75° 18' 21" W	135.69
69 - 70	N 48° 40' 30" W	165.62
70 - 71	S 02° 19' 41" E	206.9
71 - 72	S 36° 34' 02" E	128.83
72 - 73	S 78° 00' 47" W	378.34
73 - 74	S 20° 34' 27" E	279
74 - 75	N 66° 15' 43" W	353.6
75 - 76	S 06° 08' 47" E	346.34
76 - 77	S 66° 03' 35" W	224.58
77 - 78	S 37° 52' 42" E	225.75
78 - 79	N 72° 54' 08" E	408.44
79 - 80	S 11° 37' 14" W	592.63
146 - 147	S 88° 46' 02" W	1,296.49
147 - 148	S 50° 29' 01" W	2,720.65
148 - 149	S 52° 42' 35" W	1,510.73
149 - 150	N 03° 04' 47" W	1,879.32
150 - 151	N 38° 20' 15" W	493.32
151 - 152	N 03° 04' 12" W	2,630.39
152 - 153	N 42° 49' 37" W	3,048.00
153 - 154	N 01° 43' 14" E	626.16
154 - 155	N 03° 28' 37" E	361.02
155 - 156	N 12° 52' 18" W	377.29
156 - 157	N 10° 31' 31" W	449.51
157 - 158	N 42° 50' 35" E	491.77
158 - 159	N 08° 31' 41" E	314.9
159 - 160	N 14° 57' 13" E	246.2
160 - 161	N 11° 40' 29" W	417.35
161 - 162	N 25° 57' 35" W	453.68
162 - 163	N 30° 19' 36" W	425.01
163 - 164	N 10° 51' 20" E	792.96
164 - 165	N 58° 49' 10" W	158.68
165 - 166	N 05° 09' 14" W	492.86
166 - 167	N 15° 00' 24" E	577.01
167 - 168	N 44° 20' 17" E	335.04
168 - 169	S 72° 19' 17" E	711.84
169 - 170	N 72° 40' 07" E	290.88
170 - 171	N 32° 55' 37" W	3,006.78
171 - 172	N 49° 54' 59" W	1,062.40
172 - 173	S 08° 29' 45" W	1,607.56
173 - 174	S 61° 12' 31" W	1,067.17
174 - 175	S 64° 50' 41" W	2,546.92
175 - 176	N 11° 31' 02" E	6,491.31
176 - 177	N 24° 38' 07" E	593.51
177 - 178	N 01° 14' 48" E	618.05
178 - 179	N 51° 43' 33" E	315.99
179 - 180	N 44° 28' 07" E	493.5
180 - 181	S 76° 18' 45" E	399.71
181 - 182	S 62° 32' 43" E	878.84
182 - 183	S 23° 02' 47" E	1,466.89



Prepared by: \_\_\_\_\_ NAME \_\_\_\_\_  
Cartographer

Under the Supervision of:

NAME \_\_\_\_\_ NAME \_\_\_\_\_  
Chief, Surveys and Mapping Division      Chief, Conservation and Development Division

Attested:

NAME \_\_\_\_\_  
PENR Officer (Place)

Noted:

NAME \_\_\_\_\_  
Assistant Regional Director for Technical Services

**LEGEND**

- PRSI Control Point
- Protected Area Control
- Local Network
- Other Systems
- Provincial Boundary
- Protected Area Tie Line
- Protected Area Boundary
- Water Bodies/Other Private Areas
- Municipal Boundary

**NOTE:**  
Provincial boundaries depicted on the map are not authoritative.  
This map accurately indicates the boundaries of the PP based on a reference survey conducted by the RDPT's per survey plan no. 06 - 13 - 01, the original fieldnotes and computations of which are on file in the DENR Region 13 Office.

Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

**CERTIFICATION**

We hereby certify that this is the correct map of the areas designated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11070 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018. These areas were delineated by the \_\_\_\_\_ DENR, in accordance with the standard procedures on survey and mapping of the DENR.

Date Approved: 09 May 2019  
Recommended:

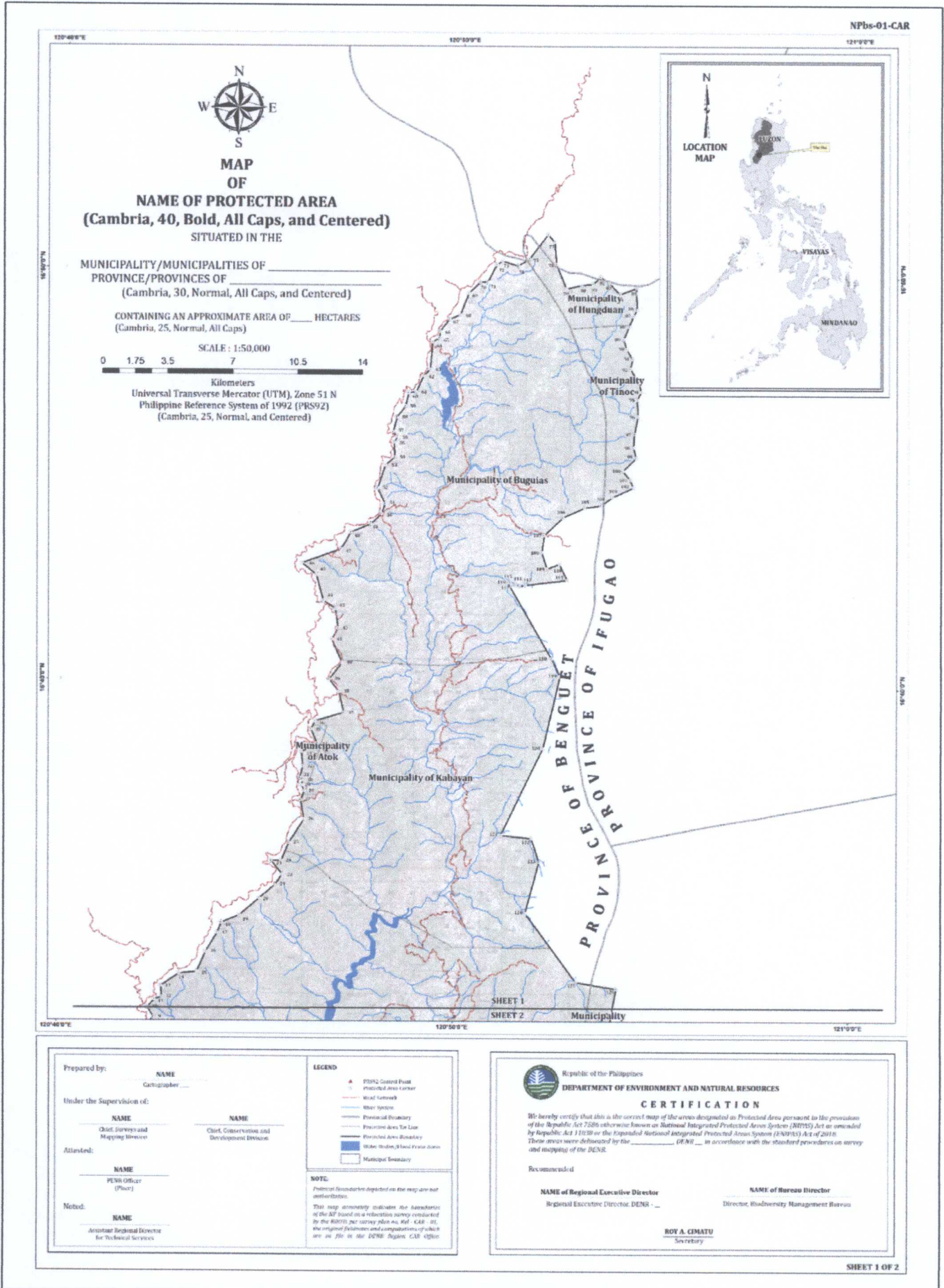
NAME of Regional Executive Director  
Regional Executive Director, DENR: \_\_\_\_\_

NAME of Bureau Director  
Director, Biodiversity Management Bureau

**ROY A. CIMATU**  
Secretary

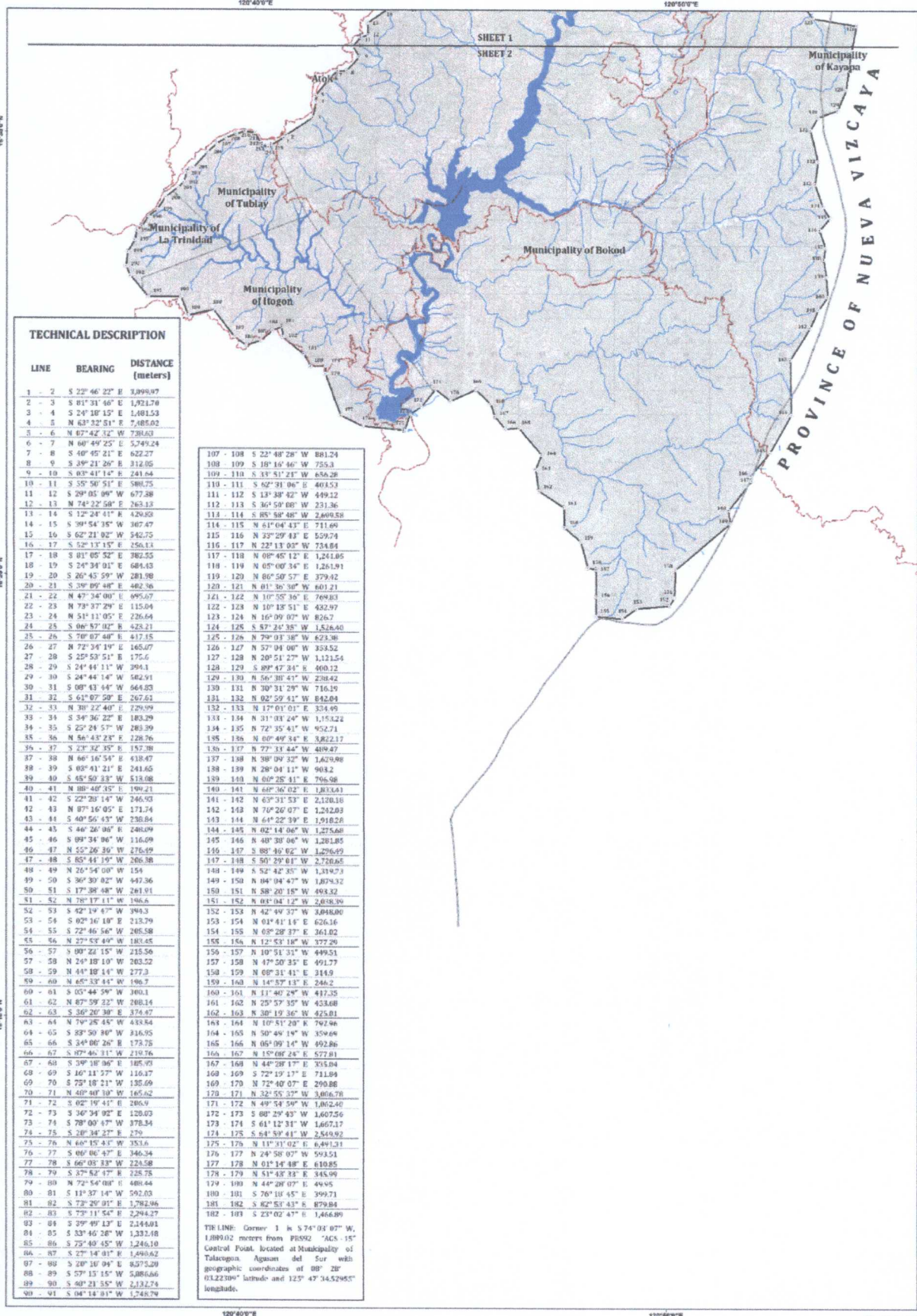


For areas 20,000 has. and above  
Portrait - 84.1 cm X 118.88 cm with adjoining Sheets



For areas 20,000 has. and above  
 Portrait – 84.1 cm X 118.88 cm with adjoining Sheets

NPbs-01-CAR



**TECHNICAL DESCRIPTION**

LINE	BEARING	DISTANCE (meters)
1 - 2	S 22° 46' 22" E	3,899.97
2 - 3	S 81° 31' 46" E	1,921.78
3 - 4	S 24° 18' 15" E	1,481.53
4 - 5	N 43° 22' 51" E	7,885.92
5 - 6	N 62° 42' 12" E	7,281.62
6 - 7	N 60° 49' 25" E	5,749.24
7 - 8	S 40° 45' 21" E	6,227.27
8 - 9	S 39° 21' 26" E	312.05
9 - 10	S 83° 41' 14" E	241.64
10 - 11	S 55° 50' 51" E	586.75
11 - 12	S 29° 05' 09" W	677.28
12 - 13	N 74° 22' 58" E	263.13
13 - 14	S 12° 24' 41" E	429.83
14 - 15	S 39° 54' 35" W	367.47
15 - 16	S 62° 21' 32" W	542.75
16 - 17	S 52° 13' 15" E	256.13
17 - 18	S 81° 05' 52" E	382.55
18 - 19	S 24° 34' 01" E	684.43
19 - 20	S 26° 45' 59" W	281.98
20 - 21	S 39° 09' 48" E	482.36
21 - 22	N 47° 34' 00" E	895.67
22 - 23	N 79° 37' 29" E	115.04
23 - 24	N 51° 11' 05" E	726.64
24 - 25	S 06° 57' 02" E	423.21
25 - 26	S 70° 07' 48" E	417.15
26 - 27	N 72° 34' 19" E	165.07
27 - 28	S 25° 53' 51" E	175.6
28 - 29	S 22° 24' 57" W	394.1
29 - 30	S 24° 44' 14" W	582.91
30 - 31	S 08° 43' 44" W	644.83
31 - 32	S 61° 07' 59" E	267.61
32 - 33	N 38° 22' 40" E	729.99
33 - 34	S 34° 36' 22" E	183.29
34 - 35	S 22° 24' 57" W	281.39
35 - 36	N 44° 43' 28" E	228.76
36 - 37	S 23° 32' 35" E	157.38
37 - 38	N 66° 16' 54" E	438.47
38 - 39	S 03° 41' 21" E	241.65
39 - 40	S 45° 52' 33" W	513.08
40 - 41	N 88° 48' 05" E	190.23
41 - 42	S 22° 28' 14" W	246.92
42 - 43	N 87° 16' 05" E	171.74
43 - 44	S 40° 55' 45" W	238.84
44 - 45	S 44° 26' 08" E	248.09
45 - 46	S 89° 34' 36" W	116.99
46 - 47	N 52° 26' 26" W	276.19
47 - 48	S 82° 41' 15" W	206.36
48 - 49	N 26° 54' 00" W	154
49 - 50	S 36° 30' 82" W	447.36
50 - 51	S 17° 38' 48" W	261.91
51 - 52	N 78° 17' 11" E	146.6
52 - 53	S 42° 19' 57" W	964.3
53 - 54	S 60° 16' 08" E	213.79
54 - 55	S 72° 46' 56" W	205.58
55 - 56	N 27° 58' 49" W	183.45
56 - 57	S 09° 21' 15" W	215.56
57 - 58	N 24° 18' 10" W	203.22
58 - 59	N 41° 48' 44" W	277.3
59 - 60	N 46° 53' 44" W	196.7
60 - 61	S 03° 44' 59" W	380.1
61 - 62	N 87° 59' 23" W	208.14
62 - 63	S 36° 20' 38" E	374.47
63 - 64	N 79° 25' 45" W	433.84
64 - 65	S 20° 50' 80" W	316.85
65 - 66	S 34° 08' 26" E	172.78
66 - 67	S 87° 46' 31" W	219.76
67 - 68	S 34° 18' 06" E	185.93
68 - 69	S 16° 11' 27" W	116.37
69 - 70	S 72° 18' 21" W	135.69
70 - 71	N 40° 08' 10" E	165.62
71 - 72	S 62° 19' 41" E	286.9
72 - 73	S 36° 34' 02" E	128.03
73 - 74	S 78° 07' 47" W	378.34
74 - 75	S 28° 34' 27" E	279
75 - 76	N 46° 15' 43" W	353.6
76 - 77	S 86° 06' 37" E	246.24
77 - 78	S 66° 03' 33" W	224.58
78 - 79	S 37° 52' 47" E	235.78
79 - 80	N 72° 54' 08" E	488.44
80 - 81	S 11° 37' 14" W	592.03
81 - 82	S 72° 20' 44" E	1,782.96
82 - 83	S 72° 11' 54" E	2,284.27
83 - 84	S 39° 09' 13" E	2,344.61
84 - 85	S 33° 46' 28" W	1,332.48
85 - 86	S 75° 49' 45" W	1,246.10
86 - 87	S 27° 14' 01" E	1,490.62
87 - 88	S 20° 50' 04" E	4,573.28
88 - 89	S 57° 15' 15" W	5,886.66
89 - 90	S 40° 21' 55" W	2,132.74
90 - 91	S 04° 14' 81" W	1,748.79

107 - 108	S 22° 40' 28" W	881.24
108 - 109	S 18° 16' 46" W	755.3
109 - 110	S 33° 51' 21" W	856.28
110 - 111	S 49° 31' 06" E	403.53
111 - 112	S 13° 38' 42" W	449.12
112 - 113	S 36° 50' 08" W	231.36
113 - 114	S 85° 58' 48" W	2,609.58
114 - 115	N 61° 04' 43" E	711.69
115 - 116	N 33° 29' 43" E	559.74
116 - 117	N 23° 13' 03" W	754.84
117 - 118	N 06° 45' 12" E	1,241.86
118 - 119	N 05° 00' 34" E	1,261.91
119 - 120	N 86° 50' 57" E	379.42
120 - 121	N 81° 36' 38" W	601.21
121 - 122	N 10° 55' 36" E	769.83
122 - 123	N 10° 18' 51" E	432.97
123 - 124	N 16° 09' 07" W	826.7
124 - 125	S 57° 24' 38" W	1,526.40
125 - 126	N 79° 03' 38" W	623.38
126 - 127	N 57° 04' 00" W	353.52
127 - 128	N 20° 51' 27" W	1,121.54
128 - 129	S 89° 47' 34" E	460.12
129 - 130	N 16° 30' 47" W	238.42
130 - 131	N 30° 31' 29" W	716.19
131 - 132	N 82° 59' 41" W	842.04
132 - 133	N 17° 01' 01" E	334.49
133 - 134	N 31° 03' 49" W	1,153.22
134 - 135	N 72° 35' 41" W	952.71
135 - 136	N 02° 49' 14" E	3,822.17
136 - 137	N 77° 33' 44" W	489.47
137 - 138	N 38° 09' 32" W	1,429.88
138 - 139	N 28° 04' 11" W	963.2
139 - 140	N 60° 28' 41" E	766.98
140 - 141	N 68° 36' 02" E	1,813.43
141 - 142	N 63° 31' 53" E	2,120.16
142 - 143	N 76° 20' 07" E	1,252.03
143 - 144	N 64° 22' 39" E	1,916.22
144 - 145	N 62° 14' 06" W	1,275.68
145 - 146	N 48° 38' 06" W	1,281.85
146 - 147	S 88° 46' 52" W	1,427.49
147 - 148	S 60° 39' 41" W	2,770.65
148 - 149	S 52° 42' 35" W	1,314.73
149 - 150	N 84° 04' 47" W	1,874.32
150 - 151	N 88° 20' 15" W	493.32
151 - 152	N 03° 04' 12" W	2,638.39
152 - 153	N 42° 49' 37" W	3,848.00
153 - 154	N 01° 41' 14" E	626.16
154 - 155	N 08° 28' 37" E	361.02
155 - 156	N 12° 53' 18" W	377.20
156 - 157	N 10° 51' 31" W	449.51
157 - 158	N 47° 50' 35" E	491.77
158 - 159	N 68° 31' 43" E	314.9
159 - 160	N 14° 57' 17" E	246.2
160 - 161	N 11° 40' 28" W	417.35
161 - 162	N 25° 57' 35" W	453.68
162 - 163	N 30° 19' 36" W	425.81
163 - 164	N 10° 51' 20" E	792.96
164 - 165	N 50° 49' 14" W	159.68
165 - 166	N 05° 09' 14" W	492.86
166 - 167	N 15° 08' 24" E	572.81
167 - 168	N 44° 28' 17" E	355.04
168 - 169	S 72° 19' 17" E	711.84
169 - 170	N 72° 40' 07" E	290.86
170 - 171	N 32° 55' 19" W	3,806.78
171 - 172	N 48° 54' 59" W	1,862.40
172 - 173	S 80° 29' 43" W	1,607.56
173 - 174	S 61° 12' 31" W	1,607.17
174 - 175	S 64° 59' 41" W	2,549.92
175 - 176	N 11° 31' 02" E	6,491.31
176 - 177	N 24° 58' 07" W	563.51
177 - 178	N 01° 14' 48" E	610.85
178 - 179	N 51° 43' 33" E	345.99
179 - 180	N 44° 28' 07" E	444.95
180 - 181	S 70° 18' 45" E	399.71
181 - 182	S 62° 53' 43" E	879.84
182 - 183	S 23° 02' 47" E	1,466.89


TR LINE: Corner is S 74° 01' 07" W, 1,889.02 meters from PPS02 "ACA - 15" Control Point, located at Municipality of Talacogon, Agusan del Sur with geographic coordinates of 08° 28' 03.222109" latitude and 125° 47' 34.52985" longitude.

# ANNEX D.5

For areas lesser than 20,000 has.  
Portrait – 80.00 cm X 80.00 cm

NPbs-01-IVB

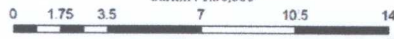
120°18'0"E
120°27'0"E



**MAP OF**  
**NAME OF PROTECTED AREA**  
**(Cambria, 40, Bold, All Caps, and Centered)**  
SITUATED IN THE

MUNICIPALITY/MUNICIPALITIES OF \_\_\_\_\_  
PROVINCE/PROVINCES OF \_\_\_\_\_  
(Cambria, 30, Normal, All Caps, and Centered)  
CONTAINING AN APPROXIMATE AREA OF \_\_\_\_\_ HECTARES  
(Cambria, 25, Normal, All Caps)

SCALE: 1:50,000

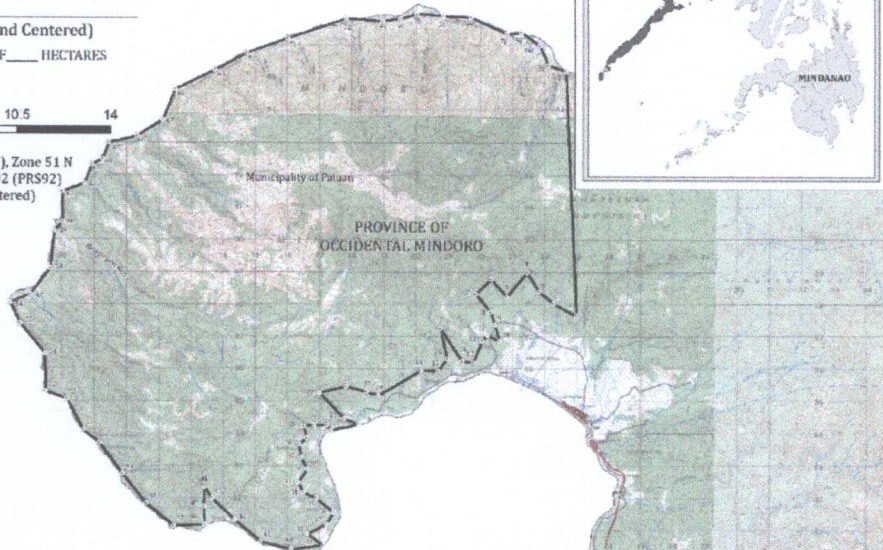


Kilometers  
Universal Transverse Mercator (UTM), Zone 51 N  
Philippine Reference System of 1992 (PRS92)  
(Cambria, 25, Normal, and Centered)


**TECHNICAL DESCRIPTION**

LINE	BEARING	DISTANCE (meters)
1 - 2	S 22° 46' 22" E	3,099.97
2 - 3	S 81° 31' 46" E	1,921.70
3 - 4	S 24° 18' 15" E	1,481.53
178 - 179	N 51° 43' 33" E	345.99
179 - 180	N 44° 28' 07" E	49.95
180 - 181	S 70° 18' 45" E	399.74
181 - 182	S 92° 53' 43" E	879.88
182 - 183	S 23° 02' 47" E	1,466.89

THE LINE: Corner 1 is S 74° 03' 67" W, 1,889.82 meters from PRS92 "AGS -15" Control Point, located at Municipality of Takasgon, Agusan del Sur with geographic coordinates of 08° 28' 03.2289" latitude and 125° 47' 34.52955" longitude.



**LOCATION MAP**



120°18'0"E
120°27'0"E

Prepared by: \_\_\_\_\_  
NAME  
Cartographer

Under the Supervision of:

NAME _____ Chief, Survey and Mapping Division	NAME _____ Chief, Conservation and Development Division
---	---

Attested:

NAME  
\_\_\_\_\_  
PERE OFFICER (Place)

Noted:

NAME  
\_\_\_\_\_  
Assistant Regional Director for Technical Services

**LEGEND**

- ▲ PRS92 Control Point
- Protected Area Corner
- Road Network
- River System
- Provincial Boundary
- Protected Area Tax Line
- Protected Area Boundary
- Water Bodies/Other Protected Areas
- Municipal Territory

**NOTE:**  
Political boundaries depicted on the map are not authoritative.  
This map accurately indicates the boundaries of the Protected Area as delineated in accordance with the procedures in the ISMG per survey plan no. 861 - 198 - 04, the original field notes and computations of which are on file in the WCMR, Region 11 Office.

Republic of the Philippines  
**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**

**CERTIFICATION**

We hereby certify that this is the correct map of the areas delineated as Protected Area pursuant to the provisions of the Republic Act 7586 otherwise known as National Integrated Protected Areas System (NIPAS) Act as amended by Republic Act 11958 or the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2020. These areas were delineated by the \_\_\_\_\_, DENR, in accordance with the standard procedures on survey and mapping of the DENR.

Recommended:

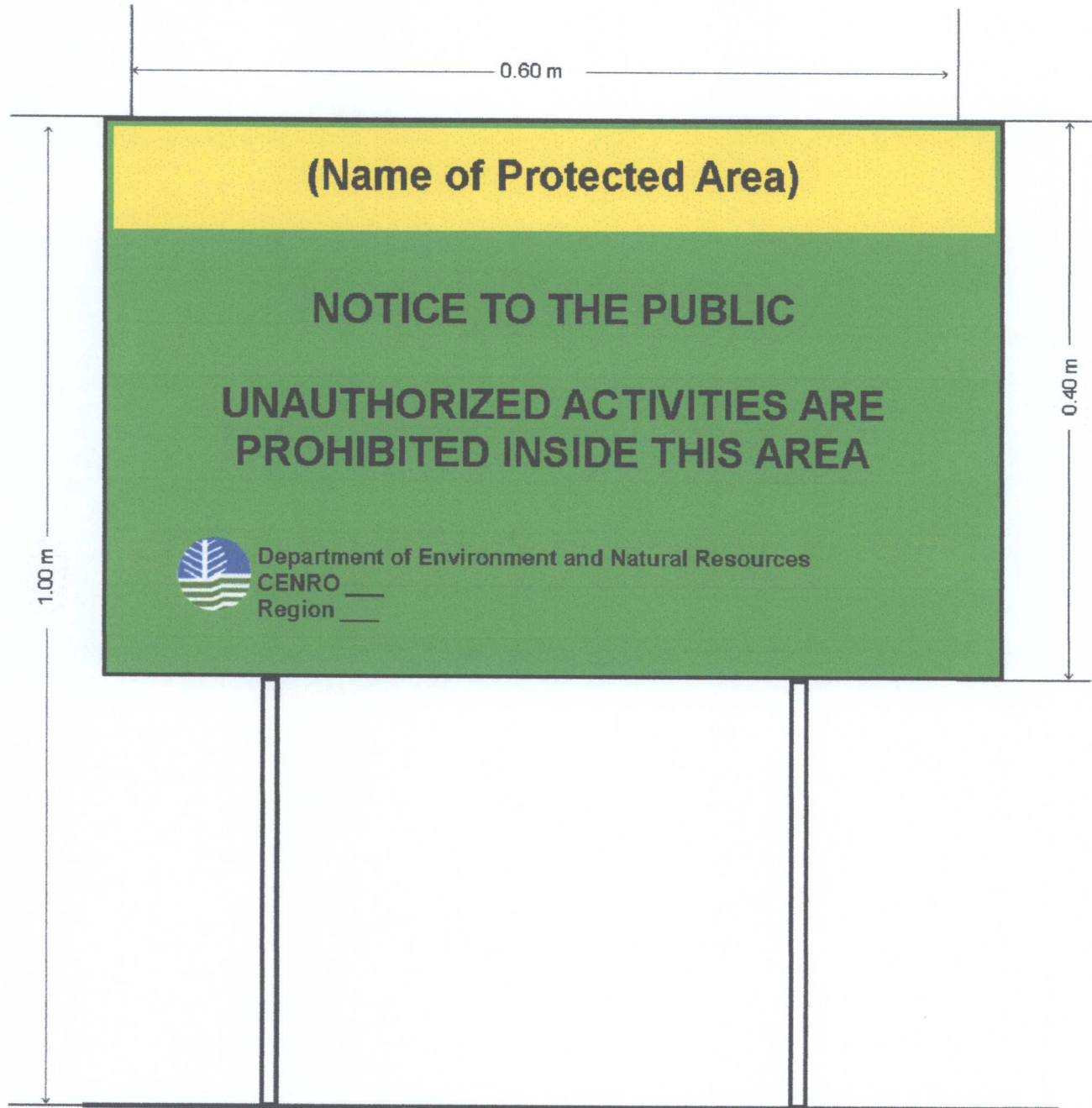
NAME of Regional Executive Director Regional Executive Director, DENR - _____	NAME of Bureau Director Director, Biodiversity Management Bureau
--	---

**ROY A. CIMATU**  
Secretary

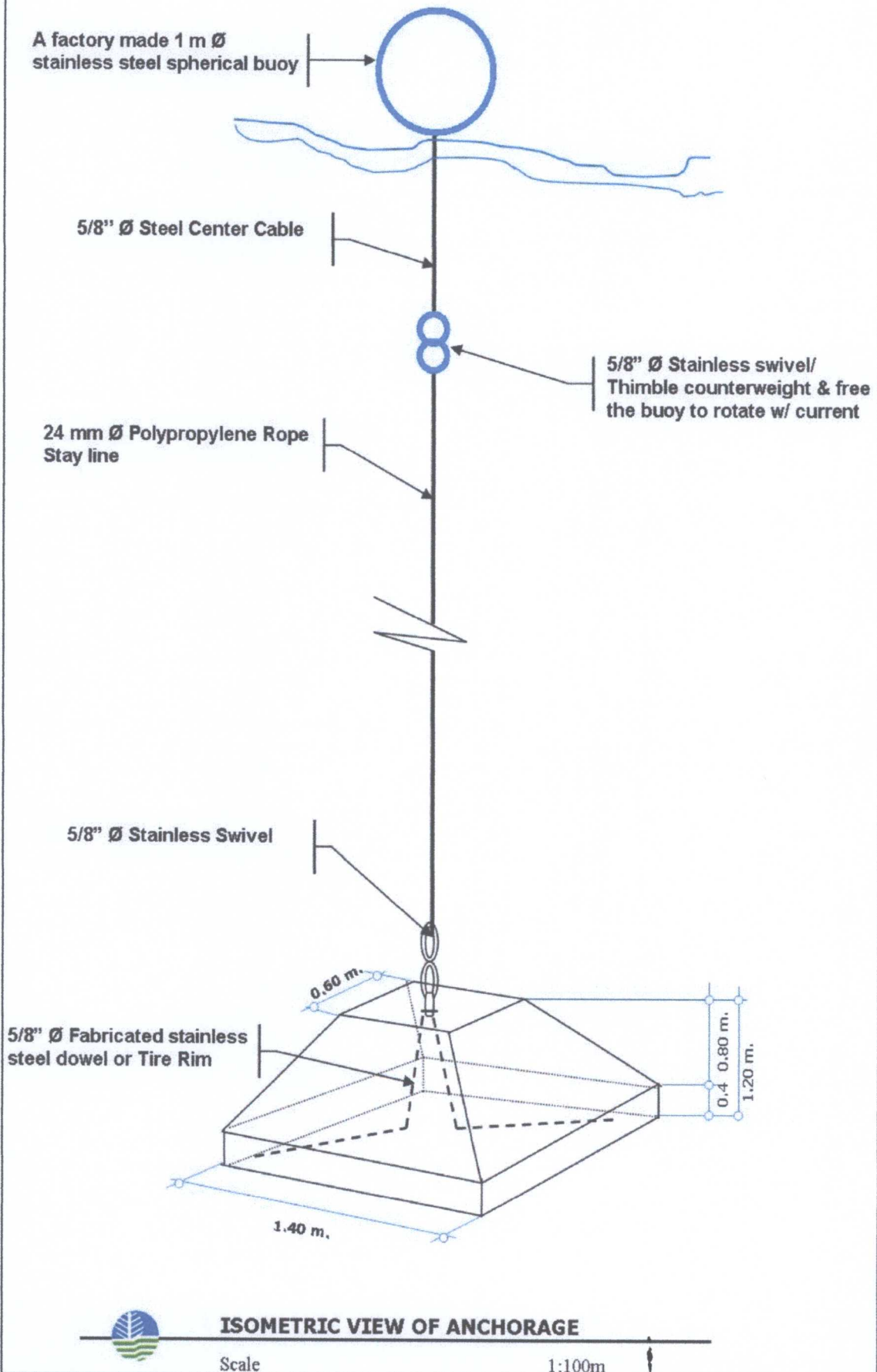




**INTERMEDIATE SIGNAGES/MARKERS  
FOR TERRESTRIAL PROTECTED AREAS**



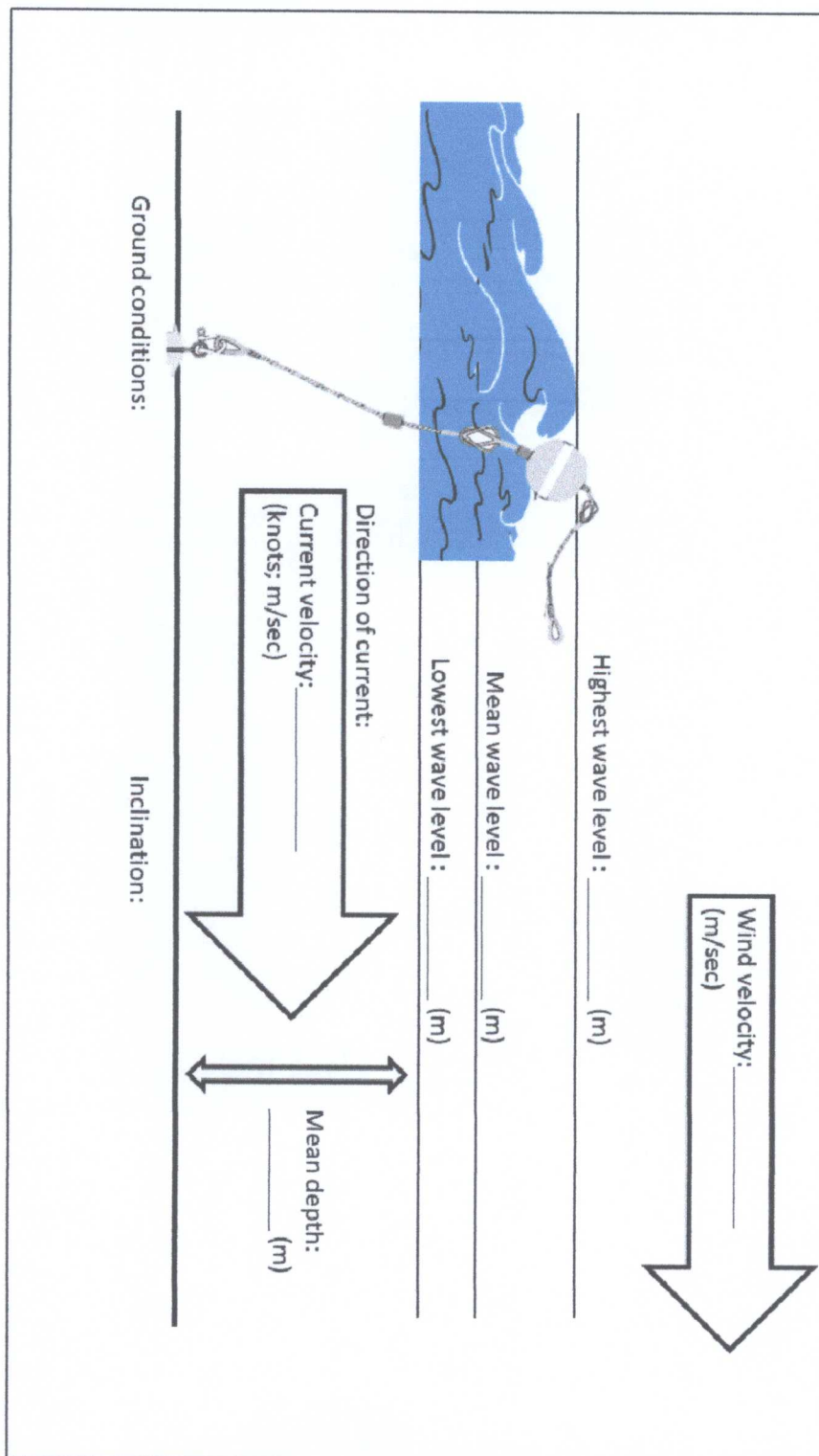
**PROPOSED BOUNDARY MARKERS  
FOR MARINE PROTECTED AREAS  
WITH 4 TONS CONCRETE SINKER**



## ANNEX G

### GUIDES IN SELECTING MOORING AND ANCHORING SYSTEMS

1. Location of Protected Area: (*Coordinates, Barangay, Municipality/City, Province, Region*)
2. Kind and size of watercraft/s being used: (*Motor boats, patrol boats, etc*)
3. Water depth;
4. Tidal range;
5. Ground conditions of the sea bottom;
6. Inclination of the sea bottom at the site;
7. Maximum wave height;
8. Maximum current at the site.
9. Wind velocity in the area;
10. Any other special equipment other than light and power system if required to be installed on the buoys. (Such as radar reflectors, etc.)

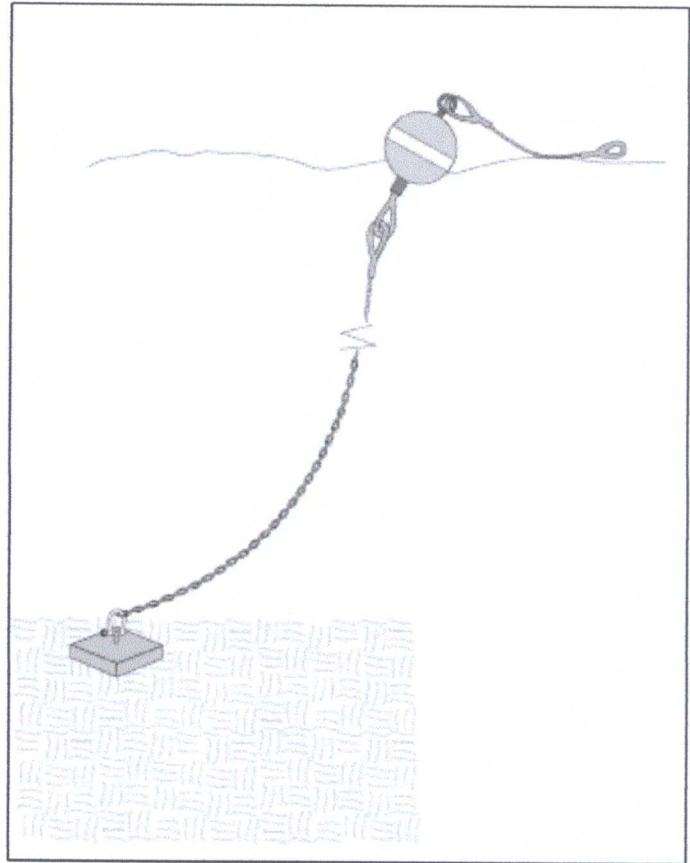


### TRADITIONAL MOORING SYSTEM

Traditional mooring systems typically consist of a floating buoy attached to a chain and heavy anchor, or a concrete block.

The block can be any heavy object sufficient to hold a boat. Most traditional mooring blocks are made from cast concrete shaped into a square pyramid, box, or drum. Metal rings are set into the concrete for attaching the anchor line.

The shape of the block depends on the holding conditions of the bottom. The holding power of any block not physically attached to the sea bottom is limited however, and dragging does occur.



### Anchoring Procedure:

Chain, rope, or polypropylene line can be used as an anchor line. Chain does not usually break and is difficult to cut. However, chain is heavy, difficult to transport, and can cause considerable structural damage to the bottom and sedimentation as it swings with the current. Rope is not as destructive as chain but can rot and break easily. The preferred anchor line, therefore, is made from polypropylene, material that is light, durable, and easily replaced if cut or lost.

To protect the line from chafing, splice a thimble (small metal strip) into each end of the line, or modifications can be adapted from the Halas system by splicing protective hose into the line. Attach one end of the line with a shackle to the mooring on the bottom. Attach the other end of the line to the bottom of the buoy at the water's surface. If rope or line is used as a down line, two rings should be set in the mooring block so that a replacement line can be attached before the other wears and breaks. Usually, a nylon line with greater flex than a polypropylene line is used as a down line. The length of rope or chain should be twice the depth of the water, with consideration given to local tide and sea conditions.

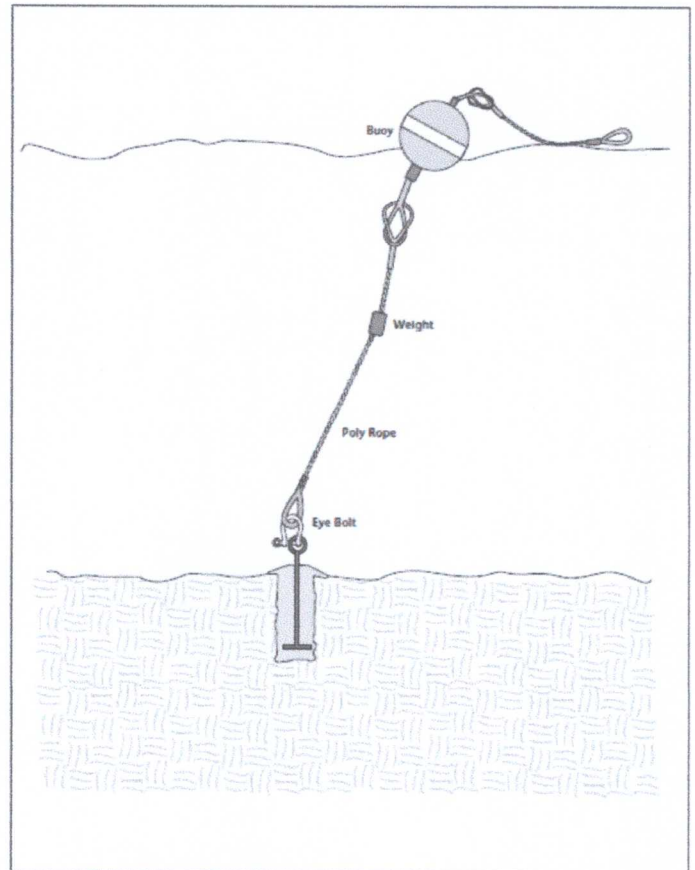
### HALAS ANCHORING SYSTEM

Halas mooring system consists of a stainless-steel

eyebolt cemented into a hole drilled into the sea floor. A floating line shackled to the eyebolt extends to the surface and through a plastic buoy to a pickup line which attaches to the boat.

The Halas system is unique in that it uses a three-part rope system instead of one continuous rope. One line leads from the anchor pin at the bottom to the buoy at the surface. A second line runs through the buoy and is attached with a loop to the anchor line at one end, and at the other end is attached with a loop to the third pick-up line.

A three-part rope system eliminates need for shackles and thus decreases maintenance time and cost of the system.



### Anchoring Procedure:

The key to success with the Halas system is locating proper substrate for drilling and cementing. The bottom substrate is what gives the system holding power. There are few known failures of individual components of the system, but have been cases of substrate failure where the entire cemented core has been pulled up and dragged across the bottom.

Flat, solid bedrock is the preferred substrate for the Halas system. Sand, coral rubble, or a combination of bottom types requires the manager to consider using alternative mooring systems, such as the Manta-Ray, in areas where the bottom will not hold a cemented eyebolt. Site selection must consider the surrounding area in addition to the bottom substrate.

### MANTA-RAY BUOY ANCHORING SYSTEM

The Manta-Ray anchor is a utility pole anchoring system adapted for underwater use. Sea bottom characteristics dictate the type of anchor system used for mooring buoys. Whereas the Halas system require a hard bottom to drill a core and cement an anchor pin, the Manta-Ray anchoring system can be used in mixed bottoms of clay, sand, gravel, broken bedrock, and coral rubble.

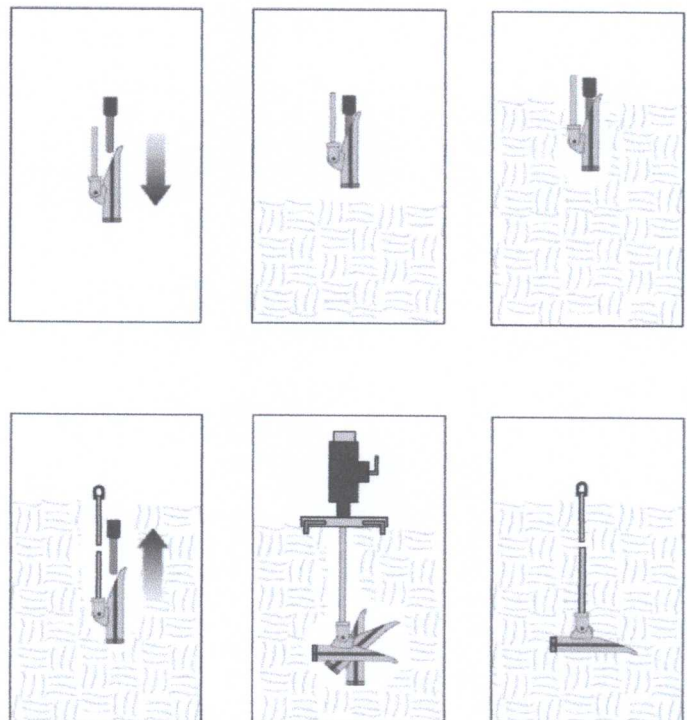
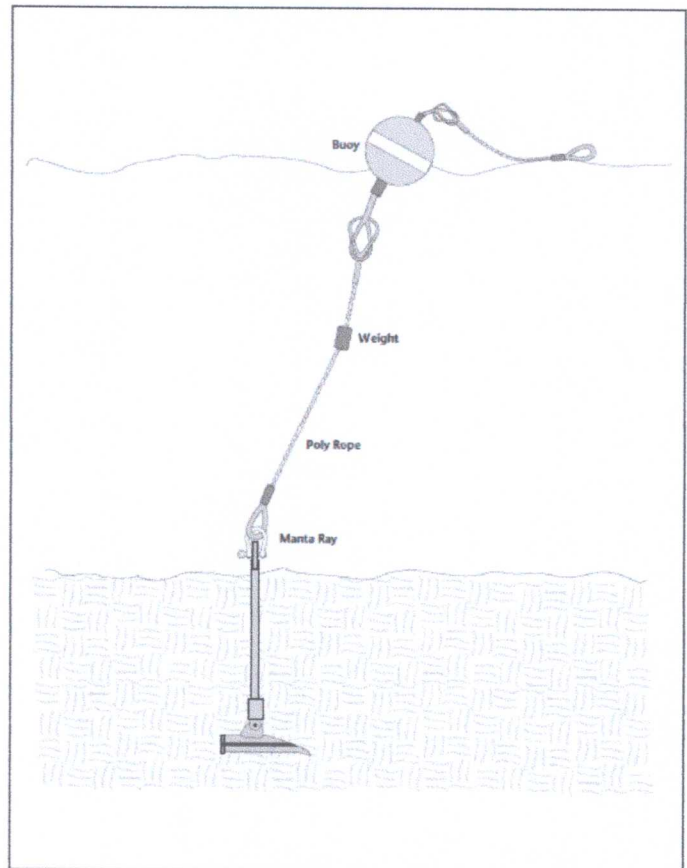
The Manta-Ray system consists of a utility anchor attached to an anchor rod that is driven under the sea bottom. A thimble eye nut is screwed into the end of the anchor rod for attachment of the buoy line.

#### Anchoring Procedure:

Anchor style and size installed depends on the sediment characteristics of the site. Probing the bottom prior to installation will give the operator an idea of the bottom conditions.

Lighter, smaller anchors are used in average sediment. The anchor should be driven deep enough that the anchor rod is not exposed above the bottom. Once the anchor and rod is in place the anchor is set and locked into a permanent position. To lock the anchor into place, an upward force must pull the anchor so that the anchor wing rotates and pivots into a locked position.

An anchor setting device, known as a load locker applies a force (measured in psi, (pound per square inch)) to put the anchor into locked position. An advantage of using a load locker to set the anchor is that the holding capacity of the anchor is immediately determined.



ANNEX G.4

The diagram shows a buoy moored to a ground line. The buoy is a white sphere with a black band. A rope connects it to a metal hook on the ground line. The water surface is depicted with blue waves. Below the water surface, there are several measurement fields with arrows pointing to the right. The fields are: Wind velocity (m/sec), Highest wave level (m), Mean wave level (m), Lowest wave level (m), Direction of current, Current velocity (knots; m/sec), Mean depth (m), and Inclination.

Wind velocity: \_\_\_\_\_ (m/sec)

Highest wave level : \_\_\_\_\_ (m)

Mean wave level : \_\_\_\_\_ (m)

Lowest wave level : \_\_\_\_\_ (m)

Direction of current:

Current velocity: \_\_\_\_\_ (knots; m/sec)

Mean depth: \_\_\_\_\_ (m)

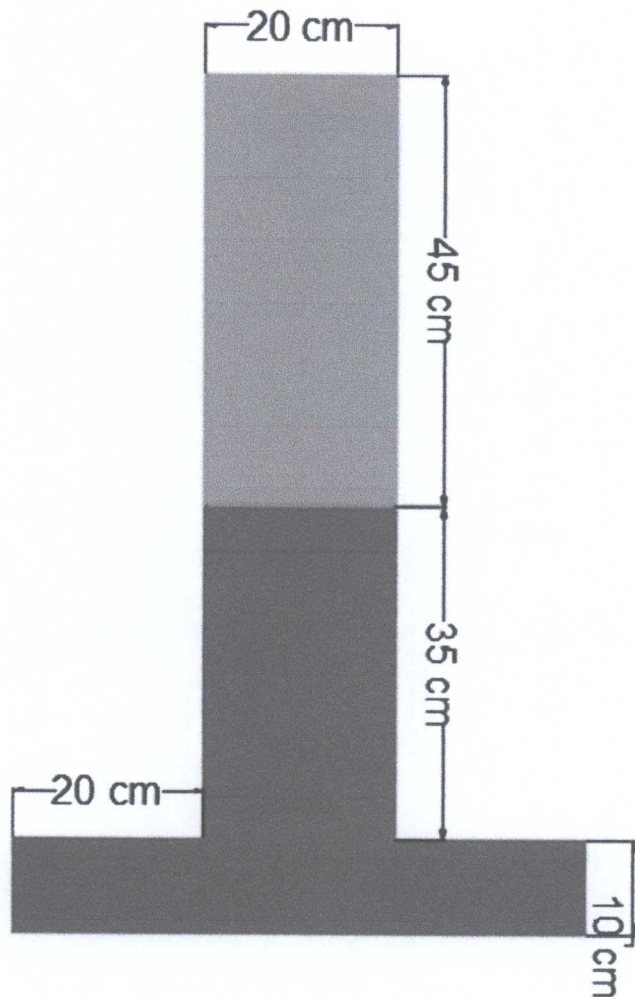
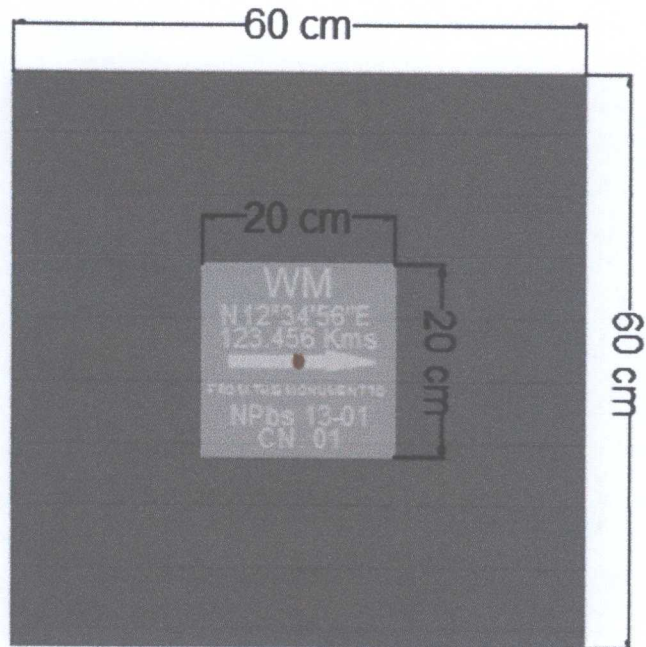
Inclination:

Ground conditions:



ANNEX H

WITNESS MONUMENTS



## ANNEX I

## COST ESTIMATES

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>I. PREPARATORY ACTIVITIES</b>			
<b>A. Team Organization</b>			
1. Technical Meeting and Supervision	6,400/meeting (20 pax)	38,000.00	per PA 5 technical meetings
<b>B. Procurement of Supplies &amp; Materials</b>			
		40,000.00	per PA
1. Plotter Paper (36" x 150 yards) 3" core	3,000/Ream	4,000.00	
2. Plotter paper Matte (36" x 50 yards)	6,000/Ream	6,000.00	
3. Plotter ink (Black, Cyan, Yellow, Magenta)	6,000/color	25,000.00	
4. Other supplies and materials (pens, paper, etc.)	5,000	5,000.00	
<b>C. Communication, Education &amp; Public Awareness (CEPA)</b>			
1. Coordination and CEPA with LGUs (including representatives from brgy. And stakeholders inside the PA)	10,000/municipality	10,000.00	per municipality

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>II. GROUND SURVEY</b>			
		12,000.00	per monument
<b>A. TEV</b>			
		7,000.00	per monument
1. One (1) Instrument Man (GE or Forester)	1,500/day	1,500.00	per day
2. Three (3) Survey Aide	1,500/day	4,500.00	per day
3. Ten (10) Laborers/haulers	800/day	8,000.00	per day
<b>B. CONVEYANCE</b>			
		5,000.00	per monument
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day
<b>III. MONUMENTING/DEMARCATING</b>			
		8,000.00	per monument
<b>A. TEV</b>			
		4,000.00	per monument
1. Ten (10) Laborers	800/day	8,000.00	per day
<b>B. MATERIALS</b>			
		4,000.00	per monument
1. One (1) bag of gravel	200/bag	200.00	per monument
2. Two (2) bags of white sand	200/bag	400.00	per monument
3. Cement	400/sack	400.00	per monument
4. ½ Plywood (1/2 inch tick)	2,000/plywood	1,000.00	per monument
5. 1 Kg. of common nails (#1, #2, #3)	200/kg	200.00	per monument
6. 2x2x8 good lumber	200/pc	500.00	per monument
7. 1 kg Gl/tie wire (#14)	100/kg	100.00	per monument
8. Four (4) pc of 10 mm steel bar	300/steel bar	1,200.00	per monument
<b>C. SIGNAGE</b>			
		8,000.00	per signage
1. Production and installation of signage	8,000/signage	8,000.00	per signage In between corners that are distant from one another (>250m); adjacent to threats and other land classification
<b>SURVEYING + MONUMENTING</b>			
		20,000.00	per monument

Activities	Unit Cost	Total Amount	Assumptions/Remarks
<b>IV. Inspection, Verification, and Approval of Surveys (IVAS)</b>			
		3,625.00	per monument
<b>A. TEV</b>			
		1,125.00	per monument
1. One (1) Geodetic Engineer	1,500/day	1,500.00	per day
2. One (1) Survey Aide	1,500/day	1,500.00	per day
3. One (1) Cartographer	1,500/day	1,500.00	per day
<b>B. CONVEYANCE</b>			
		2,500.00	per monument
1. Hiring/Rental of vehicle	10,000/day	10,000.00	per day

## CAPITAL OUTLAY (per Region)

Equipment	Unit Cost	Total Cost
3 RTK	1,500,000	4,500,000
5 Total Station	250,000	1,250,000
Map plotter	600,000	600,000
	2,350,000	6,350,000

## ANNEX I.1

Unit Cost for PA Boundary Demarcation (Marine)					
Component	No.	Unit of Price Measure	Unit Price Rate/Day	Amount	Total
A. Fabrication of Concrete Sinker (Sub-Total)					23,550.80
A.1 Materials for Concrete Sinker					16,822.00
1. 16mm Reinforcement bars	11	pcs.	437	4,807.00	
2. Portland/Fortune cement	12	bags	250	3,000.00	
3. Mixed gravel & sand	3	cu.m.	500	1,500.00	
4. # 16 G.I. Tie wire	5	kls.	85	425	
5. 10 pcs. 2"x 2"x12" Lumber	40	bd.ft.	45	1,800.00	
6. Marine Plywood # 1/2"	3	pcs.	840	2,520.00	
7. 4" Common nail	3	kls.	85	255	
8. 3" Common nail	3	kls.	85	255	
9. 2" Common nail	2	kls.	85	170	
10. 1" Common nail	1	kl.	90	90	
11. Stainless Steel # 5/8" (dowel)	10	ft	200	2,000.00	
A.2 Construction/fabrication Cost		(40% of the Material Cost)			6,728.80
B. Estimate of stay line rope, cables and its accessories (Sub-Total)					67,500.00
1. Polypropylene rope 24 mm x 660 m	2	rolls	29,850.00	59,700.00	
2. Steel center Cable # 3/8"	75	feet	50	3,750.00	
3. Stainless Swivel # 5/8"	2	pieces	1,500.00	3,000.00	
4. Thimbles # 5/8"	2	pieces	150	300	
5. Cable Clips # 5/8"	5	pieces	150	750	
C. Estimate of factory made buoy (Sub-Total)					64,800.00
C.1 Materials for Marker Buoy					60,800.00
1. Factory Made 1 m Ø stainless steel spherical buoy	1	piece	55000	55,000.00	
2. Stainless Steel Rod # 3/4"	5	pieces	1000	5,000.00	
3. Stainless steel sheet #1/8" x 12" x 10"	4	pieces	200	800	
C.2 Labor Cost in connecting accessories					4,000.00
D. Installation Cost (Sub-Total)					20,000.00
<b>TOTAL COST</b>					<b>175,850.80</b>
<b>CONTINGENCY COST</b>					<b>75,000.00</b>
<b>TOTAL COST PER MARKER SET</b>					<b>250,000.00</b>



Republic of the Philippines  
**Department of Environment and Natural Resources**  
**BIODIVERSITY MANAGEMENT BUREAU**  
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Website: <http://www.bmb.gov.ph> E-mail: [bmb@bmb.gov.ph](mailto:bmb@bmb.gov.ph)

## MEMORANDUM

FOR : The Assistant Secretary for Staff Bureau and  
Director in concurrent capacity

THRU : The Assistant Director /  
Chair, Technical Review Committee

FROM : The Chief, National Parks Division  
The Chief, Coastal and Marine Division

SUBJECT : **DRAFT TECHNICAL BULLETIN ON CLARIFYING THE GUIDELINES  
AND PROCEDURES IN THE DEMARCATION OF BOUNDARIES OF  
LEGISLATED PROTECTED AREAS UNDER THE NATIONAL  
INTEGRATED PROTECTED AREAS SYSTEM**

We are pleased to submit the enclosed the revised Technical Bulletin on Clarifying the Guidelines and Procedures in The Demarcation of Boundaries of Legislated Protected Areas Under the NIPAS. Kindly be informed that the comments and recommendations of Geodetic Engineers in the Philippines, Inc. (GEPI), Land Management Bureau (LMB), and National Mapping and Resource Information Agency (NAMRIA) were solicited and have been integrated in the current draft based on the discussions during the meetings held on 11 June 2019 and 27 June 2019.

For review/consideration and approval.

  
MERIDEN E. MARANAN

  
MARLYNN M. MENDOZA

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