

Small Hydro Resource Mapping in Indonesia

SMALL HYDROPOWER MAPPING REPORT

March 2017



This report was prepared by [GESTO](#), [AQUALOGUS](#) and [INDONESIA HYDRO CONSULT](#), under contract to The World Bank.

This is the **final output** from the **small hydro resource mapping component of the activity “Renewable Energy Resource Mapping and Geospatial Planning – Indonesia”** [Project ID: P145273]. This activity is funded and supported by the Energy Sector Management Assistance Program (ESMAP), a multi-donor trust fund administered by The World Bank, under a global initiative on Renewable Energy Resource Mapping. Further details on the initiative can be obtained from the [ESMAP website](#).

The **final report** relating to the Hydropower Database for Indonesia aims to outline national information on small hydropower in Indonesia and it is complemented by two other documents: the *GIS Database User Manual* and the *Small Hydropower Potential in NTT, Maluku, Maluku Utara and Sulawesi Report*. The **Hydropower Database** has been **validated** and has been internally **peer-reviewed**. It will be published via **The World Bank’s main website and listed on the ESMAP website along with the other project outputs** - please refer to the corresponding country page.

Copyright © 2017 THE WORLD BANK
Washington DC 20433
Telephone: +1-202-473-1000
Internet: www.worldbank.org

The World Bank, comprising the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), is the commissioning agent and copyright holder for this publication. However, this work is a product of the consultants listed, and not of World Bank staff. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work and accept no responsibility for any consequence of their use. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

The material in this work is subject to copyright. Because The World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for non-commercial purposes as long as full attribution to this work is given. Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; fax: +1-202-522-2625; e-mail: pubrights@worldbank.org. Furthermore, the ESMAP Program Manager would appreciate receiving a copy of the publication that uses this publication for its source sent in care of the address above, or to esmap@worldbank.org.



**SMALL HYDROPOWER MAPPING AND IMPROVED
GEOSPATIAL ELECTRIFICATION PLANNING
INDONESIA**

SMALL HYDROPOWER MAPPING REPORT

March 2017

TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	SYNOPSIS.....	1
1.2	ESMAP	1
1.3	THE CONSULTANT	2
1.4	OBJECTIVES.....	3
1.5	METHODOLOGY.....	5
1.6	CONTENT OF THE REPORT	6
2	DATA COLLECTION	7
2.1	CONTEXT.....	7
2.2	DATA REQUESTED	7
2.3	BACKGROUND DATA.....	10
2.3.1	<i>Context.....</i>	10
2.3.2	<i>Hydrological Data</i>	10
2.3.3	<i>Administrative Divisions</i>	17
2.3.4	<i>Electricity Sector Data.....</i>	20
2.3.5	<i>Morphological data</i>	21
2.3.6	<i>River Network</i>	23
2.3.7	<i>Land Cover</i>	24
2.3.8	<i>Forest Areas.....</i>	26
2.3.9	<i>Geology data</i>	28
2.3.10	<i>Topographic Maps</i>	29
2.3.11	<i>Roads</i>	30
2.4	SHP DATA.....	31
2.4.1	<i>Context.....</i>	31
2.4.2	<i>Initial Compilation</i>	32
2.4.3	<i>Hydro Inventory Study – 1997</i>	32
2.4.4	<i>IPP & PLN Feasibility Studies.....</i>	33
2.4.5	<i>Other Sources.....</i>	33
2.4.6	<i>Screening Process</i>	33
3	GIS DATABASE.....	35
3.1	INTRODUCTION	35
3.2	SOFTWARE AND HARDWARE OPTIONS.....	36
3.2.1	<i>Context.....</i>	36
3.2.2	<i>GIS Software</i>	36
3.2.3	<i>Database Software</i>	37
3.2.4	<i>Hardware</i>	40
3.2.5	<i>Hosting, Operation and Maintenance of the GIS Database.....</i>	40
3.3	BACKGROUND DATA.....	40
3.3.1	<i>Hydrological data</i>	40
3.3.2	<i>Administrative Divisions</i>	42
3.3.3	<i>Electricity Sector data</i>	45
3.3.4	<i>River Network</i>	46

3.3.5	<i>Forest Areas</i>	47
3.3.6	<i>Geology data</i>	48
3.3.7	<i>Topographic Maps</i>	48
3.3.8	<i>Roads</i>	48
3.4	SHP DATA.....	49
3.4.1	<i>Comprehensive list</i>	49
3.4.2	<i>List of most promising sites</i>	54
3.4.3	<i>PLN SHP Planning</i>	55
3.5	DATABASE DESIGN.....	56
3.6	CAPACITY BUILDING.....	58
4	MAPS AND INFORMATION ON SHP	59
4.1	PROJECT INFORMATION.....	59
4.2	MAPS OF FINDINGS.....	65
5	CONCLUSIONS	85
	REFERENCES	86

FIGURES

Figure 2.1 – Objectives of the project Small Hydropower Mapping in Indonesia and Improved Geospatial Planning.....	4
Figure 2.2 – Workflow with the technical approach and methodology from the Consultant.....	6
Figure 3.1 – Rainfall gauges (Hydro Inventory Study 1997 data [1], Consultant processing).....	11
Figure 3.2 – Runoff gauges (Hydro Inventory Study 1997 data [1], Consultant processing).....	13
Figure 3.3 – Faulty daily data per month in station Sabang/Cut Bau and Palembang/St. M. Ba [3].....	14
Figure 3.4 – Rainfall Atlas of Indonesia [4].....	15
Figure 3.5 – Mean annual rainfall in Indonesia (WorldClim data [5], Consultant processing).....	16
Figure 3.6 – Mean annual temperature in Indonesia (WorldClim data [5], Consultant processing).....	17
Figure 3.7 – Administrative divisions, regency level (GADM data [6], Consultant processing).....	18
Figure 3.8 – Administrative divisions of Sulawesi, NTT, Maluku and Maluku Utara, district level (Census 2010 data [7], Consultant processing).....	19
Figure 3.9 – Administrative divisions of Sulawesi, NTT, Maluku and Maluku Utara, village level (parallel contract on Geospatial Electrification Planning data, Consultant processing).....	20
Figure 3.10 – Electricity network (Hydro Inventory Study 1997 [1] and RUPTL 2016-2025 [8] data, Consultant processing).....	21
Figure 3.11 – Digital global elevation data (SRTM data [9], Consultant processing).....	22
Figure 3.12 – River network (info-geospatial data [10], Consultant processing).....	24
Figure 3.13 – Land Cover (MoFo data [11], Consultant processing).....	25
Figure 3.14 – Land Cover (<i>GlobCover</i> 2010 data [12], Consultant processing).....	26

Figure 3.15 – Forest areas (MoFo data [11], Consultant processing).....	27
Figure 3.16 – Geology map (Hydro Inventory Study 1997 data [1], Consultant processing).	29
Figure 3.17 – BIG Cartograms by region [13].	30
Figure 3.18 – Roads network (VMAP data [14], Consultant processing).....	31
Figure 4.1 – Screenshots of the plug-in developed for the SHP GIS Database.....	36
Figure 5.1 – Distribution of hydropower projects per Island and Wilayah.	60
Figure 5.2 – Distribution of Large (LHP) and Small (SHP) hydro per Island and Wilayah.	61
Figure 5.3 – Distribution of SHP per Island and Wilayah.....	62
Figure 5.4 – Total capacity (MW) per Island and identified developer.	64
Figure 5.5 – Identified SHP – Wilayah Aceh.....	65
Figure 5.6 – Identified SHP – Wilayah Sumatera Utara.	66
Figure 5.7 – Identified SHP – Wilayah Riau dan Kepulauan Riau.....	67
Figure 5.8 – Identified SHP – Wilayah Sumatera Barat.	68
Figure 5.9 – Identified SHP – Wilayah Sumatera Selatan, Jambi dan Bengkulu.	69
Figure 5.10 – Identified SHP – Distribusi Lampung.....	70
Figure 5.11 – Identified SHP – Distribusi Banten.....	71
Figure 5.12 – Identified SHP – Distribusi Jawa Barat.	72
Figure 5.13 – Identified SHP – Distribusi Jawa Tengah dan DI Yogyakarta.....	73
Figure 5.14 – Identified SHP – Distribusi Jawa Timur.	74
Figure 5.15 – Identified SHP – Distribusi Bali.....	75
Figure 5.16 – Identified SHP – Wilayah Nusa Tenggara Barat.	76
Figure 5.17 – Identified SHP – Wilayah Nusa Tenggara Timur.	77
Figure 5.18 – Identified SHP – Wilayah Kalimantan Barat.....	78
Figure 5.19 – Identified SHP – Wilayah Kalimantan Selatan dan Kalimantan Tengah.....	79
Figure 5.20 – Identified SHP – Wilayah Kalimantan Timur dan Kalimantan Utara.	80
Figure 5.21 – Identified SHP – Wilayah Sulawesi Selatan, Sulawesi Tenggara dan Sulawesi Barat.....	81
Figure 5.22 – Identified SHP – Wilayah Sulawesi Utara, Sulawesi Tengah dan Gorontalo.....	82
Figure 5.23 – Identified SHP – Wilayah Maluku dan Maluku Utara.	83
Figure 5.24 – Identified SHP – Wilayah Papua dan Papua Barat.	84

TABLES

Table 3.1 – Requested data.	8
Table 3.2 – Comparison between alternative DEM datasets.	23

Table 3.3 – Indonesian categories of Forest Areas.....	26
Table 4.1 – Comparison between QGIS and ArcGIS.	37
Table 4.2 – Popular relational database management systems (ORDBMS).....	38
Table 4.3 – Column description of the Hydrological data – Rainfall Gauges.....	41
Table 4.4 – Column description of the Hydrological data – Runoff gauges.....	42
Table 4.5 – Column description of the Administrative divisions – Islands.	43
Table 4.6 – Column description of the Administrative divisions – Provinces.....	43
Table 4.7 – Column description of the Administrative divisions – Regencies.	43
Table 4.8 – Column description of the Administrative divisions – Districts.	44
Table 4.9 – Column description of the Administrative divisions – Villages.	44
Table 4.10 – Column description of the Administrative divisions – PLN Wilayahs.....	45
Table 4.11 – Column description of the Electricity Sector – Generation projects.....	45
Table 4.12 – Column description of the Electricity Sector – Transmission Lines.	46
Table 4.13 – Column description of the Electricity Sector – Substations.	46
Table 4.14 – Column description of the River Network – Rivers.....	46
Table 4.15 – Column description of the River Network – River Basins.	47
Table 4.16 – Column description of the River Network – Water bodies.....	47
Table 4.17 – Column description of the Forest Areas.	47
Table 4.18 – Column description of the Geology data – Formations.....	48
Table 4.19 – Column description of the Geology data – Faults.....	48
Table 4.20 – Column description of the Topographic maps.....	48
Table 4.21 – Column description of the Roads network.	49
Table 4.22 – Column description of the SHP – Comprehensive compilation.	49
Table 4.23 – Column description of the SHP – List of most promising sites.	54
Table 4.24 – Column description of the SHP – PLN SHP Planning.....	55
Table 4.25 – Database and plug-in tables’ correspondence.....	57
Table 5.1 – Distribution of the hydropower projects per Island and Wilayah.	60
Table 5.2 – Distribution of SHP per Island and Wilayah.....	62
Table 5.3 – Indonesian SHP status.....	63
Table 5.4 – Indonesian SHP developer’s categories.	63

ANNEXES

Annex I – Unprocessed SHP Data

Annex II – GIS Database User’s Manual

Annex III – GIS and ORDBMS Training Presentation and Materials

Annex IV – IPP’s SHP List

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ADB	<i>Asian Development Bank</i>
ASTER	<i>Advanced Spaceborne Thermal Emission And Reflection Radiometer</i>
BIG	<i>Badan Informasi Geospasial (Geospatial Information Agency)</i>
BMKG	<i>Badan Meteorologi, Klimatologi, Dan Geofisika (Indonesian Agency For Meteorology, Climatology And Geophysics)</i>
BPS	<i>Badan Pusat Statistik (Statistics Indonesia)</i>
CSP	<i>Concentrated Solar Power</i>
DEM	<i>Digital Elevation Model</i>
DivEBT	<i>Divisi Energi Baru Dan Terbarukan (New And Renewable Energy Division)</i>
ESMAP	<i>The Energy Sector Management Assistance Program</i>
FIT	<i>Feed-in-tariff</i>
GADM	<i>Global Administrative Areas</i>
GEP	<i>Geospatial Electrification Planning</i>
GIS	<i>Geographic Information System</i>
GNS	<i>Geonet Names Server</i>
HEEP	<i>Hydroelectric Power Plant</i>
HPPS	<i>Hydro Power Potential Study</i>
IHC	<i>Indonesia Hydro Consult</i>
IPP	<i>Independent Power Producer</i>
JICA	<i>Japan International Cooperation Agency</i>
KEN	<i>Kebijakan Energi Nasional (National Energy Policy)</i>
LCOE	<i>Levelized Cost Of Electricity</i>
LHP	<i>Large Hydropower Project</i>
MEMR	<i>The Ministry Of Energy And Mineral Resources Of Indonesia</i>
METI	<i>The Ministry Of Economy, Trade, And Industry Of Japan</i>
MoFo	<i>The Ministry Of Forestry Of Indonesia</i>
NASA	<i>United States National Aeronautics And Space Administration</i>
NCAR	<i>National Center For Atmospheric Research</i>
NCEP	<i>National Centers For Environmental Prediction</i>
NOAA	<i>National Oceanic and Atmospheric Administration</i>
NTB	<i>Nusa Tenggara Barat</i>
NTT	<i>Nusa Tenggara Timur</i>
ORDBMS	<i>Object-Relational Database Management Systems</i>
PLN	<i>Perusahaan Listrik Negara (State Electricity Company)</i>
PPA	<i>Power Purchase Agreement</i>
RE	<i>Renewable Energy</i>
RUKN	<i>Rencana Umum Ketenagalistrikan Nasional (Electricity Master plan)</i>
RUPTL	<i>Rencana Usaha Penyediaan Tenaga Listrik (Electrification Development Program)</i>
SHP	<i>Small Hydropower Project</i>

SRTM	<i>Shuttle Radar Topography Mission</i>
TRMM	<i>Tropical Rainfall Measuring Mission</i>
USAID	<i>United States Agency For International Development</i>
USGS	<i>United States Geological Survey</i>
VMAP	<i>Vector Map</i>
WB	<i>World Bank</i>
WMO	<i>World Meteorological Organization</i>

1 INTRODUCTION

1.1 SYNOPSIS

The *Small Hydropower Mapping and Improved Geospatial Electrification Planning in Indonesia* project (Selection No. 1125330), is an initiative administered by the Energy Sector Management Assistance Program (ESMAP), whose objective is to facilitate and improve the planning and investment process for small hydropower development in both grid and isolated systems through:

- a) Building up a central database on small hydropower at national scale and validating the mapping of small hydropower in NTT, Maluku, Maluku Utara and Sulawesi
- b) Improved electrification planning by integrating small hydropower potential for the provinces of NTT, Maluku, Maluku Utara and Sulawesi into the planning process

The current document represents the *Small Hydropower Mapping Report* that aims to outline national information on small hydropower in Indonesia. It is complemented by two other documents: the *GIS Database User's Manual* and the *Small Hydropower Potential in NTT, Maluku, Maluku Utara and Sulawesi Report*.

The next sub-sections further explain the background, objectives and content of the document.

1.2 ESMAP

ESMAP is a global knowledge and technical assistance program administered by The World Bank and supported by 11 bilateral donors. ESMAP's efforts focus on energy security, energy access, and climate change, and involve three core services: i) analytical work, ii) knowledge clearinghouse, and iii) operational support to The World Bank regions for technical assistance work at the country level.

Carrying out RE resource mapping and geospatial analysis at the country level helps to scale up the deployment of biomass, small hydro, solar and wind electricity generation, particularly in countries where one or more of these sources of power are underdeveloped. This is because such mapping is a crucial step to developing a policy framework to guide investment in RE electricity generation which, along with publicly-available data, helps reduce transaction costs and speeds up deployment by providing commercial developers with:

- Increased certainty that projects are likely to be approved or permitted with minimal bureaucracy and delay
- Data transparency and a level playing field, thereby reducing barriers to the entry and limiting the scope of corruption
- A baseline of reliable data that can help guide prospecting activities and can be used for data verification purposes
- A better informed off-taker or purchasing authority, thereby improving the price negotiation process

In response, ESMAP has launched a new initiative to support country-driven efforts to improve RE resource awareness, put in place appropriate policy frameworks for RE development, and provide “open access” to resource and geospatial mapping data. One of the key elements of this ESMAP initiative was to select consulting firms and establish framework agreements for the procurement of resource data and mapping services. On the scope of “Small Hydropower Resource Data and Mapping Service”, the Consultant Consortium headed by Gesto Energy Consulting (GESTO), also including Aqualogus, Engenharia e Ambiente (AQUALOGUS) and GAF AG was successfully selected for the framework agreement with The World Bank.

The current project “Small Hydropower Mapping and Improved Geospatial Planning” is under the scope of the framework agreement with The World Bank.

For the renewable energy mapping based on hydropower, The World Bank hired qualified consulting firms with demonstrated capabilities in providing small hydropower resource mapping and related services. The Indefinite Delivery Contract commenced on May 28, 2013, and is expected to end by 2017. The tender for *Small Hydropower Mapping and Improved Electrification Planning in Indonesia* was released under this contract in late 2013.

For this particular tender, the Consultant’s Association (CONSULTANT) is led by GESTO, and includes AQUALOGUS and Indonesia Hydro Consult, as a local partner.

After the tenders’ evaluation in early 2014, the World Bank informed the CONSULTAT that it was chosen to perform the Project. After a period of negotiation the Contract was signed on February 12 2014.

The project was built on previous efforts for the assessment of renewable energy potential and electrification funded by The World Bank (ASTAE-AusAID-ESMAP), ADB, AusAid, Norwegian Government, USAID and others. The resource mapping activity is part of a broader World Bank program of technical assistance that will assist in the implementation of the 1,000 Island Electrification Program via scaling up renewable energy, resource mapping, geospatial planning and capacity building of key stakeholders in each of the above areas.

1.3 THE CONSULTANT

GESTO, the leading partner, is an international consultant specialized in energy and in the evaluation of renewable resources. GESTO has know-how and experience in the development of renewable energy policy as well as master plans and supports all phases of renewable energy project development.

With a wide scope of expertise, including but not limited to, hydro resource study and evaluation, project analysis and prioritization, and support for projects development, GESTO track record includes, not only, resource mapping - more than 15 resource maps in the last 4 years – but also, the development of Hydro Atlas and projects identification for Cape Verde, East Timor, Mozambique and Angola, and a 5 MW Solar plant development in Cape Verde (Santiago Island) - the largest built in Africa at that time.

Currently, GESTO presents a worldwide portfolio of concluded and on-going projects: Renewable Energy Roadmap to 2020 (Cape Verde), Concentrated Solar Power (CSP) Plant Pre-Feasibility Study (Namibia), Mozambique Renewable Energy Atlas, Angola Energy Vision to 2025, Renewable Electrification Plan of East Timor and Project Development for Renewable Auctions in South Africa.

AQUALOGUS core business is dedicated consultancy and engineering design services in water and environmental projects. The company has 16 years' experience in hydropower projects evaluation, feasibility assessment and design. It has recently developed/participated a number of studies and designs of hydropower schemes, dams and environmental assessments, worth highlighting the evaluation of the small hydropower potential (<10 MW) potential for the Portuguese territory and the Tagus hydrologic region hydropower potential mapping and location, as well as the following related projects:

- Medium and small hydropower plants: more than 30 studies and designs in the last 10 years, with installed power ranging from 500 kW to 30 MW, in Portugal, Mozambique, Cape Verde and Brazil.
- Large dam designs: several embankment and concrete structures for hydro agricultural schemes (mostly in the large multipurpose Alqueva project), hydropower and water supply (detailed design in the last 5 years of Fridão 35 m gravity dam, Daivões 75 m gravity dam, Odelouca 76 m earth dam).
- Environmental impact assessment studies of hydropower plants (more than 15 in the last 10 years) and of hydraulic schemes (more than 20 000 ha of irrigation projects).

Indonesia Hydro Consult (IHC) is one of the fastest growing hydro engineering consulting service companies in Indonesia. They are leading providers of hydro project solutions and provide high quality on-site and remote consulting services for growing hydro developers nationwide and give them a significant development benefit. Their objective is to enhance the success of their clients by providing solutions for projects and cost-effective consulting services for their business needs.

IHC has expertise in the field of hydro engineering nationwide in Indonesia. The experience gained from site reconnaissance, planning and studies, design and design reviews, and construction assistances have made them capable to offer comprehensive consultancy services. Their benefits from the previous projects enable them to offer improvement at every step of the project. Their experience and resources enable innovative development to assemble project teams quickly, based on the technical requirements of each project.

1.4 OBJECTIVES

After the 2013 Scoping Mission by the ESMAP team in Jakarta it was concluded that small hydropower can play a role in clean power generation in Indonesia, and that there was interest from both the public and private investors to develop small hydropower, but that there lacked promotion and coordinated planning of small hydropower development. Hence the ESMAP current contribution for small

hydropower in Indonesia (Small Hydropower Mapping and Improved Geospatial Planning in Indonesia) has an overall objective to mainstream small hydropower into the planning process for generation growth and electrification planning in Indonesia.

More precisely the consultancy services have the specific purpose to facilitate and improve the planning process of small hydropower in both grid and isolated systems through establishment of GIS-based databases, which will help PLN to optimize development and avoid conflicts with long-term maximized utilization of the resource and to promote and facilitate the role of small hydropower in remote areas and in isolated grid systems, where the need is to go from planning small hydropower based on maximized capacity and least cost of energy, to customizing schemes to demand to get the highest benefit of substituting fossil fuel generating plants.

The objectives of the project are schematically presented in Figure 1.1.



Figure 1.1 – Objectives of the project Small Hydropower Mapping in Indonesia and Improved Geospatial Planning.

Moreover, the consultancy services will be done in parallel on two vectors following PLN's interest:

- Building up a central database on small hydropower at a national scale to be housed in PLN's central office in Jakarta.
- Improved electrification planning by integrating small hydropower potential for the provinces of NTT, Maluku, Maluku Utara, and Sulawesi in eastern Indonesia.

The two components will be linked through developing the national database on small hydropower in such a way that it can feed input to the geospatial electrification planning tool, which is in the long-term aimed to be implemented for the entire country.

1.5 METHODOLOGY

The Terms of Reference requested the work to be grouped into two main activities:

- Activity 1 – Data collection and production of a national small hydropower GIS database, review and validation of small hydropower potential for NTT, Maluku, Maluku Utara and Sulawesi
- Activity 2 – Support to the inclusion of small hydropower potential to the geospatial electrification planning for NTT, Maluku, Maluku Utara and Sulawesi

As an optional activity, a training component was requested and contracted within the scope of the project. The training activity aims to provide PLN the required skills to host, operate and further develop the National Database, as well as to perform the required analysis to prioritize the Small Hydropower Projects (SHP) in the region, according to the established multi-criteria analysis.

The objectives of Activity 1 are:

- To carry out an inception phase and draw an inception report
- To create a GIS database for national information on SHP development
- To create the list of the most promising SHP sites in NTT, Maluku, Maluku Utara and Sulawesi
- To produce the Small Hydropower Mapping Report and promote a workshop for results presentation to client and relevant stakeholders

The objectives of Activity 2 are:

- To create a list of potential SHP sites in NTT, Maluku, Maluku Utara and Sulawesi to be incorporated in the Geospatial Electrification Planning (GEP) Tool
- To draw policy recommendations on the development of SHP in Indonesia
- To produce the Final Report and promote the Final Workshop for the client and relevant stakeholders

For the development of these activities, the Consultant's methodology is best described in the workflow of interconnected sub-activities and tasks presented in Figure 1.2.

SMALL HYDROPOWER MAPPING REPORT

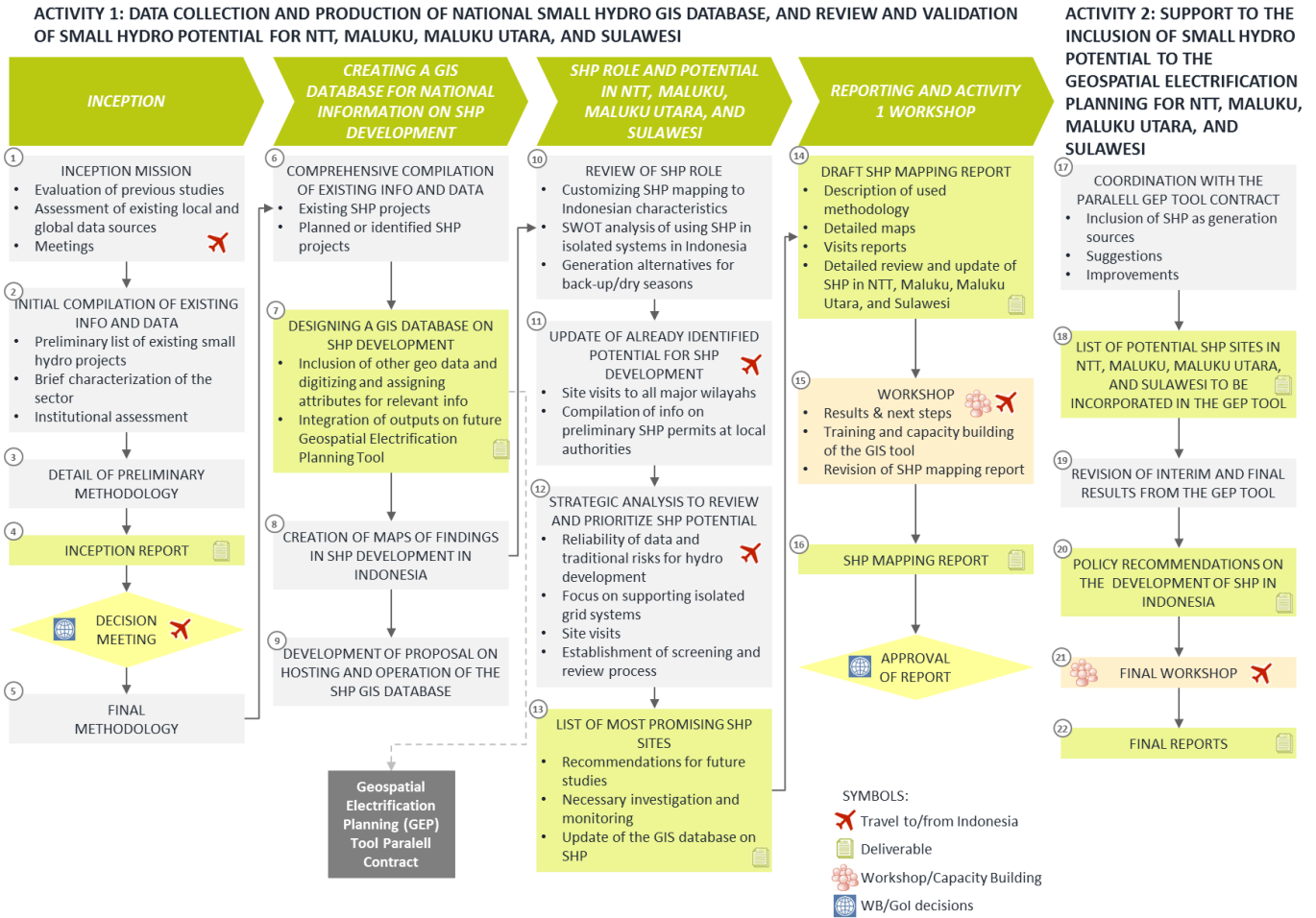


Figure 1.2 – Workflow with the technical approach and methodology from the Consultant.

1.6 CONTENT OF THE REPORT

Chapter 1 is the project’s introduction. Chapter 2 describes the data collection mission in detail. It comprehends all data collected from background information to SHP projects, with the first applied screening process thoroughly described.

Chapter 3 presents the GIS Database, its organization and design. Also presented is the GIS Database User’s Manual that has been developed as a handbook in order to ease its use for all levels of computer literacies.

Finally, Chapter 4 presents the main findings and Chapter 5 the project conclusions.

2 DATA COLLECTION

2.1 CONTEXT

This chapter presents the data collected throughout the entire duration of the project, organized by data requested, background data and SHP data.

On the data requested sub-chapter, all data from major stakeholders considered at some point of the project as relevant and requested for the small hydropower database or for the Small Hydro assessment is presented with special focus on its source and respective alternatives.

The other two sub-chapters comprehensively cover all data collected. The first, the background data, covers all data gathered that may be relevant for Small hydro assessment, from administrative divisions through hydrological data. At last, the extensive collection of Small Hydro projects task is reported in 2.4, with a detail description of all screening made to exclude as many duplicate or inconsistent projects as possible.

2.2 DATA REQUESTED

During the Inception Mission, PLN was identified as the most relevant holder of information on small hydropower development and some data was therefore requested.

In the sequence of the meetings held with other relevant stakeholders, additional data was found to be useful and requested at said meetings. All the requested data is summarized in Table 3.2 along with the data collected.

Table 2.1 – Requested data.

Requested Data	Document/Info	Source	Collected Data (Y/N)	Format	Alternative available data	Gaps between requested and available data
Hydropower Masterplans	Hydro Inventory Study 1997 – Map info database	PLN	Y	MapInfo	No alternative available.	
	Project for the Master Plan Study of Hydropower Development in Indonesia	JICA	Y	PDF		No gaps identified. Data collected.
List of hydropower projects	PLN list of IPP's request	PLN	Y	xls	No alternative available.	This is the main source of data, according to ToR in order to accomplish the assignment.
	PLN development projects	PLN	Y	xls	No alternative available.	
	RUPTL 2016-2025	PLN	Y	pdf	No alternative available.	The planned electricity sector for the upcoming years is stated in the RUPTL. After careful analysis of the latest document, the locations of small hydropower plants were digitized.
Existing Dams	List and characteristics of existing dams, with geographical information	Department of Water Resources (Ministry of Public Works)	N		Consultant research on global datasets.	This database would allow us to have more certain in the characteristics of the existing dams, but since it was not possible to collect, the Consultant researched related info on global datasets.
Existing Hydropower Plants	RUPTL	PLN	Y	Pdf		The existing hydropower plants are stated in the RUPTL. After careful analysis of the document, the location of the hydropower and small hydropower plants were digitized.
	PLN database	PLN	Y	xls	No alternative available.	
Temporal datasets	Stream gauge stations	Department of Water Resources (Ministry of Public Works)	N	xls	The Consultant's software Evapower.	Without any stream records provided, it was used the Consultant software <i>Evapower</i> to assess river hydrology.
	Meteorological stations	Badan Meteorologi, Klimatologi, dan Geofisika (BMKG)	N	Xls	The global datasets may provide an alternative, but the quality of information lowers the quality of the outcomes. For the rainfall the rainfall Atlas of Indonesia presents more accurate results.	Without any meteorological records provided by the BMKG, it was assessed the quality of WMO data from a few stations. Since this had too much missing records for a statistical analysis, the Rainfall Atlas of Indonesia was used for a preliminary assessment. For the temperature it was used the temporal dataset from WorldClim.
Spatial datasets	Electrical grid	PLN	N	Vector format	Hydro Inventory Study 1997 – Map info database and RUPTL 2026-2025.	Without any spatial information provided, the electrical grid was based on the Hydro Inventory Study 1997, and updated for NTT, Maluku, Maluku Utara and Sulawesi, the focus regions of this project by digitizing the RUPTL 2016-2025.
	Forest areas	Ministry of Forestry (MoFo)	Y	Vector format		No gaps identified. Data collected.
	Protected areas	Ministry of Environment	N	Vector format	World Database on Protected Areas	The global dataset is a comprehensive source, but the involvement of the competent authority promotes the acceptance of the study findings.
	Land use	GlobCover	Y	Raster Format		GlobCover released a more recent Land Cover, from 2010, than the available in the MoFo database (Landsat 2000). It is considered that the information of GlobCover is sufficient for the execution of the assignment.
	Isohyets	Badan Meteorologi, Klimatologi, dan Geofisika (BMKG)	N	Raster or vector format	Rainfall Atlas of Indonesia or Global datasets with mean rainfall (worldclim, reanalysis, etc.)	The Rainfall Atlas of Indonesia document has the Indonesia isohyets that were used throughout this project, but the spatial datasets would have improved the workability of this information on the database.
	Isotherms	Badan Meteorologi, Klimatologi, dan Geofisika (BMKG)	N	Raster or vector format	Global datasets with mean temperature (worldclim, reanalysis, etc.)	No records were obtained to assess the quality of the World Clim global dataset, but given the generic good accuracy of this global dataset, it was used.
	Digital Elevation Model (BIG)	PLN	N	Raster format	Shuttle Radar Topography Mission (SRTM) or Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER).	BIG is a smaller scale DEM, improving the outcomes in relation with the big scale DEMs as SRTM and ASTER, but since it was not provided it was used the SRTM DEM.

Requested Data	Document/Info	Source	Collected Data (Y/N)	Format	Alternative available data	Gaps between requested and available data
Spatial datasets	Road and Railroad network	PLN	N	Vector format	Vector Map Level O (VMAPO)	The information in VMAPO is not detailed, but given the scope of the work, roads and rails may not be a strong restriction to hydropower development. Therefore, since no official or local information were available, this global dataset was adopted for the project.
	Land property	PLN	N	Vector format	No alternative available	
	Contour data	Badan Informasi Geospasial (BIG)	N	Vector format	Derived from DEM	The quality of the DEM affected the quality of the contours derived from them. Official information is more reliable.
	Streams and rivers		N	Vector format	Derived from DEM	The quality of the DEM affected the quality of the streams and rivers derived from them. Non-official information was used to assess and to name them.
	Administrative boundaries		N	Vector format	Global Administrative Areas (GADM), version 2.0, January 2012. Census 2010 public maps.	The global dataset is a comprehensive source, but the involvement of the competent authority will supports the authenticity of the information.
	Topographic maps		N	Raster format	No alternative available	
	Settlements and population	Badan Pusat Statistik (BPS) or Badan Informasi Geospasial (BIG)	N	Vector format	Global databases - Vector Map Level O (VMAPO) or Geonet names server (GNS)	The information of the parallel contract for Geospatial electrification permits a single and unified assessment of the load demand. The source information is from BIG/BPS. It was acquired by PLN for the parallel contract and is required in this project, but only for NTT, Maluku and Maluku Utara regions was provided. The global dataset does not allow inferring the population, though it was useful to find locations and populated places.
Legal framework	Environmental legislation	Government of Indonesia issued Government Regulation No. 27 of 2012	Y	Pdf	-	-
		State Ministry of Environment Decree No.11/2006	Y	Pdf	-	-
	Forestry legislation	Law of the Republic of Indonesia No. 41 of 1999	Y	Pdf	-	-
		Forestry Minister Regulation No.16 of 2014	Y	Pdf	-	-
	Dam licensing and hydropower process description	Law of the Republic of Indonesia No. 2 of 2012	Y	Pdf	-	-
		Law of the Republic of Indonesia No. 7 of 2004	y	Pdf	-	-

2.3 BACKGROUND DATA

2.3.1 CONTEXT

The background data is essential for the evaluation/design of SHP solutions, as it is easily assessed by the data present on the next sub-chapters.

It should be stressed that although all background data collected has its relevance in SHP planning, not all should be included into the GIS Database considering data format and/or size. If all collected data were to be included into the GIS database, the database would lose its ease and quickness of use that is essential for SHP planning. Regardless, the plug-in developed by the Consultant to ease the database workability was intentionally very open to allow the addition of all type of data for an optimal assessment.

2.3.2 HYDROLOGICAL DATA

2.3.2.1 RAINFALL GAUGES

One of the most important variables when developing hydrologic studies is the mean rainfall on the watershed over a series of years. This variable is obtained by processing the rainfall depth measured over a short period of time (seasons, months, days or even hours) by a rainfall gauge.

The rainfall depth is often measured by recording gauges, which automatically record this variable in short periods of time (down to 1 minute, in some cases). This type of gauge is geared with a bucket that collects rainfall and is then translated into a vertical movement by means of a pen on a chart. However, the rainfall depth may also be measured by *non-recording* gauges, in which the rainfall depth is read manually at longer time intervals, usually in remote, sparsely inhabited areas.

After collecting rainfall, there are two types of data that may be stored in tables, *raw data* and *processed data*. The first type of data is directly read from the bucket and must be processed before used in any hydrological study. Note that this type of data is not continuous as the bucket must be emptied before reaching its full capacity. However, when storing these two types of data in a table, there is common information that must complement the values of rainfall depth, such as: the gauge identification (name and ID), the hydro-meteorological network and administrative divisions where the gauge is located, it's respective coordinates and also the time when the data was collected.

After processing the data the rainfall depth measured over a period of time multiple to twelve hours may be obtained. Note that from the same rainfall record a sub-diary rainfall depth over a period of 12h could also be obtained. In this case, a table with twice as the number of rows in would be the output.

Unfortunately, the rainfall data in Indonesia it's not easy to obtain on a digital format. Moreover given the mass amount of information that would be required to digitize, the difficult to maintain up-to-date and the minor quality lost comparing to other sources for the SHP planning at a desktop level this type of information was not included into the database. It also should be stressed that this database main purpose is SHP planning and for that reason it was added all known rainfall gauges stations with IDs, Figure 2.1, to ease the area of influence analysis of any watershed. That way, when necessary the reviewer may know the stations ID for data collection.

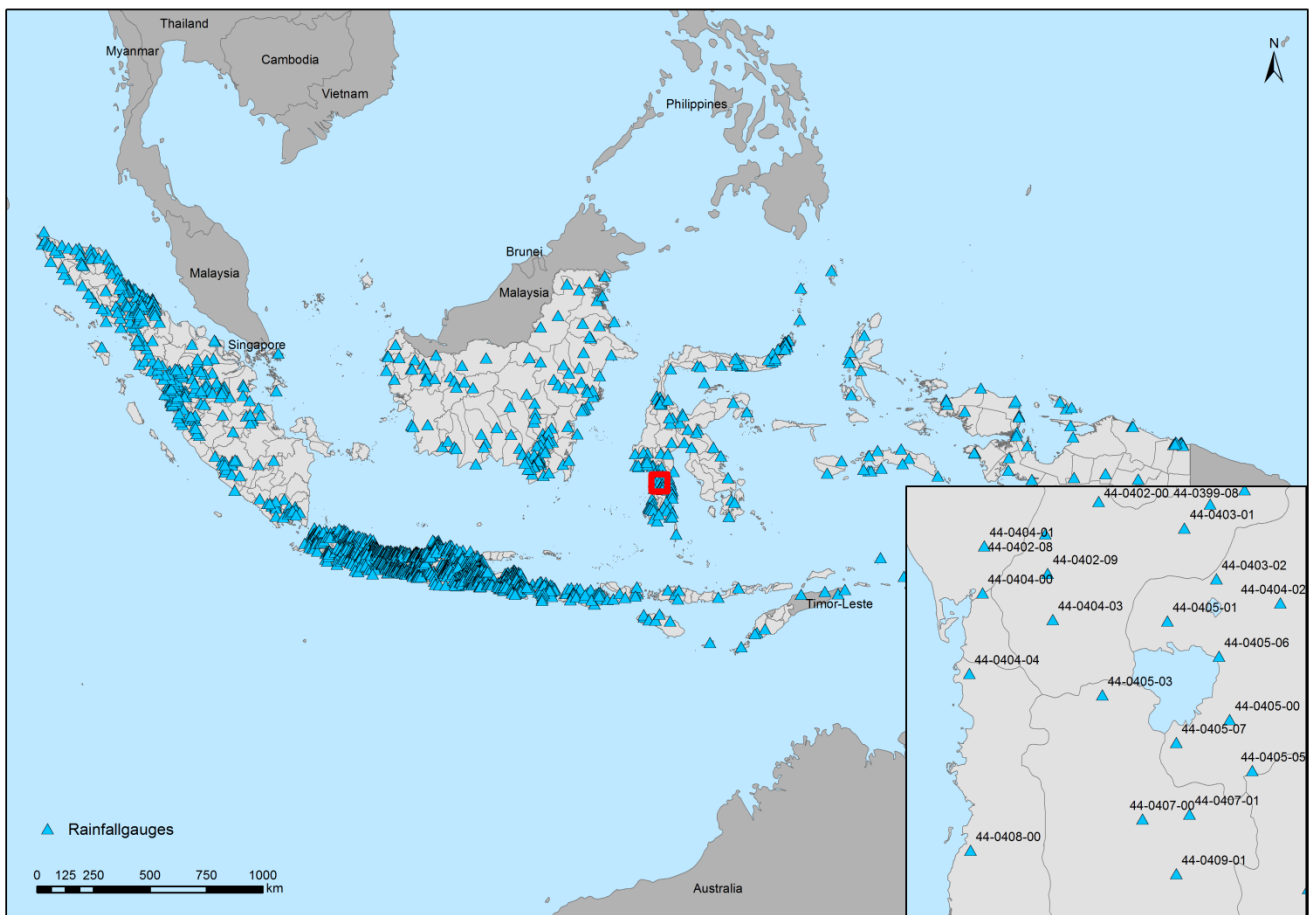


Figure 2.1 – Rainfall gauges (Hydro Inventory Study 1997 data [1], Consultant processing).

2.3.2.2 RUNOFF GAUGES

Although this type of device is named *runoff* gauge, the stream flow rate is not directly recorded, even though this variable is one of the most important in hydrologic studies. Instead, water level is recorded and the stream flow rate is deduced by means of a *rating curve* [2]. This curve is constructed by plotting successive measurements of the discharge and height of the water level.

The water level may be recorded either manually or automatically. Manual measurements of the water level are made using *staff gauges*, which use graduated boards set in the water surface. In addition, this variable may also be obtained through the use of sound devices, which measure the time between the emission of the signal and the respective reception at the water surface. However, there are also automatic devices – *bubble gauges* – that sense the water level by bubbling a continuous stream of gas into the water.

In comparison with rainfall depth, the measured water level (*raw data*) must also be processed before used in any hydrological study. As described above, the water level is converted into stream flow rate by means of a rating curve. Once again, when storing these two types of data in a table, there is common information that must complement the values of water level/stream flow rate, such as: the gauge identification (name and ID), the river, river basin and administrative divisions where the gauge is located, it's respective coordinates and also the time when the data was collected.

Unfortunately, Indonesian runoff gauges face the same problem as rainfall gauges, since it's not easy to gather, store or maintain up-to-date the data since its not digitized yet.

Figure 2.2, presents the runoff gauges stations for a project hydrological analysis.

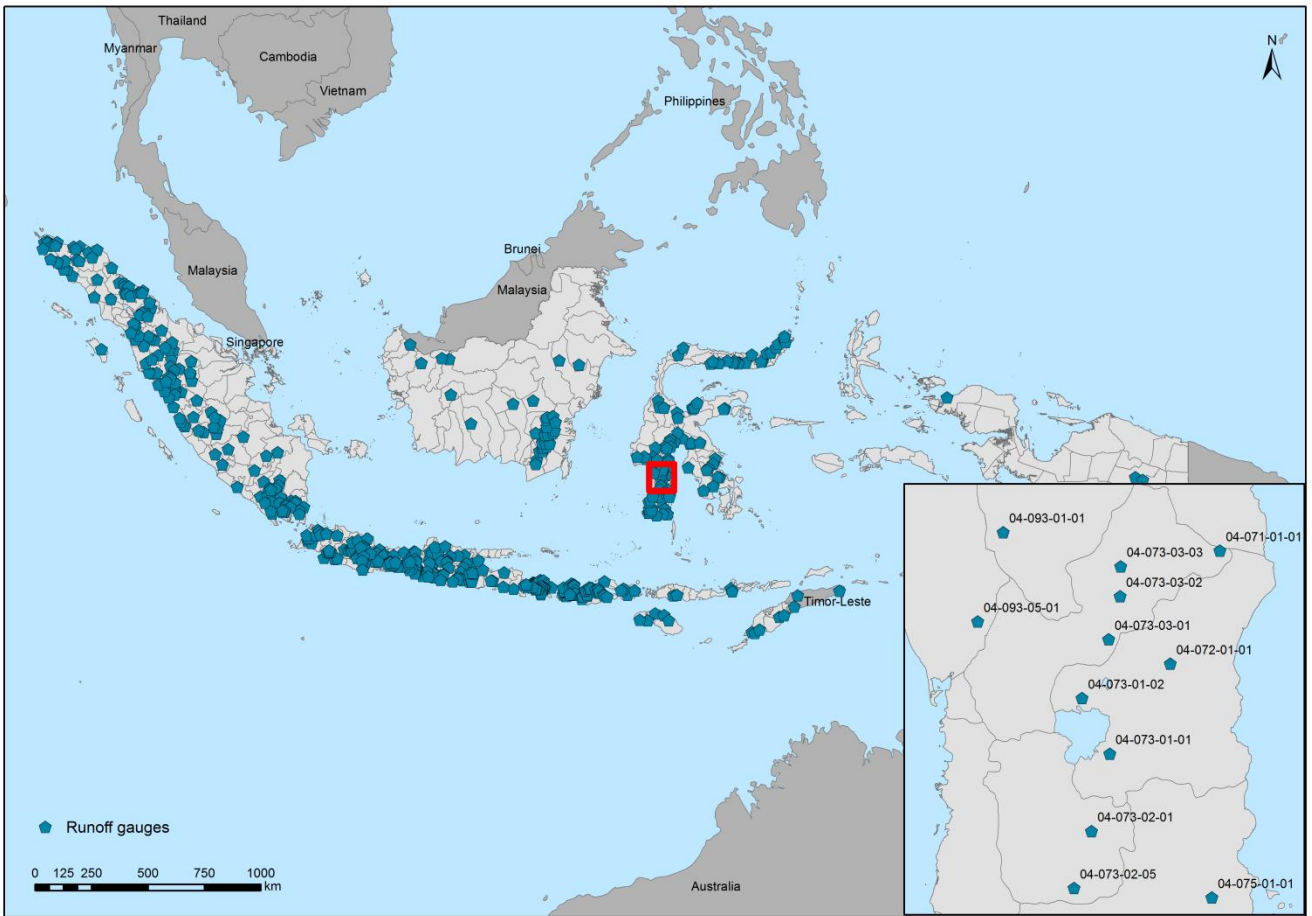


Figure 2.2 – Runoff gauges (Hydro Inventory Study 1997 data [1], Consultant processing).

2.3.2.3 GLOBAL DATA

Both hydrological and meteorological data were requested as presented in sub-chapter 2.2, but since no data from official sources was provided, alternatives were adopted.

Meteorological data on a gauging stations record format was only possible to obtain for rainfall from the stations registered on the World Meteorological Organization, WMO [3].

After a first analysis, the missing and faulty data of WMO registered stations was obtained. An example of the output obtained for some stations is presented in Figure 2.3, where the number of daily data per month missing is shown.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1958	3	3	1	2	3	0	1	1	1	0	0	0
1959	13	8	5	3	6	2	14	7	9	8	13	7
1960	1	2	0	0	0	1	0	0	0	0	11	1
1961	0	0	1	1	3	4	0	0	30	31	0	0
1962	1	0	3	1	1	4	2	29	30	31	30	31
1963	31	28	31	30	31	30	31	31	30	31	30	31
1964	31	29	31	30	31	30	31	31	30	31	30	31
1965	31	28	31	30	31	30	31	31	30	31	30	31
1966	31	28	31	30	31	30	31	31	30	31	30	31
1967	31	28	31	30	31	30	31	31	30	31	30	31
1968	31	29	31	30	31	30	31	31	30	31	30	31
1969	31	28	31	30	31	30	31	31	30	31	30	31
1970	31	28	31	30	31	30	31	31	30	31	30	31
1971	31	28	31	30	31	30	31	31	30	31	30	31
1972	31	29	31	30	31	30	31	31	30	31	30	31
1973	18	13	21	14	19	8	16	7	6	2	13	17
1974	11	11	6	8	3	3	3	9	11	5	4	1
1975	15	10	15	13	8	7	12	6	13	13	14	17
1976	17	11	13	8	5	1	5	8	2	3	2	7
1977	3	4	3	2	2	0	1	1	2	1	1	1
1978	3	4	3	3	2	3	6	2	2	2	7	3
1979	1	1	0	0	1	7	3	0	0	1	0	2
1980	0	0	0	0	1	0	2	3	2	5	1	4
1981	5	0	1	5	4	1	5	8	3	3	5	0
1982	2	3	2	2	3	2	1	0	1	4	3	1
1983	2	0	1	9	2	3	1	4	1	4	0	2
1984	8	7	1	2	3	1	1	2	9	5	5	7
1985	2	2	6	21	15	10	11	1	4	3	4	8
1986	5	12	12	3	20	18	11	8	8	2	4	13
1987	22	21	15	13	15	6	15	12	12	5	8	10
1988	6	10	11	6	4	3	2	6	0	7	5	0
1989	1	7	5	15	17	9	5	17	3	17	20	21
1990	24	10	18	25	28	20	16	22	30	28	23	25
1991	26	23	24	30	31	30	31	27	25	22	28	22
1992	28	23	21	28	31	24	22	24	16	5	5	13
1993	13	0	0	0	3	5	3	0	6	9	5	2
1994	1	2	4	3	1	5	7	0	3	0	0	6
1995	1	0	8	4	0	2	4	1	1	0	1	13
1996	24	21	0	5	1	2	4	6	0	1	1	15
1997	1	0	1	0	0	1	0	2	0	0	7	11
1998	0	0	0	2	0	0	0	2	7	0	9	3
1999	18	10	16	6	6	4	9	5	7	0	0	3
2000	4	2	3	3	1	3	1	4	6	27	2	4
2001	8	14	14	8	8	18	1	6	7	5	7	2
2002	2	3	0	5	3	5	3	1	0	5	2	2
2003	1	2	4	0	0	1	0	0	1	1	0	1
2004	0	0	5	0	0	0	0	1	0	0	0	0
2005	0	0	0	1	0	0	2	2	2	3	4	1
2006	1	0	2	5	2	4	1	0	0	1	0	2
2007	3	1	3	3	0	1	1	1	1	1	2	0
2008	4	2	6	6	2	3	2	7	0	0	2	3
2009	8	4	5	0	3	3	1	0	0	3	2	3

Figure 2.3 – Faulty daily data per month in station Sabang/Cut Bau and Palembang/St. M. Ba [3].

As it can be seen in Figure 2.3, every year shows faulty data that can compromise the accurate development of any hydrological study. Furthermore, during some meetings it was stated that obtaining ground meteo-climate data in Indonesia is very difficult because only few stations are digitally registered and most of them are in hard copies and in handwriting¹.

As an alternative, the Rainfall Atlas of Indonesia was collected, Figure 2.4 [4]. This publication is widely used and accepted as an accurate determination of the mean annual rainfall in Indonesia.

¹ The Consultant’s team own previous experience (via IHC) confirms the difficulty in assessing hydrological data.



Figure 2.4 – Rainfall Atlas of Indonesia [4].

In addition, global data sources such as the World Clim project, the Tropical Rainfall Measuring Mission (TRMM) or the NCEP/NCAR reanalysis were gathered. As an example, Figure 2.5 and Figure 2.6 present the mean annual rainfall and temperature for Indonesia, obtained from data of World Clim [5]. These global data sources allow an estimation of the rainfall and temperature, but it is advisable to have at least some good quality ground stations to assess the global data sources level of accuracy.

Since it was not possible to collect ground station records with suitable settings for a statistical analysis, the Rainfall Atlas for Indonesia was used for the determination of the rainfall and the World Clim dataset for the temperature. Furthermore, the Consultant’s own experience confirms that the Rainfall Atlas is more accurate when compared with Global datasets such as World Clim, although they may still be used for preliminary approaches.

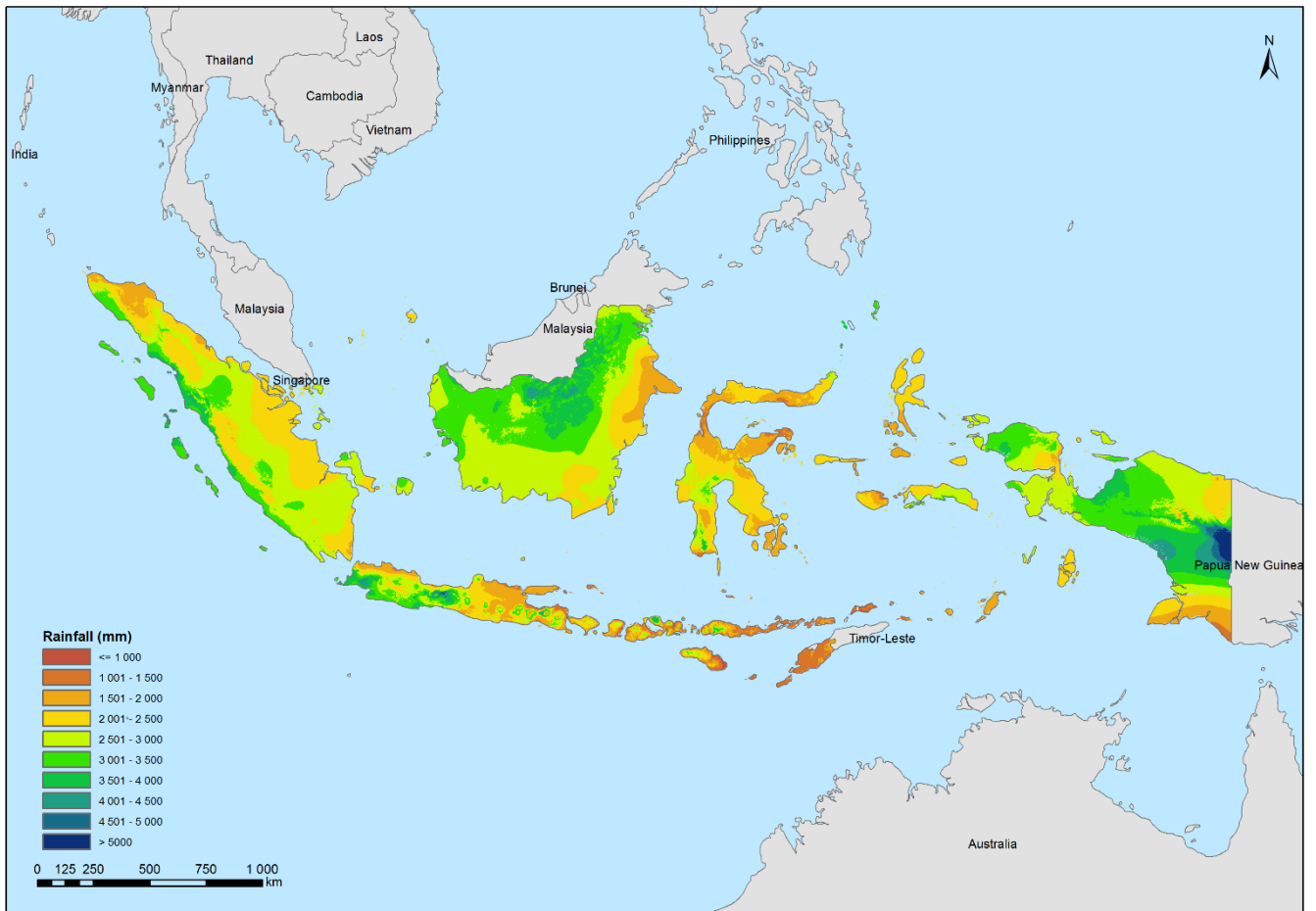


Figure 2.5 – Mean annual rainfall in Indonesia (WorldClim data [5], Consultant processing).

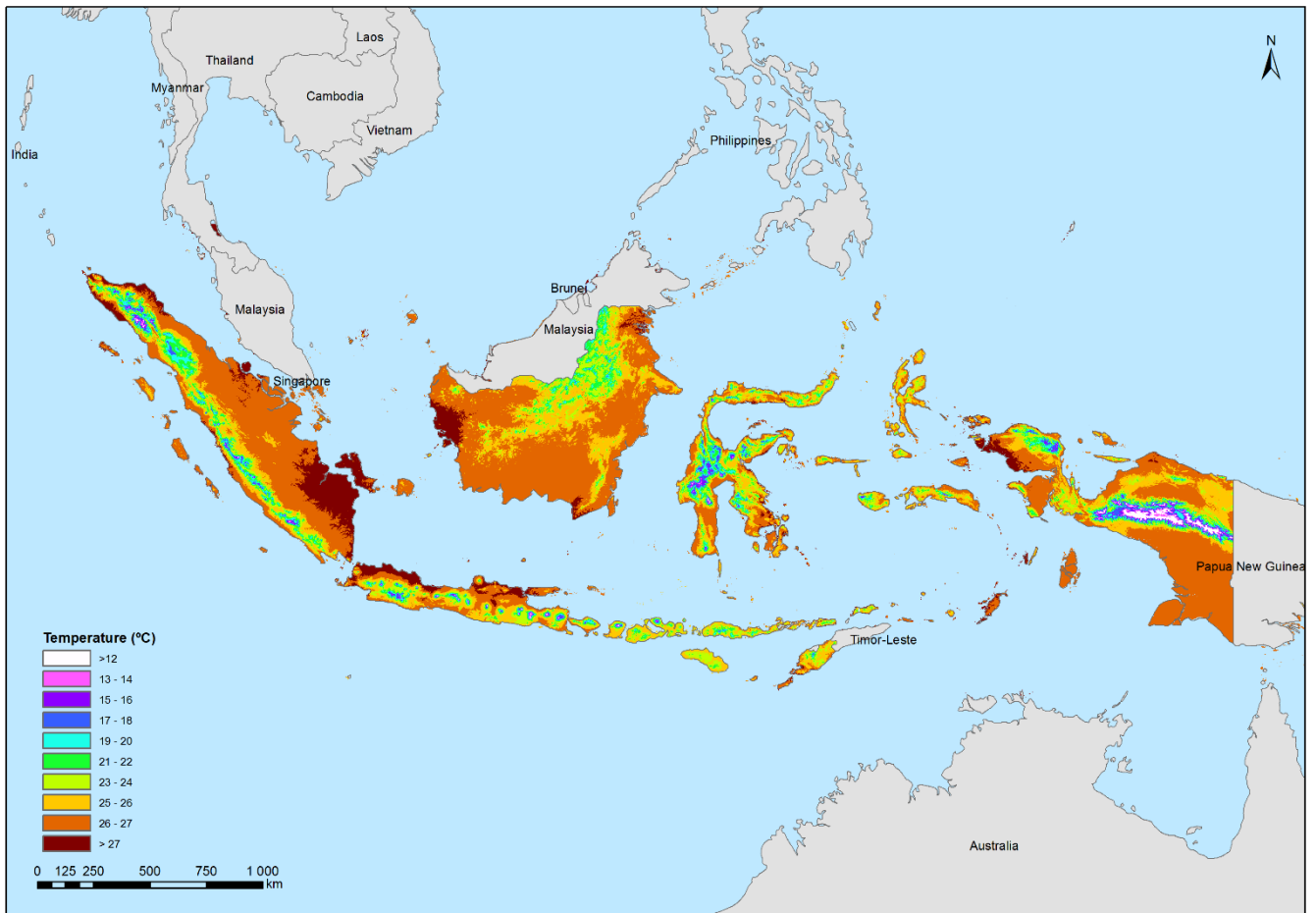


Figure 2.6 – Mean annual temperature in Indonesia (WorldClim data [5], Consultant processing).

2.3.3 ADMINISTRATIVE DIVISIONS

The administrative divisions are crucial to extract local information for the projects and to correctly identify the local entities to be consulted. The Indonesia administrative divisions are: province (provinsi), regency (kabupaten), district (kecamatan) and village (kelurahan/desa).

For this purpose the GADM database of Global Administrative Areas (version 2.0, January 2012) may be used up to the regency level, as showed in Figure 2.7 [6].



Figure 2.7 – Administrative divisions, regency level (GADM data [6], Consultant processing).

For the study areas of Sulawesi, NTT, Maluku and Maluku Utara it was necessary to use a more detailed level of administrative divisions. For that reason, it was necessary to geo-reference the district level maps of the focus regions from the Indonesia Census 2010 and the result is present in Figure 2.8 [7].



Figure 2.8 – Administrative divisions of Sulawesi, NTT, Maluku and Maluku Utara, district level (Census 2010 data [7], Consultant processing).

For NTT, Maluku and Maluku Utara, the others study regions, it was adopted an even more detailed administrative division, a village level division provided by the parallel contract on Geospatial Electrification Planning, Figure 2.9.

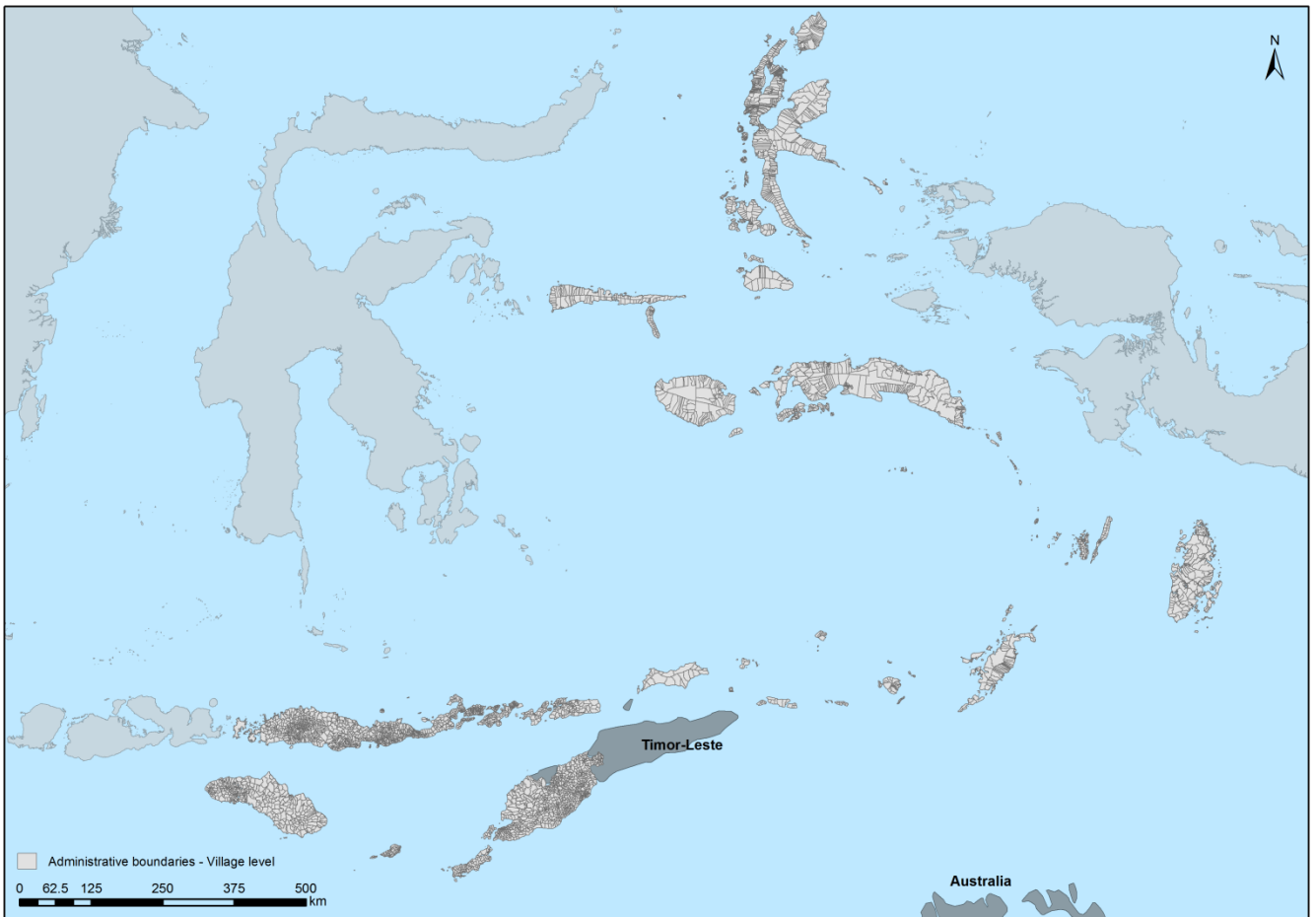


Figure 2.9 – Administrative divisions of Sulawesi, NTT, Maluku and Maluku Utara, village level (parallel contract on Geospatial Electrification Planning data, Consultant processing).

2.3.4 ELECTRICITY SECTOR DATA

The electricity sector data was gathered from two different sources, the Hydro Inventory Study database and from the electricity sector regional maps from the RUPTL 2016-2025.

Part of this information was delivered by the parallel contract on Geospatial Electrification Planning on NTT, Maluku, Maluku Utara², while the remainder of it was gathered from other sources.

² Sulawesi was not under the scope of the parallel contract

On the other hand, although the Hydro Inventory Study database had nationwide spatial data of the electricity grid, substations and power stations, they were not up-to-date especially for the study area. In that sense, through geo-referencing the electricity sector provincial maps of the study area from the RUPTL 2016-2025, it was possible to update this network and to consider the PLN grid expansion plan in the SHP analysis, Figure 2.10.

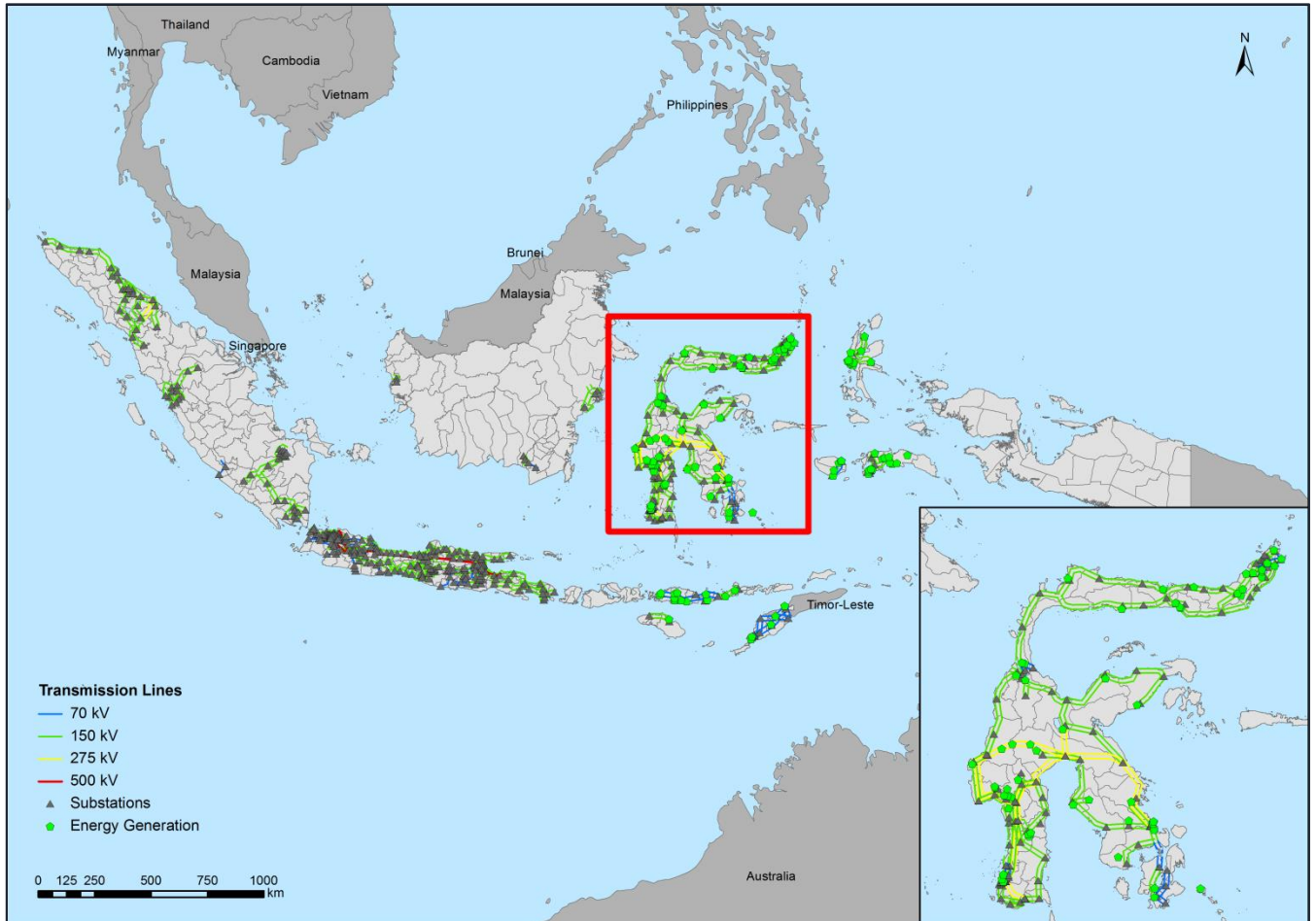


Figure 2.10 – Electricity network (Hydro Inventory Study 1997 [1] and RUPTL 2016-2025 [8] data, Consultant processing).

2.3.5 MORPHOLOGICAL DATA

Contour data, as well river and streams, may be derived from a Digital Elevation Model (DEM). Since the scope of work is SHP, the DEM resolution should be as refined as possible to improve the final result accuracy, especially in the focus regions of Sulawesi, NTT, Maluku and Maluku Utara.

During the Inception Mission, it was acknowledged that PLN currently possesses BIG data in the regions inside the scope of work of the parallel contract on Geospatial Electrification Planning. However, it was not possible to collect or even assess the type of information and scale due to confidentiality issues.

The alternative datasets for this purpose are the global digital elevation dataset provided by the Advanced Spaceborne Thermal Emission and Reflection Radiometer³ (ASTER) or the Shuttle Radar Topography Mission (SRTM), presented in Figure 2.11 [9].

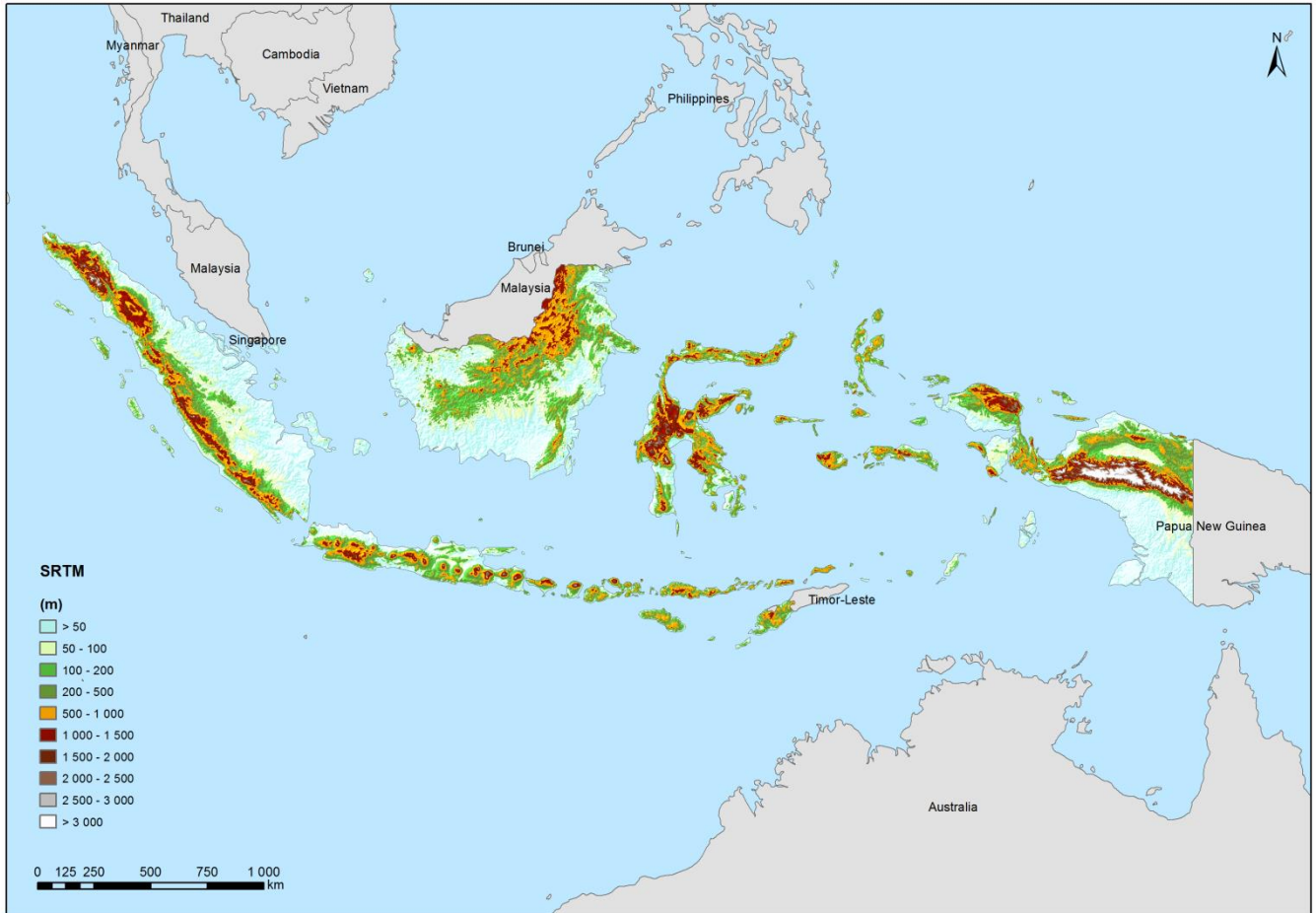


Figure 2.11 – Digital global elevation data (SRTM data [9], Consultant processing).

The comparison between these alternative datasets is present in Table 2.2.

³ ASTER GDEM is a product of METI and NASA.

Table 2.2 – Comparison between alternative DEM datasets.

	ASTERGDEM	SRTM
Data source	ASTER	Space shuttle radar
Generation and distribution	METI/NASA	NASA/USGS
Release year	V1 ~2011 V2	~2003 V1 ~2007 V4.1
Data acquisition period	2000 ~ ongoing	11 days (in 2000)
DEM resolution	30m	90m
DEM accuracy (stdev.)	7~14m	10m
DEM coverage	83 degrees north ~ 83 degrees south	60 degrees north ~ 56 degrees south
Area of missing data	Areas with no ASTER data due to constant cloud cover (supplied by other DEM)	Topographically steep area (due to radar characteristics)

The main problem with the use of big scale DEMs for SHP assessment may be summarized in two issues:

- 1) The larger the pixel, the worst the costs and hydraulic head estimation;
- 2) The stream network derived from flow accumulation procedures will present some deviations, sometimes getting the wrong path. This is more prone in big scales.

Nevertheless, from the hydropower experience in the territory it is known that the mean error of SRTM, ASTER or BIG DEMS is usually less than 5%, with an impact in in the range of 1-2% in the watershed calculation, thus the Consultant proceeded with this datasets.

2.3.6 RIVER NETWORK

The river network, Figure 2.12, was obtained from different data sources. While rivers and water bodies were obtained from the info-geospatial database that combines data from global datasets and from the Bakosurtanal [10]. The river basins were obtained from the Hydro Inventory Study database [1].

When compared, the collected river network with the derived from the SRTM DEM, the first was more accurate, especially in some singular areas where the natural slope is very flat or steep and the DEM faces the most discrepancies on the elevation modelling.



Figure 2.12 – River network (info-geospatial data [10], Consultant processing).

2.3.7 LAND COVER

The Ministry of Forestry (MoFo) has a public land cover file, based on the Landsat 2000 (the same base of Globcover2000), presented in Figure 2.13 [11].

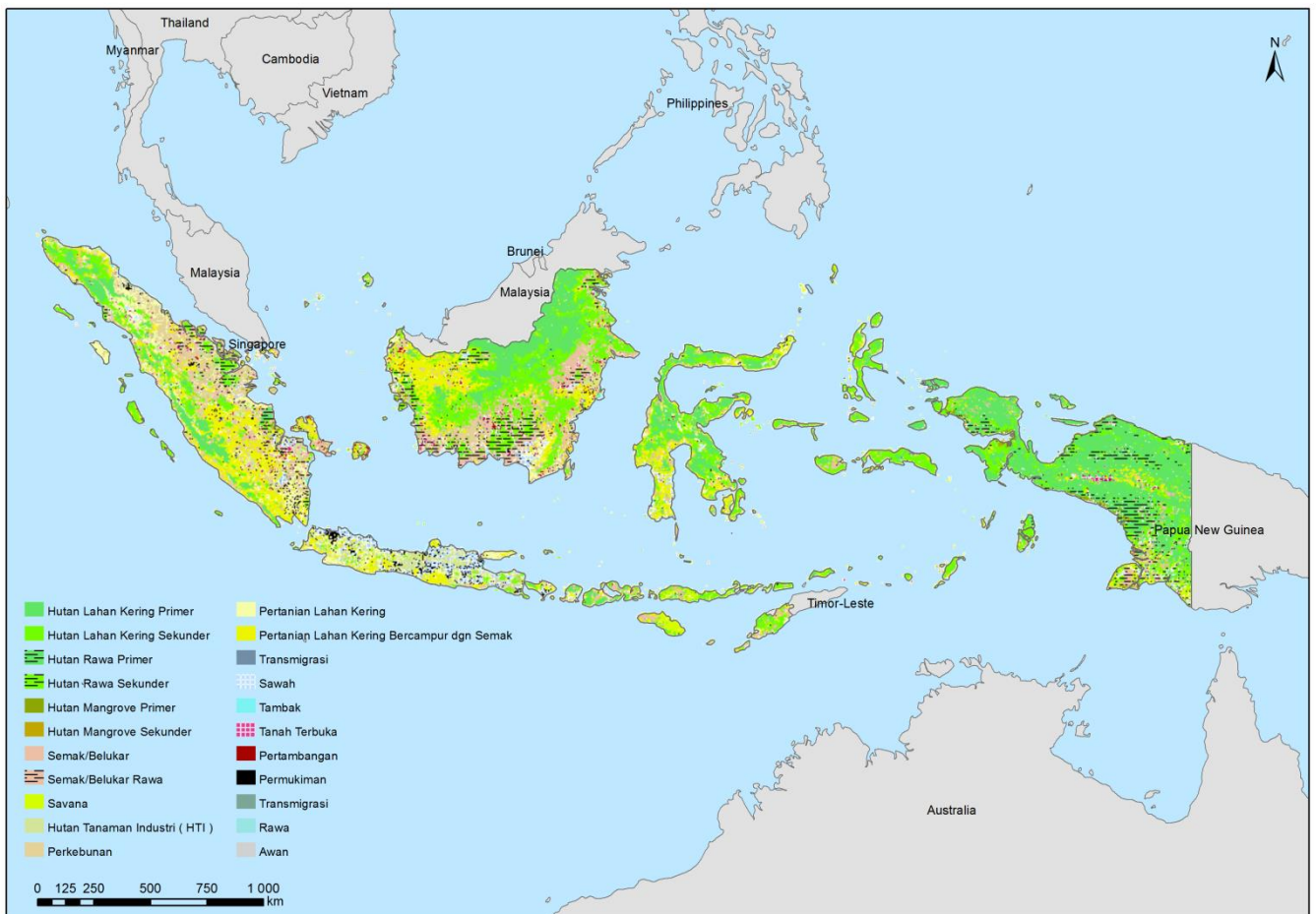


Figure 2.13 – Land Cover (MoFo data [11], Consultant processing).

The *GlobCover* has since then released a more recent version in 2010, presented in Figure 2.14 [12]. Considering that the detail and scale of the source information are the same as the official source and that *GlobCover* is more recent and updated, the latter was adopted in the project.

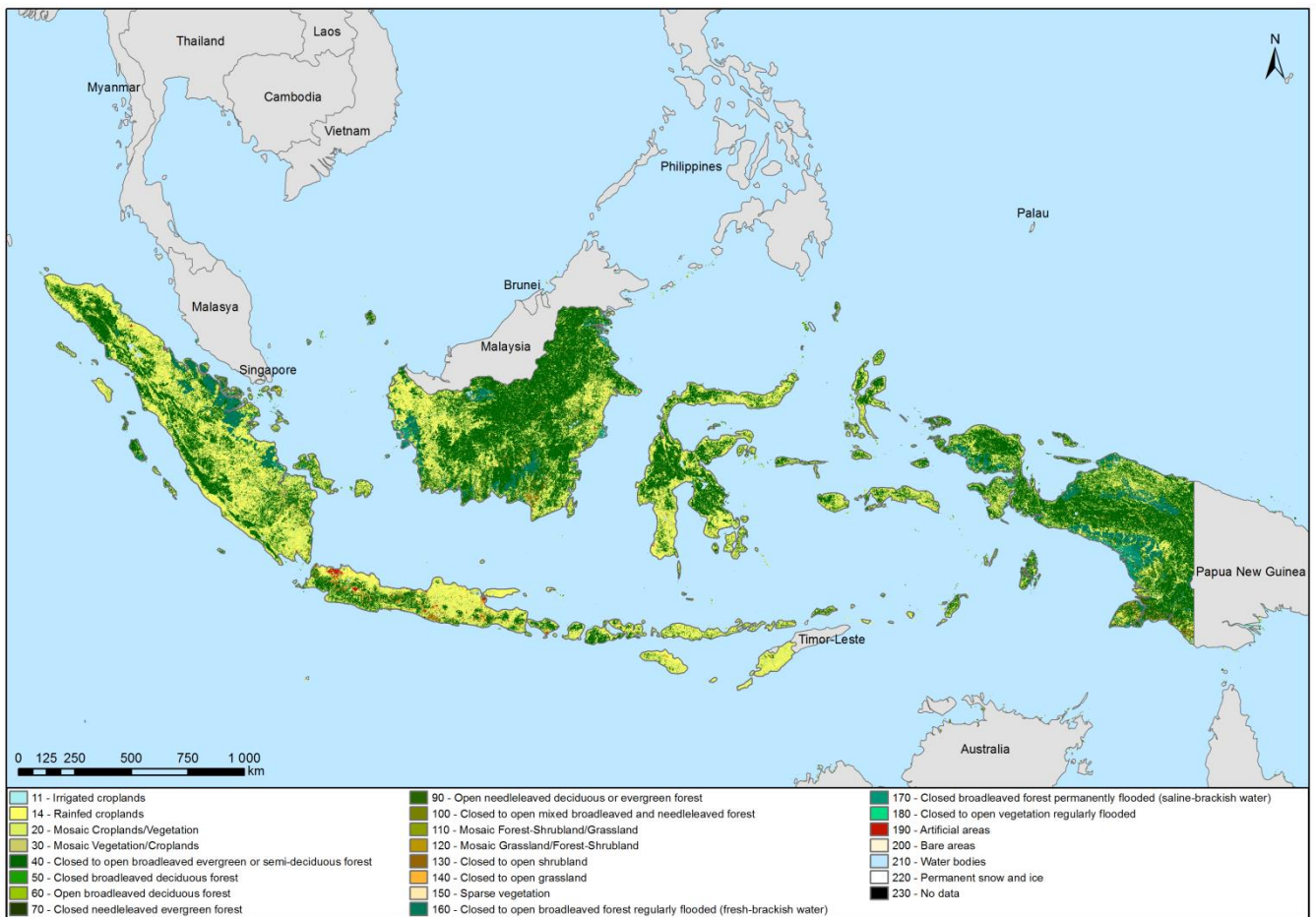


Figure 2.14 – Land Cover (*GlobCover 2010 data [12], Consultant processing*).

2.3.8 FOREST AREAS

The forest areas were obtained from the database of MoFo, Figure 2.15. The forest areas categories defined by Mofo are presented Table 2.3 [11].

Table 2.3 – Indonesian categories of Forest Areas.

Forest Area Categories		Abbreviation
ENGLISH	BAHASA INDONESIA	
Protected Forest	Hutan Lindung	HL
Production Forest	Hutan Produksi	HP
Convertible Production Forest	Hutan Produksi Konversi	HPK
Limited Production Forest	Hutan Produksi Terbatas	HPT
Natural Reserve	Kawasan Suaka Alam Dan Pelestarian Alam	KSPA
Marine Natural Reserve	Kawasan Suaka Alam Dan Pelestarian Alam Laut	KSPA Laut
Other Use	Areal Penggunaan Lain	APL



Figure 2.15 – Forest areas (MoFo data [11], Consultant processing).

Based on Ministerial Regulation No. 41 year 1999, government sets the forests in conservation (*Hutan Konservasi*), protected (*Hutan Lidung*) and production (*Hutan Produksi*). Furthermore, defines the Conservation Forest as one that has as main function fauna, flora and ecosystem preservation. The conservation forest is divided under Natural Reserves (*Kawasan Suaka Alam Dan Pelestarian Alam*) or Marine Natural Reserves (*Kawasan Suaka Alam Dan Pelestarian Alam Laut*), as shown in Table 2.3.

On the other hand, protected forests have the main function of shielding life support systems that regulate water systems, maintain soil fertility, erosion control and prevent floods and sea water intrusion, while production forest main purpose is, as the name suggest, forestry exploration. Moreover, there are especial production areas which can be the Limited production Forest (*Hutan Produksi Terbatas*) or the Convertible production Forest (*Hutan Produksi Konversi*). On the first, it is only possible to explore for forestry production with low intensity while the second is reserved for other types of exploration and can be converted to non-forest allocation.

Finally, this classification allows a better understanding of the expected difficulties in development activities from the natural environmental point of view. Considering the current legislation and the usually low SHP environment impact this type of developments should only face legal difficulties on forest areas categorized as conservation areas in which it is strictly forbidden to build.

2.3.9 GEOLOGY DATA

For a complete assessment of a SHP it should also be taken into account the dam site and reservoir geology. The Hydro Inventory Study database contained a geology map with description of rock formations and main faults that was collected and added to the GIS Database, Figure 2.16 [1].

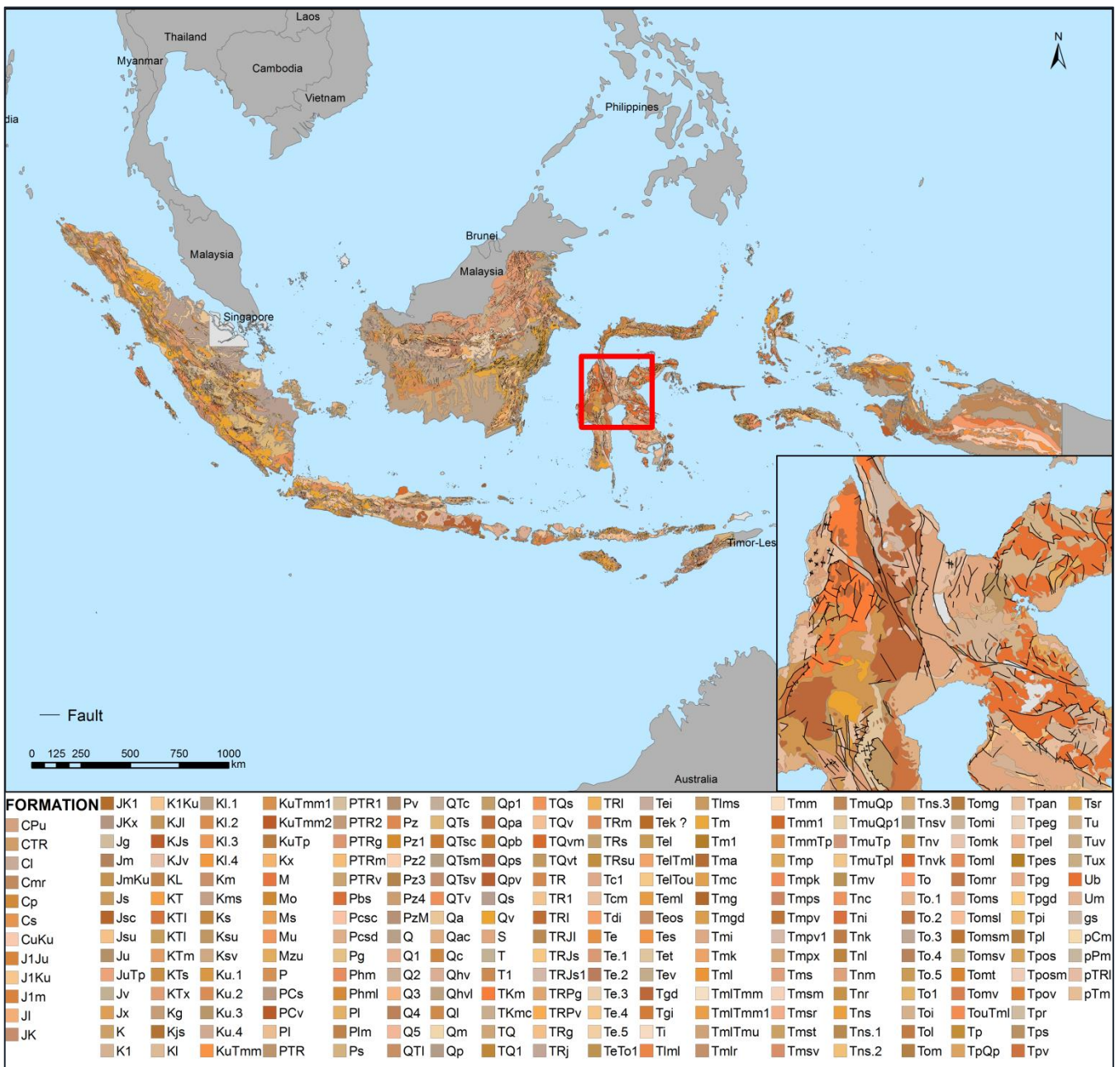


Figure 2.16 – Geology map (Hydro Inventory Study 1997 data [1], Consultant processing).

2.3.10 TOPOGRAPHIC MAPS

Topographic maps display most of the natural and man-made elements in the country, and can be obtained from the BIG database [13]. In the vector database, the information is divided into 7 themes:

- Theme 1: Land Cover: land cover areas such as forests, fields and settlements;
- Theme 2: Hydrography: include water elements such as rivers, lakes and coastlines;
- Theme 3: Topography: high-level data such as contours;

- Theme 4: Building: buildings, houses and office buildings;
- Theme 5: Transportation and Utilities: roads, railways, transmission wires and bridges;
- Theme 6: Administrative divisions: the state border, provinces, regencies/cities, townships and villages;
- Theme 7: Toponyms: geographic names such as the island's name, the name of the strait and the name of the mountain.

There's also cartograms, by regions, with the data availability and the year of manufacture by map scale 1:250 000, 1:50 000, 1:25 000 and 1:10 000, presented in Figure 2.17.

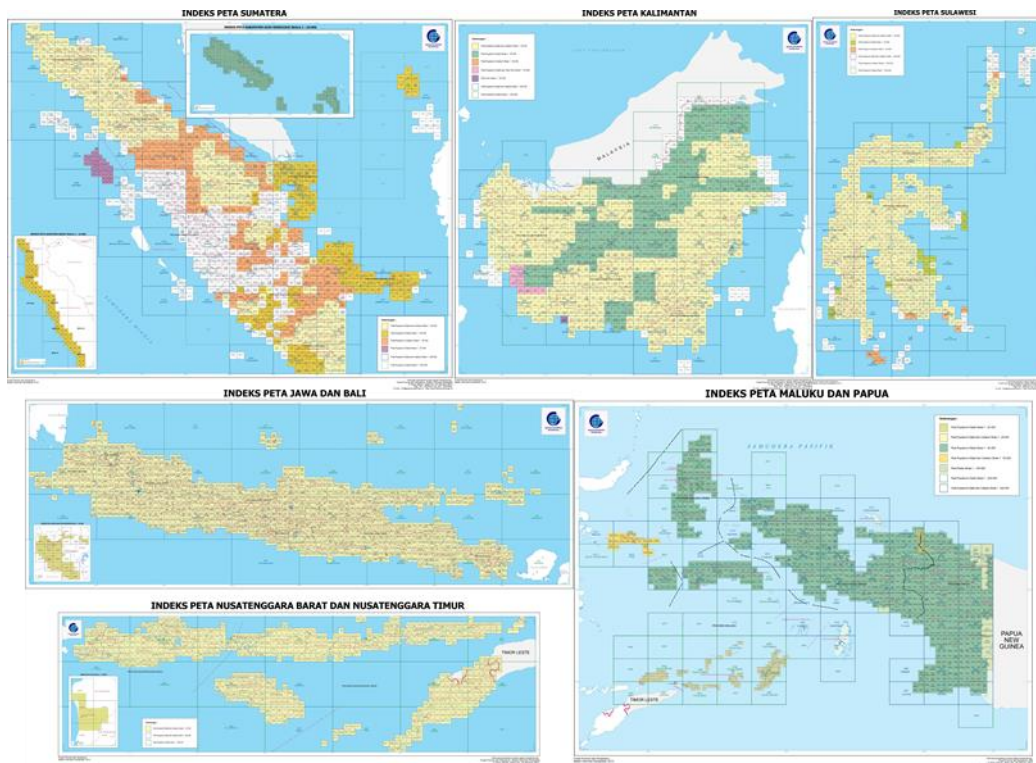


Figure 2.17 – BIG Cartograms by region [13].

Given the mass extension of Indonesia and the scope of the work, it was considered not to be cost/effective to purchase these maps, as it would not add much value to the project.

However, for future planning or pre-design of SHP by PLN staff, it was added to the database the gathered geo-referend cartograms, to ease the geo-referencing of the maps if necessary.

2.3.11 ROADS

The roads network was obtained from the *Vector Map* (VMAP), a vector-based collection of Geographic Information System (GIS) data about Earth at various levels of detail. For the current purpose the level used was level 0 (low resolution), which has global coverage at public domain [14].



Figure 2.18 – Roads network (VMAP data [14], Consultant processing).

2.4 SHP DATA

2.4.1 CONTEXT

The collection of SHP data was the most important and challenging assignment of Activity 1.

The SHP data was gathered from the RUPTL 2013-2022, Hydro Inventory Study – 1997, IPP's requests, PLN's own feasibility studies and from the Consultant's own internal knowledge SHP database with almost 2700 projects identified in total.

Unprocessed data collected and referenced during this report is presented in **Annex I**.

The next sub-chapters will address the work performed on retrieving data of each source, and the effort made in joining those lists while merging duplicates and removing projects with wrong/outdated information.

The comprehensive compiled SHP list after the screening has 2000 entries. Chapter 5 presents nationwide maps and information based on this list, which is also stored on the GIS database.

2.4.2 INITIAL COMPILATION

Since the beginning of the project the Consultant made an effort to collect as many potential SHP sites as possible. By the time of the inception mission in 2014 the Consultant had already retrieved the existing and planned SHP from the RUPTL (2013-2022) and merged them with other databases⁴ taking into consideration the project's name, installed capacity and province (since the projects from RUPTL didn't state the coordinates). It was possible at that stage to merge 73 projects, making the initial compilation at the Inception Stage with only 190 projects with identified location.

It should be stressed that PLN's current and planned energy situation for the next 10 years is publicly reported on the RUPTL every year. The problem with this type of source is the lack of project information, since it just covers the approximate location and installed capacity. For a GIS database and pre-feasibility analysis purpose it's very incomplete and for that reasons it was complemented with the collection of more data from other sources. Moreover, this just comprehended the existing and the already approved SHP, missing the potential sites for future project that are the main scope of this work.

2.4.3 HYDRO INVENTORY STUDY – 1997

From the beginning of the project the Consultant made clear that PLN's current SHP database (MapInfo format) from the Hydro Inventory Study from 1997 had the bulk of the projects that should be collected and analyzed. Therein laid a problem, since the info stored in this database was considered classified by PLN and its clearance raised concerns. Fortunately, this was overcome and it ended up being a major contribution since it immensely increased the number of entries (more than 1300 projects) on the SHP database and improved the overall quality of the list of most promising SHP sites on NTT, Maluku, Maluku Utara and Sulawesi.

⁴ Such as the Consultant's own internal knowledge database of SHP in Indonesia (via IHC)

2.4.4 IPP & PLN FEASIBILITY STUDIES

Regarding the IPP's requests, PLN allowed the Consultant to retrieve all necessary info from the Feasibility Studies submitted by IPP's during the PPA procedure that were stored in PLN Pusat (50) or in another repository in Jakarta (142).

Furthermore, during the Wilayah visits on the study area it was possible to retrieve new projects from IPP's requests and from PLN local SHP studies. The data gathered from those projects were in majority retrieved from Feasibility Studies delivered with the IPP's requests.

During the Wilayah visits it was also possible to collect Feasibility studies developed by PLN of SHP sites to be implemented by PLN or to tender them later with the final goal of installing more renewable energy and reduce coal/fuel dependency and CO₂ emissions while dropping the overall energy generation cost. From the regional offices it was possible to identify 48 new projects from IPP's requests and 6 from PLN studies, in a total of 54 new projects. The detailed description of the missions to the Wilayahs is presented in the accompanying *Small Hydropower Potential in NTT, Maluku, Maluku Utara and Sulawesi Report*.

2.4.5 OTHER SOURCES

As requested by the Consultant, PLN New and Renewable Energy Department (DivEBT) prepared a list of all existing/planned SHP. This information was retrieved from the Masterplan of HEEP Development list, small hydropower projects in HPPS, IPPs and PLN lists of small hydropower projects.

That list had a total of almost 900 entries but only contained project name, installed capacity and coordinates. Moreover some projects didn't have coordinates or had them but were wrong since they weren't located near any river. Also, when plotted with some base map on background it was possible to assess that some were already build, as it is described on 2.4.6.

2.4.6 SCREENING PROCESS

In brief, the projects were collected from RUPTL, Hydro Inventory Study from 1997, IPP and PLN Feasibility Studies, PLN New and Renewable Energy Department and the Consultant's own internal knowledge SHP database. In order to merge those lists while removing duplicates it was necessary to have especial attention to projects with different characteristics on the same location. On those cases if the overall project characteristics were too different, mainly the output power, it was decided to keep both projects in the same location given that they should have different schemes for the same location.

After a thorough analysis it was possible to eliminate approximately 700 duplicate projects while merging projects.

This comprehensive compilation list with 2000 entries was added to the database with all project information collected and is analyzed in detail in chapter 4.

3 GIS DATABASE

3.1 INTRODUCTION

The GIS Database for SHP planning was developed by the Consultant for small hydropower mapping and improved geospatial electrification planning in Indonesia based on PLN specific necessities and is currently hosted in PLN's server.

The main purpose of building up this central database on SHP (nationwide level) is to facilitate and improve the planning process of SHP in both grid and isolated systems in Indonesia.

The central GIS database for national information on Small Hydropower Planning (SHP Database) was developed in PostgreSQL which is an open source object-relational database management system (ORDBMS). This ORDBMS has a PostGIS extension which allows GIS objects to be stored in the database.

The visualization and management tools of this GIS Database are supported by a user-friendly open source Geographic Information System – QGIS. To provide customized options for easier and intuitive usage of the existing data in this database, a package of QGIS Plugins (version QGIS Essen 2.14) was developed, Figure 3.1.

WGS84 (World Geodetic System 84) is the adopted coordinate system by the GIS database for national information on Small Hydropower Planning, therefore all saved and visualized data are in this coordinate system.

A GIS Database User's Manual has been developed as a handbook to help the utilization of the GIS Database for different levels of computer literacies, and is presented in **Annex II**.

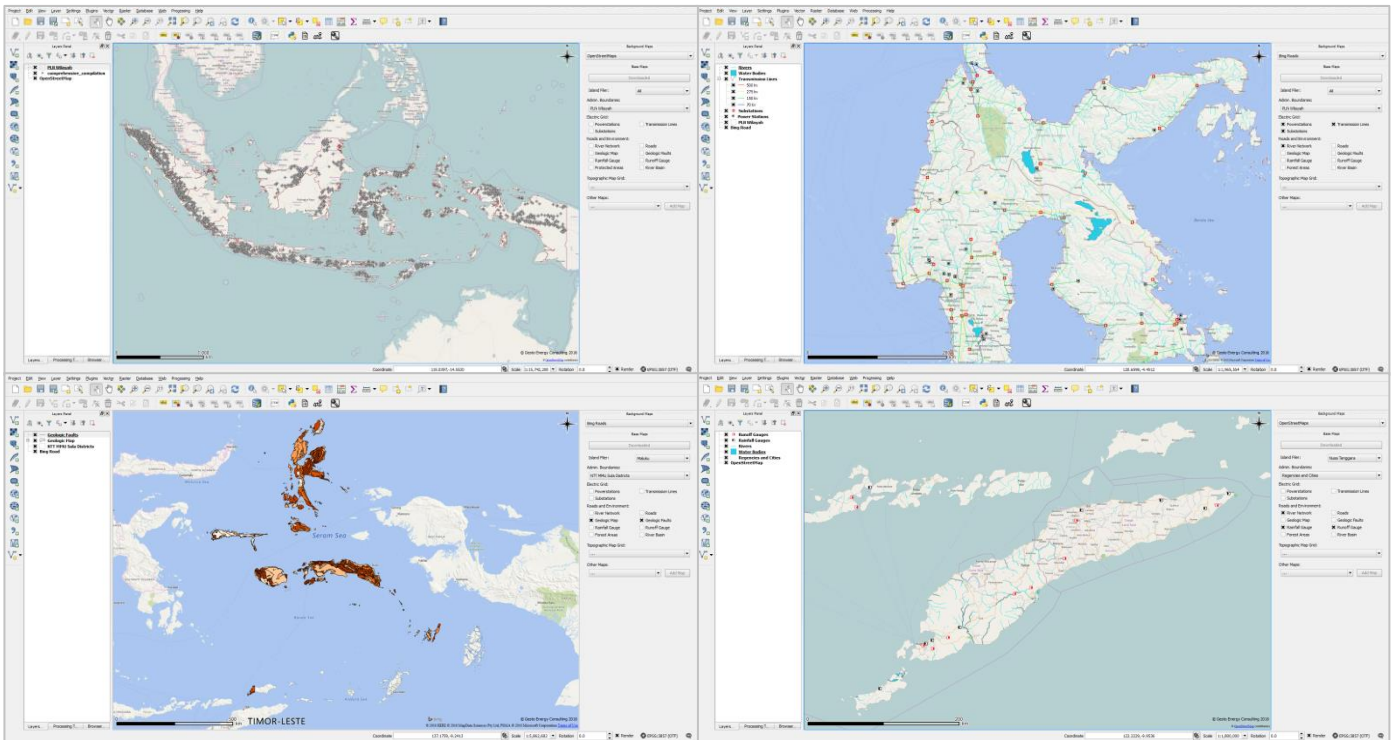


Figure 3.1 – Screenshots of the plug-in developed for the SHP GIS Database.

3.2 SOFTWARE AND HARDWARE OPTIONS

3.2.1 CONTEXT

The choice between software and hardware to adopt is of great importance and was made early in the project development since it influences its design and implementation.

Early on, the discussion on software was focused not so much on the different existing brands but more on the type of software, i.e., whether the option should be open source or proprietary.

3.2.2 GIS SOFTWARE

The choice of the right software for building-up a GIS project is a big investment either in time, resources or, sometimes, money. Different types of GIS software are available in the market such as proprietary options (ESRI ArcGIS, MapInfo, Global Mapper, etc.) and open source software (QGIS, GRASS GIS, gvSIG, etc.). A comparison between two of the most used open source (QGIS) and proprietary (ArcGIS) solutions is presented in Table 3.1.

Table 3.1 – Comparison between QGIS and ArcGIS.

	QGIS	ArcGIS
Cost	<ul style="list-style-type: none"> • Free downloadable open source software • Free plugins that enable customization • No maintenance contracts 	<ul style="list-style-type: none"> • Commercial software that includes three desktop versions, • Different extensions and tools in separate modules very expensive (several thousands of dollars) • Costly maintenance contracts
Licensing	<ul style="list-style-type: none"> • No licensing concerns because QGIS is free and open source software • Loaded on any computer • Numerous updates available each year 	<ul style="list-style-type: none"> • Software restricted through a computer license • Installation are regulated by a licensing key • Extensions with fixed licensing keys used in just one computer
Development	<ul style="list-style-type: none"> • Most development done by paid developers through contributions • Huge community of volunteers help on development of new features on QGIS software • The code is available for anyone to see and it can be modified by anyone allowing customization 	<ul style="list-style-type: none"> • As proprietary software the development is performed by ESRI • The code is not available for use • The product that is purchased cannot be modified in anyway.
Platform	<ul style="list-style-type: none"> • Windows • Mac • Linux 	<ul style="list-style-type: none"> • Windows
Support	<ul style="list-style-type: none"> • Support via dedicated websites, forums and blogs • Huge community of users can easily support in technical issues • Technical support for QGIS are available via OSGeo.org site • No maintenance contracts 	<ul style="list-style-type: none"> • Specialized support well established in all ArcGIS products • Direct support 24/7 through direct contact to ESRI phone lines or emails. • Depending of maintenance contracts

In terms of security of sensitive data and capacity needed from the end-users, both options are similar, albeit in the latter case QGIS may be associated to a more intuitive and faster to learn alternative.

Based on the Consultant's experience on advanced work with both options, the best solution for this project was decided to be QGIS, an open source solution. QGIS is a cross-platform free and open source desktop GIS application that provides visualization, editing and data analysis. QGIS is strong and powerful to use and provides a continuously growing number of capabilities provided by core function and plugins. QGIS provides integration with other open source programs including PostgreSQL, GRASS and MapServer ensuring extensive functionalities.

3.2.3 DATABASE SOFTWARE

Considering the database, the one to be implemented on this project should be relational to allow the management system to implement the relational model smoothly. Each database implements a different model to structure the data that is being managed in a logical fashion. The design and conceptualization of the database are the first step to preview how a database will work and handle the information contained therein. This type of database management systems requires structures (e.g. tables) to be defined to contain and work with data. Each column holds a different type of information and each record in the database, uniquely identified with keys, are related together, as defined within

the relational model. The type of data and the attributes on each table has to be defined after the collection of all available data at different institutions and agencies.

Some of the most commonly used and popular Object-Relational Database Management Systems (ORDBMS) are presented in Table 3.2.

Table 3.2 – Popular relational database management systems (ORDBMS).

	PostgreSQL:	MySQL:	SQLite:
Description	The most advanced, SQL-compliant and open-source ORDBMS	The most popular and commonly used ORDBMS.	A very powerful, embedded relational database management system
Cost	Free, Open source	Proprietary (Oracle), Open source	Free, Open source
Supported Data Types	<ul style="list-style-type: none"> • bigint • bigserial • bit [(n)] • bit varying [(n)] • boolean: • box • bytea • character varying [(n)]: • character [(n)] • cidr • circle • date • double precision • inet • integer • interval [fields] [(p)] • line • lseg • macaddr • money • numeric [(p, s)] • path • point • polygon • real • smallint • serial • text • time [(p)] [without time zone] • time [(p)] with time zone: • timestamp [(p)] [without time zone] • timestamp [(p)] with time zone • tsquery • tsvector • txid_snapshot • uuid • xml 	<ul style="list-style-type: none"> • Tinyint • Smallint • Mediumint • Int or integer • Bigint • Float • Double, double precision, real • Decimal, numeric • Date • Datetime • Timestamp • Time • Year • Char • Varchar • Tinyblob, tinytext • Blob, text • Mediumblob, mediumtext • Longblob, longtext • Enum • Set 	<ul style="list-style-type: none"> • Null • Integer • Real • Text • Blob
Advantages	<ul style="list-style-type: none"> • An open-source SQL standard compliant ORDBMS • Is supported by a devoted and experienced community which can be accessed through knowledge-bases 	<ul style="list-style-type: none"> • Easy to work with; • Supports a lot of the SQL functionality that is expected from a ORDBMS -- either directly or indirectly; • A lot of security features, some rather 	<ul style="list-style-type: none"> • The entire database consists of a single file on the disk, which makes it extremely portable;

	PostgreSQL:	MySQL:	SQLite:
	and Q&A sites 24/7 for free; <ul style="list-style-type: none"> • Strong third-party support: PostgreSQL is adorned with many great and open-source third-party tools for designing, managing and using the management system. • It is possible to extend PostgreSQL programmatically with stored procedures 	advanced, are built in MySQL; <ul style="list-style-type: none"> • Scalable and powerful; • MySQL works in very efficient way thus providing speed gains. 	<ul style="list-style-type: none"> • Although it might appear like a "simple" DB implementation, SQLite uses SQL;
Disadvantages	<ul style="list-style-type: none"> • For simple read-heavy operations, PostgreSQL might appear less performant than the counterparts • Given the nature of this tool, it lacks behind in terms of popularity, despite the very large amount of deployments • Due to above mentioned factors, it is harder to come by hosts or service providers that offer managed PostgreSQL instances. 	<ul style="list-style-type: none"> • Known limitations, comes with functional limitations that some state-of-the-art applications might require • Reliability issues: The way certain functionality gets handled, renders it a little-less reliable compared to some other ORDBMS's • Stagnated development: there are complaints regarding the development process since its acquisition; 	<ul style="list-style-type: none"> • With no management connections to set access privileges to the database and tables • In SQLite is not possible to tinker with to obtain a great deal of additional performance.

Compared to other ORDBMS, PostgreSQL stands out with its support object-oriented and/or relational database functionality, such as the complete support for reliable transactions, i.e. Atomicity, Consistency, Isolation and Durability. PostgreSQL is extremely capable of handling many tasks in a very efficient way and can grant security to the data store inside through login and password.

Furthermore, PostgreSQL:

- Has good integration with QGIS, data can be integrated in QGIS writing directly in database;
- Works in different operation systems (LINUX, WINDOWS);
- Runs in different programming languages, including Python, Java, C/C++, .net, Ruby, etc.;
- Has almost unlimited storage space⁵:

Limit	Value
Maximum Database Size	Unlimited
Maximum Table Size	32 TB
Maximum Row Size.....	1.6 TB
Maximum Field Size	1 GB
Maximum Rows per Table	Unlimited
Maximum Columns per Table.....	250 - 1600 depending on column types
Maximum Indexes per Table	Unlimited

⁵ Source: www.postgresql.org

Taking in consideration the aspects described above and the needs of the GIS database for SHP the Consultant chose the PostgreSQL relational database for this project.

3.2.4 HARDWARE

Both QGIS and PostgreSQL don't have a formal system requirement per se. However we recommend, for proper use and installation of the software, the following installation requirements:

- Processor: Intel I3 2 cores @2GHz (or superior)
- RAM: 4 GB (or superior)
- Hard Disk: 320 GB or superior (2GB minimum of free space)
- Operation System: Windows 7 or Windows 8
- Access to PLN server

3.2.5 HOSTING, OPERATION AND MAINTENANCE OF THE GIS DATABASE

The Consultant was expected to develop a proposal to PLN on hosting and operation of the SHP GIS database⁶.

However, the data clearance issues raised by PLN during the project execution implied a revision of the work plan, with the anticipation of the training sessions expected to be develop by the end of the project to an interim period (October 2015), in order to build capacity to PLN staff to be able to operate and maintain the database themselves. It also implied the database to be hosted on PLN's server.

Therefore, considering the strengthening of PLN Staff capacity made and decision on hosting, operation and maintenance of the database in PLN, the early requirement for a proposal was considered void.

3.3 BACKGROUND DATA

3.3.1 HYDROLOGICAL DATA

As mentioned in section 2.3.2, the possible data to be added to the database was only the location of rainfall and runoff gauges, with just a few more information. The Rainfall Atlas for Indonesia and World

⁶ In accordance with the *Small Hydropower Mapping and Improved Geospatial Electrification Planning in Indonesia Technical Assistance Terms of Reference*

Clim data were considered of secondary importance for the planning stage, since their inclusion would slow the computation process without significant improvements on the overall output.

Rainfall gauges GIS table on the plug-in is named “*Rainfall Gauges*” and the column names with its corresponding meaning are presented in Table 3.3. The Hydro Inventory Study database had also information regarding the stations registered in BMKG. Additionally, the Consultant added the administrative division until province level to ease the analyses.

Table 3.3 – Column description of the Hydrological data – Rainfall Gauges.

Column name	Description
id	Database identification number
geom	Point geometry (WGS84)
station_name	Rainfall gauge station name
station_id	Rainfall gauge station identification number
latitude	Rainfall gauge station latitude (WGS84 - Decimal degrees)
longitude	Rainfall gauge station longitude (WGS84 - Decimal degrees)
bmkg_station	Rainfall gauge station name from <i>BMKG</i>
region_bmkg	Rainfall gauge station region from <i>BMKG</i>
id_0	Island identification number
name_0	Island name
id_1	Province identification number
name_1	Province name

Runoff gauges GIS table on the Plug-in is named “*Runoff Gauges*” and beside the administrative divisions until province level it was also added the rivers and river basins based on the Hydro Inventory Study database, Table 3.4.

Table 3.4 – Column description of the Hydrological data – Runoff gauges.

Column name	Description
id	Database identification number
geom	Point geometry (WGS84)
station_name	Runoff gauge station name
station_id	Runoff gauge station identification number
id_0	Island identification number
name_0	Island name
riverbasin	River basin name
river	River name
longitude	Runoff gauge station longitude (WGS84 - Decimal degrees)
latitude	Runoff gauge station latitude (WGS84 - Decimal degrees)
id_1	Province identification number
name_1	Province name

3.3.2 ADMINISTRATIVE DIVISIONS

In terms of administrative divisions Islands, Provinces, Regencies, Districts, Villages and PLN regional divisions (Wilayahs) were added to the database, although Districts and Villages were only digitize for the study area of Sulawesi, NTT, Maluku and Maluku Utara given the scope of work.

Tables' column name and corresponding description is presented in Table 3.5 to Table 3.10.

Table 3.5 – Column description of the Administrative divisions – Islands.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
id_0	Island identification number
name_0	Island name
type_0	Level 0 type of administrative division (Bahasa)
engtype_0	Level 0 type of administrative division (English)

Table 3.6 – Column description of the Administrative divisions – Provinces.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
id_1	Province identification number
name_1	Province name
type_1	Level 1 type of administrative division (Bahasa)
engtype_1	Level 1 type of administrative division (English)
id_0	Island identification number
name_0	Island name

Table 3.7 – Column description of the Administrative divisions – Regencies.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
id_2	Regency identification number
name_2	Regency name
type_2	Level 2 type of administrative division (Bahasa)
engtype_2	Level 2 type of administrative division (English)
id_1	Province identification number
name_1	Province name
id_0	Island identification number
name_0	Island name

Table 3.8 – Column description of the Administrative divisions – Districts.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
idsp2010	District identification number <i>Sensus Penduduk 2010</i>
id_3	District identification number
name_3	District name
type_3	Level 3 type of administrative division (Bahasa)
engtype_3	Level 3 type of administrative division (English)
id_2	Regency identification number
name_2	Regency name
id_1	Province identification number
name_1	Province name
id_0	Island identification number
name_0	Island name

Table 3.9 – Column description of the Administrative divisions – Villages.

Column name	Description
id	Database identification number
geom	point geometry (WGS84)
idsp2010	Village identification number <i>Sensus Penduduk 2010</i>
id_4	Village identification number
name_4	Village name
type_4	Level 4 type of administrative division (Bahasa)
engtype_4	Level 4 type of administrative division (English)
id_3	District identification number
name_3	District name
id_2	Regency identification number
name_2	Regency name
id_1	Province identification number
name_1	Province name
id_0	Island identification number
name_0	Island name

Table 3.10 – Column description of the Administrative divisions – PLN Wilayahs.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
id_wilayah	Wilayah identification number
short	Wilayah name abbreviated
wilayah	Wilayah name
id_0	Island identification number
name_0	Island name

3.3.3 ELECTRICITY SECTOR DATA

For the electricity sector the generation projects, Table 3.11 , transmissions lines, Table 3.12, and substations, Table 3.13, were added to the database. This data is in accordance with the RUPTL 2016-2025.

Table 3.11 – Column description of the Electricity Sector – Generation projects.

Column name	Description
id	Database identification number
geom	point geometry (WGS84)
type	Generation project type
status	Generation project status
name	Generation project name
cod	Commercial Operation Date
cap_mw	Installed Capacity (MW)
id_0	Island identification number
name_0	Island name

Table 3.12 – Column description of the Electricity Sector – Transmission Lines.

Column name	Description
id	Database identification number
geom	Line geometry (WGS84)
voltage_kv	Transmission line voltage (kV)
nr_lines	Number of Transmission lines
status	Transmission line status
id_0	Island identification number
name_0	Island name

Table 3.13 – Column description of the Electricity Sector – Substations.

Column name	Description
id	Database identification number
geom	point geometry (WGS84)
substation	Substation name
status	Substation status
voltage_kv	Substation voltage (kV)
id_0	Island identification number
name_0	Island name

3.3.4 RIVER NETWORK

For the river network the rivers, Table 3.14, river basins, Table 3.15, and the main water bodies, Table 3.16, were added. The source of this river network is thoroughly approached in section 2.3.6.

Table 3.14 – Column description of the River Network – Rivers.

Column name	Description
id	Database identification number
geom	Line geometry (WGS84)
name	River name
id_0	Island identification number
name_0	Island name

Table 3.15 – Column description of the River Network – River Basins.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
riverbasin	River basin name
id_0	Island identification number
name_0	Island name
id	Database identification number
geom	Polygon geometry (WGS84)

Table 3.16 – Column description of the River Network – Water bodies.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
name	Water body name
id_0	Island identification number
name_0	Island name
id	Database identification number
geom	Polygon geometry (WGS84)

3.3.5 FOREST AREAS

The forest areas categorization presented in section 2.3.8 was also added to the database, with the corresponding column description in Table 3.17.

Table 3.17 – Column description of the Forest Areas.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
forest_use	Category of Forest use
forest_use_short	Category of Forest use abbreviation
notes	Additional notes

3.3.6 GEOLOGY DATA

The geology formations and faults were added to the database under the “Geologic map”, Table 3.18 and Table 3.19.

Table 3.18 – Column description of the Geology data – Formations.

Column name	Description
id	Database identification number
geom	Polygon geometry (WGS84)
formation	geological formation abbreviated
description	geological formation description
id_0	Island identification number
name_0	Island name

Table 3.19 – Column description of the Geology data – Faults.

Column name	Description
id	Database identification number
geom	Line geometry (WGS84)
structure	Fault structure
id_0	Island identification number
name_0	Island name
id	Database identification number

3.3.7 TOPOGRAPHIC MAPS

Topographic maps in the database are the georeferenced cartograms collected: *bakosurtanal* (1:250 000, 1:100 000, 1:50 000), *jantop* 1.250 000 and 1:50 000 (*gading, hind 1090, Mandau*). All of them have the same structure as presented in Table 3.20.

Table 3.20 – Column description of the Topographic maps.

Column name	Description
gid	Database identification number
topo	Topographic map description
geom	Polygon geometry (WGS84)

3.3.8 ROADS

The roads network was added with the structure presented in Table 3.21.

Table 3.21 – Column description of the Roads network.

Column name	Description
id	Database identification number
geom	Line geometry (WGS84)
id_0	Island identification number
name_0	Island name

3.4 SHP DATA

3.4.1 COMPREHENSIVE LIST

The comprehensive list corresponds to the SHP data after the first screening process as reported in section 2.4.6. This data was added to ease PLN's staff to quickly assess if any project:

- i. has already been identified;
- ii. in which stage it is;
- iii. who is developing that project.

To serve as repository of the initial data and avoid misinterpretations this list was left as unprocessed as possible, with minimal data handling from the Consultant. The column description is presented in Table 3.22.

Table 3.22 – Column description of the SHP – Comprehensive compilation.

Column name	Description
id	Database identification number
geom	Point geometry (WGS84)
proj_id	Project identification number
permission	PLN's access permission
proj_name	Project name
inst_cap_mw	Installed capacity (MW)
dam_long	Dam longitude (WGS84 - Decimal degrees)
dam_lat	Dam latitude (WGS84 - Decimal degrees)
pw_long	Powerhouse longitude (WGS84 - Decimal degrees)
pw_lat	Powerhouse latitude (WGS84 - Decimal degrees)
source	Project provenience
status	Project status

Column name	Description
commission_year	Project commission year
study_level	Project study level (if still under study)
submission_year	Project submission year
developer	Project developer
ipp_pln	Developer (IPP or PLN)
dev_type	SHP development type
dam_type	Dam type
size	SHP size
river	Name of project river
river_basin	Name of project river basin
catchment_area_km2	Catchment Area (km ²)
reservoir_area_km2	Reservoir Area (km ²)
annual_rainfall_mm	Average annual rainfall (mm)
runoff_m3s	Runoff (m ³ /s)
sediment_yield_kt_km2_yr	Sediment yield (kt/km ² /yr)
evaporation_rate_mm_day	Evaporation rate (mm/day)
full_supply_level	Full supply level
gross_storage_vol_dam3	Gross storage volume (dam ³)
min_op_level	Minimum operating level
act_storage_vol_dam3	Active storage volume (dam ³)
av_op_level	Average operation level
dead_storage_vol_dam3	Dead storage volume (dam ³)
drawdown_depth_m	Drawdown depth (m)
sed_vol_dam3	Sedimentation volume (dam ³)
crest_elev	Crest elevation
crest_length_m	Crest length (m)
dam_height_m	Dam height (m)
dam_vol_dam3	dam volume (dam ³)
n_headrace_tunnel	Number of headrace tunnels
n_penstocks	Number of penstocks
headrace_type	type of headrace
headrace_length_m	Headrace length (m)
penstock_length_m	Penstock length (m)

Column name	Description
headrace_diam_m	Headrace diameter (m)
penstock_diam_m	Penstock diameter (m)
headrace_std_section	Headrace standard section
channel_length_m	Channel length (m)
channel_section_area_m2	Channel section area (m ²)
tunnel_length_m	Tunnel length (m)
tunnel_section_area_m2	Tunnel section area (m ²)
pw_type	Type of powerhouse
max_discharge_m3s	Maximum discharge (m ³ /s)
av_head_m	Average head (m)
eff_head_m	Effective head (m)
gross_head_m	Gross head (m)
design_flow_m3s	Design flow (m ³ /s)
firm_flow_m3s	Firm flow (m ³ /s)
firm_discharge_m3s	Firm discharge (m ³ /s)
tailwater_level	Tailwater level
annual_energy_gwh	Annual energy generation (GWh)
firm_power_mw	Firm power (MW)
firm_energy_gwh	Firm energy generation (GWh)
min_power_mw	Minimum power (MW)
annual_secondary_energy_gwh	Annual secondary energy generation (GWh)
turbine	Type of turbine
max_turbine_out_mw	Maximum turbine output (MW)
n_turbines	Number of turbines
turbine_rated_speed_rpm	Turbine rated speed (rpm)
generator_type	Type of generator
generator_rated_out_mva	Generator rated output (MVA)
n_generators	Number of generators
generator_rated_freq_hz	Generator rated frequency (hz)
transformer_type	Type of transformer
transformer_rated_out_mva	Transformer rated output (MVA)
transformer_rated_vol_kv	Transformer rated voltage (kV)
n_transformers	Number of transformers

Column name	Description
trans_line_length_km	Transmission line length (km)
voltage_kv	Voltage (km)
n_trans_line	Number of transmission lines
substation	Substation to connect
access_road_length_km	Access road length (km)
access_road_from	Access road is form
power_dev_cost_musd	Power development cost (MUSD)
trans_line_cost_musd	Transmission line cost (MUSD)
access_road_cost_musd	Access road cost (MUSD)
total_cost_musd	Total Cost (MUSD)
capex_musd_mw	Capital expenditure (MUSD/MW)
lcoe_usd_kwh	Levelized cost of energy (USD/kWh)
construction_cost_idr	Construction Cost (IDR)
mechanical_electrical_equipment_cost_idr	Mechanical/electrical equipment cost (IDR)
trans_line_cost_idr	Transmission Line cost (IDR)
access_road_cost_idr	Access road cost (IDR)
land_resettlement_cost_idr	Land resettlement cost (IDR)
other_costs_idr	Other costs (IDR)
total_cost_idr	Total Cost (IDR)
capex_idr_kw	Capital expenditure (IDR/kW)
lcoe_idr_kwh	Levelized cost of energy (IDR/kWh)
EIRR	Economic internal rate of return (%)
FIRR	Financial internal rate of return (%)
land_user_reservoir_area	Land use inside reservoir area
resettlement_area_required	Required resettlement area
resettlement_required	Resettlement required
access_road_submerged	Access roads submerged
max_water_level	Maximum water level
gate_height_m	Gate height (m)
gate_width_m	gate width (m)
n_gates	Number of gates
dam_geological_classification	Dam geological classification
headrace_geological_classification	Headrace geological classification

Column name	Description
surge_tank_geological_classification	Surge tank geological classification
penstock_geological_classification	Penstock geological classification
tailrace_geological_classification	Tailrace geological classification
spillway_type	Type of spillway
n_spillway_gates	Number of spillway gates
spillway_gate_type	Type of spillway gates
spillway_height_m	Spillway height (m)
spillway_width_m	Spillway width (m)
spillway_design_flood_m3s	Spillway design flood (m ³ /s)
spillway_overflow_depth_m	Spillway overflow depth (m)
spillway_overflow_width_m	Spillway overflow width (m)
chuteway_length_m	Chuteway length (m)
chuteway_width_m	Chuteway width (m)
river_diversion_type	Type of river diversion
river_diversion_design_flood_m3s	River diversion design flood (m ³ /s)
n_river_diversion_tunnels	Number of river diversion tunnels
river_diversion_tunnel_diameter_m	River diversion tunnel diameter (m)
river_diversion_upstream_cofferdam_height_m	River diversion upstream cofferdam height (m)
river_diversion_downstream_cofferdam_height_m	River diversion downstream cofferdam height (m)
tailrace_type	Type of tailrace
tailrace_length_m	Tailrace length (m)
tailrace_width_m	Tailrace width (m)
tailrace_std_section	Tailrace standard section
tailrace_diam_m	tailrace diameter (m)
n_tailrace	Number of tailraces
penstock_type	Type of penstock
penstock_steel_liner_length_m	Penstock steel liner length (m)
surge_tank_type	Type of Surge tank
n_surge_tanks	Number of surge tanks
surge_tank_diam_m	Surge tank diameter (m)
surge_tank_height_m	Surge tank height (m)
surge_tank_length_m	Surge tank length (m)
surge_tank_width_m	Surge tank width (m)

Column name	Description
remarks	Remarks
island	Island in which the project is located
province	Province in which the project is located
regency	Regency in which the project is located
pln_wilayah	PLN regional division (Wilayah) in which the project is located
pln_wilayah_short	Abbreviation of the PLN regional division (Wilayah) in which the project is located

3.4.2 LIST OF MOST PROMISING SITES

The list of most promising sites is the result of the screening and ranking process realized by the Consultant under the current contract on the focus area of Sulawesi, NTT, Maluku and Maluku Utara, and is reported on the accompanying *Small Hydropower Potential in NTT, Maluku, Maluku Utara and Sulawesi Report*.

Considering the importance to SHP planning it was decided to include it on the database, with column description presented in Table 3.23.

Table 3.23 – Column description of the SHP – List of most promising sites.

Column name	Description
id	Database identification number
geom	Point geometry (WGS84)
rank	Project rank after Consultant's assessment
permission	PLN's access permission
project_id	Project identification number
project_name	Project name
long	Powerhouse longitude (WGS84 - Decimal degrees)
lat	Powerhouse latitude (WGS84 - Decimal degrees)
island	Island in which the project is located
province	Province in which the project is located
district	Regency in which the project is located
pln_wilayah	PLN regional division (Wilayah) in which the project is located
pln_wilayah_short	Abbreviation of the PLN regional division (Wilayah) in which the project is located
river	Name of project river
area	Catchment Area (km ²)

Column name	Description
modular	Modular flow (m ³ /s)
hydr	Hydraulic Circuit Length (km)
trans	Transmission Line Length (km)
mw_o	Optimal design - Installed capacity (MW)
flow_o	Optimal design - Design flow (m ³ /s)
head_o	Optimal design - Net head (m)
annual_o	Optimal design - Annual energy production (GWh)
musd_o	Optimal design - Capital investment (MUSD)
capex_o	Optimal design - Capital expenditure (MUSD/MW)
lcoe_o	Optimal design - Levelized cost of energy (USD/MWh)
irr_o	Optimal design - Internal rate of return (%)
mw_90	90% discharge dependability - Installed capacity (MW)
annual_90	90% discharge dependability - Annual energy production (GWh)
musd_90	90% discharge dependability - Capital investment (MUSD)
capex_90	90% discharge dependability - Capital expenditure (MUSD/MW)
lcoe_90	90% discharge dependability - Levelized cost of energy (USD/MWh)
irr_90	90% discharge dependability - Internal rate of return (%)

3.4.3 PLN SHP PLANNING

It was decided to add the PLN SHP planning list to the database to contribute to PLN's planning purposes. This list is for PLN's staff to keep up-to-date and has all current and under development SHP projects, easing project's features and status sharing within PLN. That way if there is any development on a project it could immediately be shared to everyone with database access. The fields chosen for this list are presented in Table 3.24, but since the database is completely adaptable it could be changed for PLN's best convenience.

Table 3.24 – Column description of the SHP – PLN SHP Planning.

Column name	Description
id	Database identification number
geom	Point geometry (WGS84)
permission	PLN's access permission
proj_name	Project name

Column name	Description
inst_cap_mw	Installed capacity (MW)
long	Powerhouse longitude (WGS84 - Decimal degrees)
lat	Powerhouse latitude (WGS84 - Decimal degrees)
island	Island in which the project is located
province	Province in which the project is located
regency	Regency in which the project is located
pln_wilayah	PLN regional division (Wilayah) in which the project is located
pln_wilayah_short	Abbreviation of the PLN regional division (Wilayah) in which the project is located
status	Project status
commission_year	Project commission year
developer	Project developer
ipp_pln	Developer (IPP or PLN)
system	Electrical System to be incorporated
river	Name of project river
river_basin	Name of project river basin
catchment_area_km2	Catchment area (km ²)
annual_rainfall	Average annual rainfall (mm)
runoff_m3s	Runoff (m ³ /s)
dam_height_m	Dam height (m)
full_supply_level	Full supply level
tailwater_level	Tailwater level
gross_head_m	Gross head (m)
design_flow_m3s	Design flow (m ³ /s)
annual_energy_gwh	Annual energy generation (GWh)
firm_power_mw	Firm power (MW)
total_cost_idr	Total Cost (IDR)
capex_idr_kw	Capital expenditure (IDR/kW)
lcoe_idr_kwh	Levelized cost of energy (IDR/kWh)

3.5 DATABASE DESIGN

In terms of database design the tables are divided into 2 schemes, “*projects*” and “*public_shapes*”. This division exists only to simplify the database management with the division of SHP data into the

“*projects*” scheme and the background data into the “*public_shapes*”. Also, since the SHP data has sensitive information, it’s easier to control users’ access. Ultimately it will depend on the database administrator to control users’ access and the tables to be in the database, but for this design phase it was added 3 tables to the “*projects*” scheme and 25 tables on the “*public_shapes*”.

The name of the tables in the database is different from the name in the plug-in in order to simplify the operations and to comply with some database design rules. The corresponding names and at what scheme they belong are presented in Table 3.25.

Table 3.25 – Database and plug-in tables’ correspondence.

Scheme	Database Table name	Plug-in Table name
public_shapes	gen_forest_areas	Forest areas
public_shapes	admin_00_islands	Islands
public_shapes	admin_01_provinces	Provinces
public_shapes	admin_02_regencies	Regencies and Cities
public_shapes	admin_03_ntt_mmu_sula_districts	NTT MMU sula Districts
public_shapes	admin_04_ntt_mmu_villages	NTT MMU Villages
public_shapes	admin_pln_wilayahs	PLN Wilayah
public_shapes	topo_bakosurtanal_100k	Topographic map grid - Bakosurtanal 100k
public_shapes	topo_bakosurtanal_250k	Topographic map grid - Bakosurtanal 250k
public_shapes	topo_bakosurtanal_50k	Topographic map grid - Bakosurtanal 50k
public_shapes	topo_jantop_250k	Topographic map grid - Jantop 250k
public_shapes	topo_jantop_gading_50k	Topographic map grid - Jantop Gading 50k
public_shapes	topo_jantop_hind1090_50k	Topographic map grid - Jantop Hind 50k
public_shapes	topo_jantop_mandau_50k	Topographic map grid - Jantop Mandau 50k
public_shapes	elect_generation	Powerstations
public_shapes	elect_grid	Transmission Lines
public_shapes	elect_substations	Substations
public_shapes	gen_roads	Roads
public_shapes	geo_fault	Geologic Faults
public_shapes	geo_map	Geologic Map
public_shapes	hydro_rainfallgauges	Rainfall Gauge
public_shapes	hydro_riverbasins	River Basin
public_shapes	hydro_rivers	Rivers (River Network)
public_shapes	hydro_runoffgauges	Runoff Gauge

Scheme	Database	Plug-in
	Table name	Table name
public_shapes	hydro_water_bodies	Water Bodies (River Network)
projects	comprehensive_compilation	comprehensive_compilation
projects	pln_shp_planning	pln_shp_planning
projects	list_most_promissing_sites	list_most_promissing_sites

3.6 CAPACITY BUILDING

As previously mentioned, in October 2015 a week of training was carried out in order to capacitate PLN staff to operate and maintain the database internally. This implied capacity building in GIS and Object-Relational Database Management Systems (ORDBMS). The training presentation and material is presented in **Annex III**.

Complementary capacity building was given at the time of the Final Workshop. This capacity building focused on the new features of the database, and on reviewing data management operations. This training's presentation is also presented in **Annex III**.

4 MAPS AND INFORMATION ON SHP

4.1 PROJECT INFORMATION

As mentioned in section 2.4.6 the data collection and initial screening yielded 2000 SHP projects. Those 2000 projects will be analyzed in more detail in this chapter focusing on the main conclusions that should be taken based on statistics analysis. The comprehensive list of compiled data is presented in **Annex I**.

Firstly, it should be stressed that 33 of those projects are located in East-Timor, former Indonesian territory that has gained independence as sovereign nation since the initial Hydropower Master Plan of 1997. Those projects were gathered from PLN’s archives and for that reason were kept on the database, but will be excluded of any further analysis. Also, 4 projects don’t have information regarding the installed capacity, which is essential for any basic analysis.

On the other hand, from the remaining 1963 projects, 176 were not possible to locate geographically (just stating the province where they are located). Although all 1963 projects were analyzed, these 176 projects were not included on the maps of findings of the next subchapter for not having the necessary coordinates.

The compiled data corresponds to a total of 88 GW from 1963 hydropower projects. Table 4.1 and Figure 4.1 present the distribution of the hydropower projects per island and wilayah.

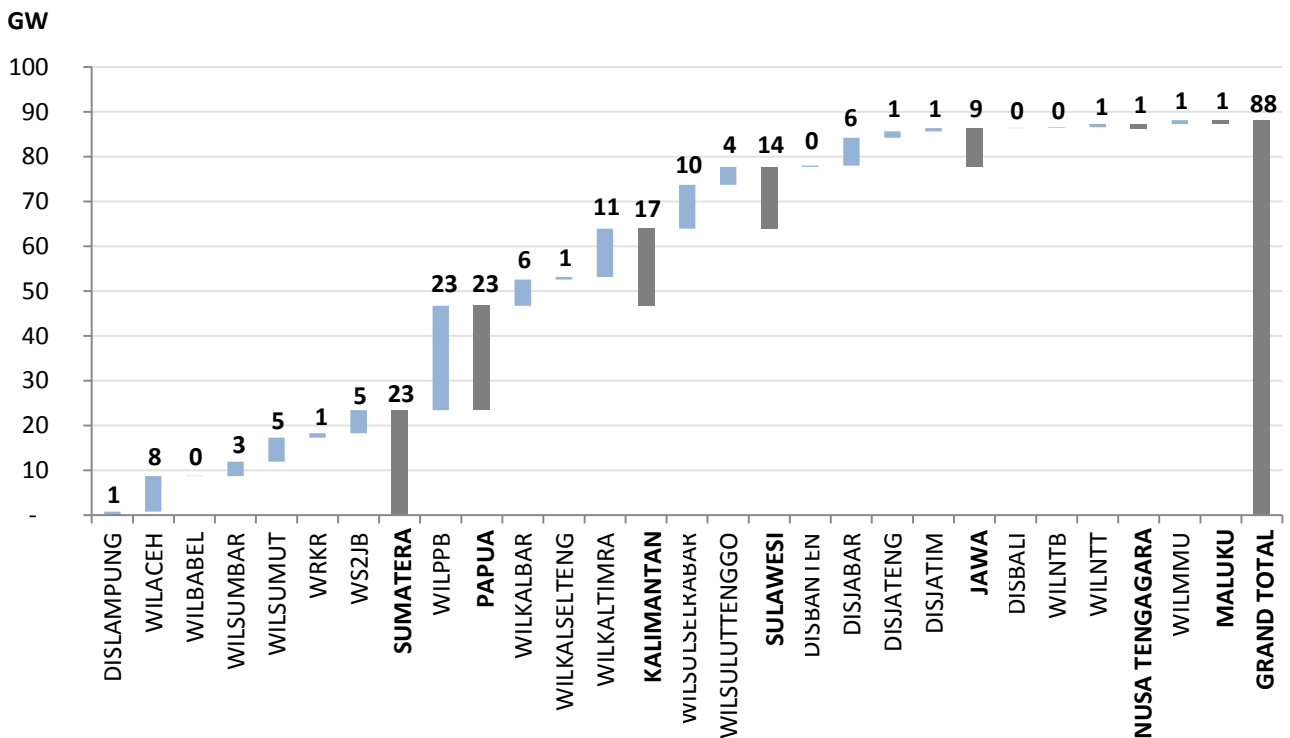


Figure 4.1 – Distribution of hydropower projects per Island and Wilayah.**Table 4.1 – Distribution of the hydropower projects per Island and Wilayah.**

WILAYAH	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)
Jawa	329	8 608
DISBANTEN	23	262
DISJABAR	133	6 259
DISJATENG	107	1 406
DISJATIM	66	681
Kalimantan	191	17 194
WILKALBAR	94	5 836
WILKALSELTENG	28	540
WILKALTIMRA	69	10 817
Maluku	65	835
WILMMU	65	835
Nusa Tenggara	152	988
DISBALI	22	111
WILNTB	36	156
WILNTT	94	720
Papua	241	23 315
WILPPB	241	23 315
Sulawesi	328	13 794
WILSULSELRABAR	177	9 788
WILSULUTTENGGO	151	4 005
Sumatera	657	23 426
DISLAMPUNG	33	776
WILACEH	179	7 894
WILBABEL	2	1
WILSUMBAR	120	3 221
WILSUMUT	180	5 373
WRKR	12	980
WS2JB	131	5 181
Grand Total	1 963	88 160

It can be seen that this database includes not only SHP but also Large Hydro Projects (LHP), since in average the projects on the database have more than 40 MW. This wasn't considered problematic since even a hydropower project that was initially thought as LHP may be downsized to SHP. However, caution is advised, since it may not be feasible to install power capacity far from the optimal design (since the energy costs might be too high). Even so, less than 1000 projects on the database are SHP with a total capacity of 4 GW, while LHP reaches 84 GW, Figure 4.2.

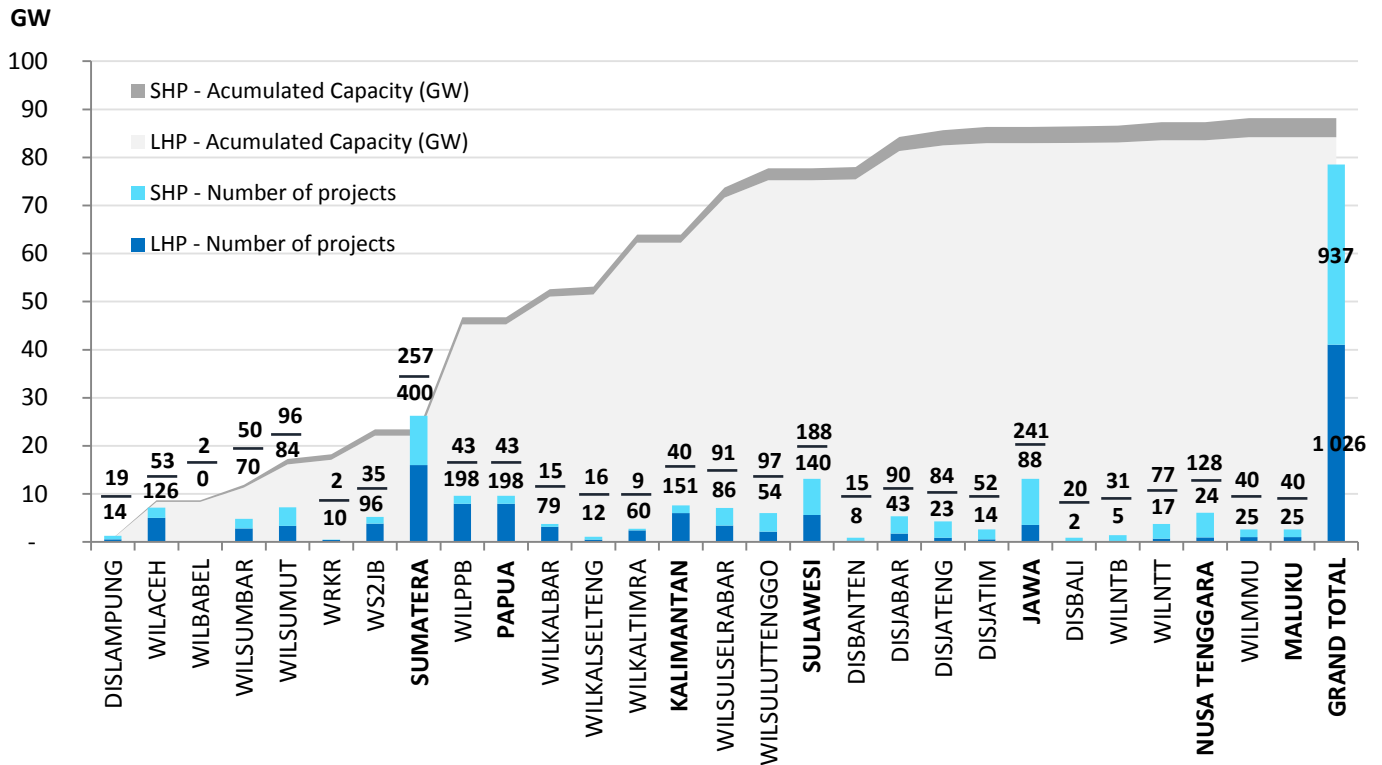


Figure 4.2 – Distribution of Large (LHP) and Small (SHP) hydro per Island and Wilayah.

Proceeding with the SHP analysis, it should be stressed that more than half of SHP are located on Sumatera or Jawa Islands with almost 500 projects and a total capacity of more than 2 GW. In terms of average capacity, Sumatera and Kalimantan have the highest capacity per SHP with more than 5 MW. Given the type of feed-in-tariff (FiT) implemented by the Government it was expected the collection of more projects near the 10 MW limit, but since that’s not the case, it is possible that the majority of the gathered SHP are designed considering the optimal solution in terms of Cost/Production. Sumatera Island does not only presents the highest number of projects and average capacity per SHP, as also naturally presents the highest total capacity with more than 1,3 GW. This analysis can be seen in Figure 4.3 and Table 4.2.

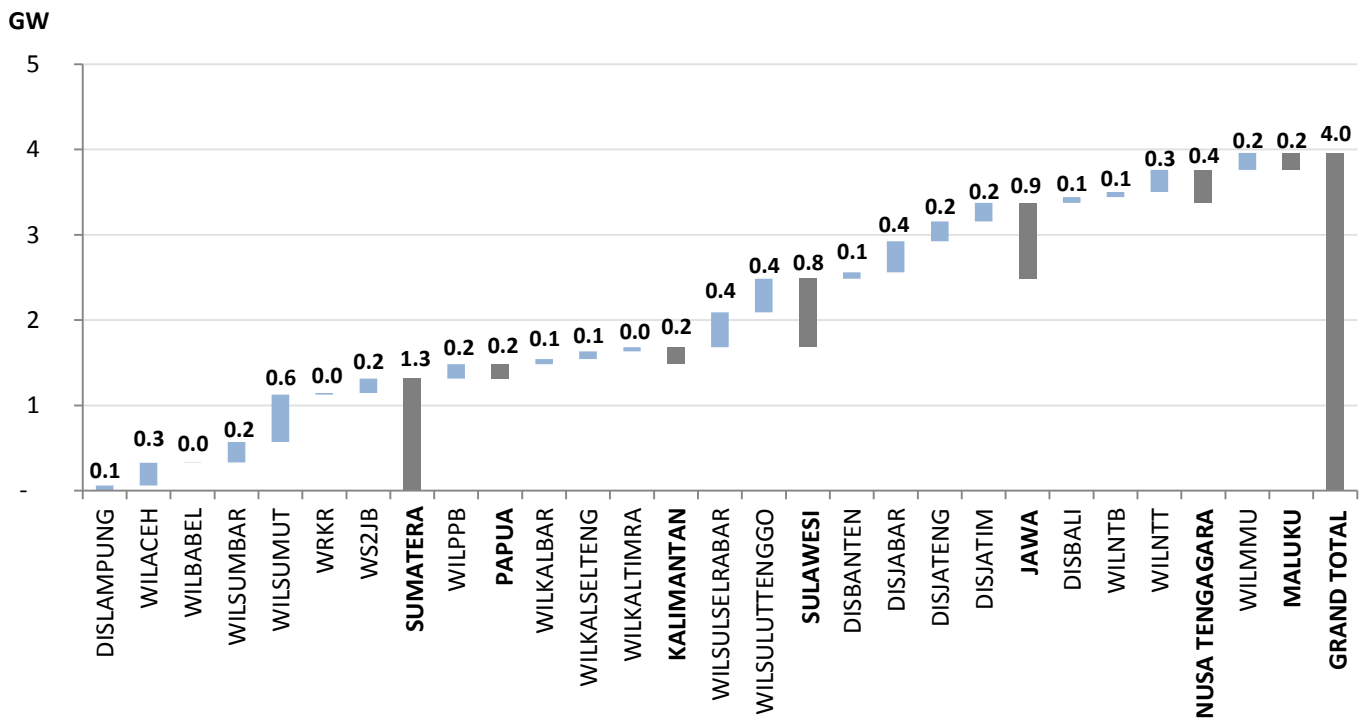


Figure 4.3 – Distribution of SHP per Island and Wilayah.

Table 4.2 – Distribution of SHP per Island and Wilayah.

WILAYAH	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)
Jawa	241	890
DISBANTEN	15	78
DISJABAR	90	363
DISJATENG	84	233
DISJATIM	52	216
Kalimantan	40	199
WILKALBAR	15	59
WILKALSELTENG	16	92
WILKALTIMIRA	9	48
Maluku	40	198
WILMMU	40	198
Nusa Tenggara	128	387
DISBALI	20	69
WILNTB	31	58
WILNTT	77	260
Papua	43	168
WILPPB	43	168
Sulawesi	188	803
WILSULSELRABAR	91	409

WILAYAH	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)
WILSULUTTENGGO	97	394
Sumatera	257	1 314
DISLAMPUNG	19	60
WILACEH	53	269
WILBABEL	2	1
WILSUMBAR	50	240
WILSUMUT	96	557
WRKR	2	18
WS2JB	35	169
Grand Total	937	3 959

Still on SHP, there are a large number of entries without any information regarding the status of the project and even if they had it, they could just be outdated. For instance 85% of the projects don't have such data, corresponding a more than 3 GW, Table 4.3. Project's developer information suffers from a similar situation as more than 40% of SHP don't have indication of even the developer's type (IPP or PLN), Table 4.4. Even so, from the identified 386 SHP under IPP responsibility it was possible to collect in 250 of them the name of the company in charge. The list of the IPP's SHP projects by Island is presented in **Annex IV**, with indication of the project's capacity and status.

Table 4.3 – Indonesian SHP status.

STATUS	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)
Completed	83	285
PPA	6	37
Under Construction	51	271
Unknown	797	3 366
Grand Total	937	3 959

Table 4.4 – Indonesian SHP developer's categories.

DEVELOPER	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)
IPP	386	1 675
PLN	157	249
Unknown	394	2 035
Grand Total	937	3 959

While it is comprehensive for the type of developer to be unknown at a study level, since it may be unspecified at that stage, the unknown status of a project should naturally correspond to some study

level, although this is not certain - specially since some sources were databases that may not be up-to-date.

Finally, bearing in mind PLN’s past SHP strategy it was expected for the vast majority of SHP in the database to be developed by IPPs. This strategy is now changing considering the high power demand of some Indonesian regions where the generation cost is still very high. For that reason, PLN wants to boost renewable generation projects implementation by developing SHP themselves. As stated, this is PLN’s recent approach and this database is based on past studies and may not represent this scenario. Figure 4.4 presents the total capacity per Island and identified developer, where it is easily seen that IPP still are the main actors on the SHP market, but there is still a lot of identified potential with undefined developer.

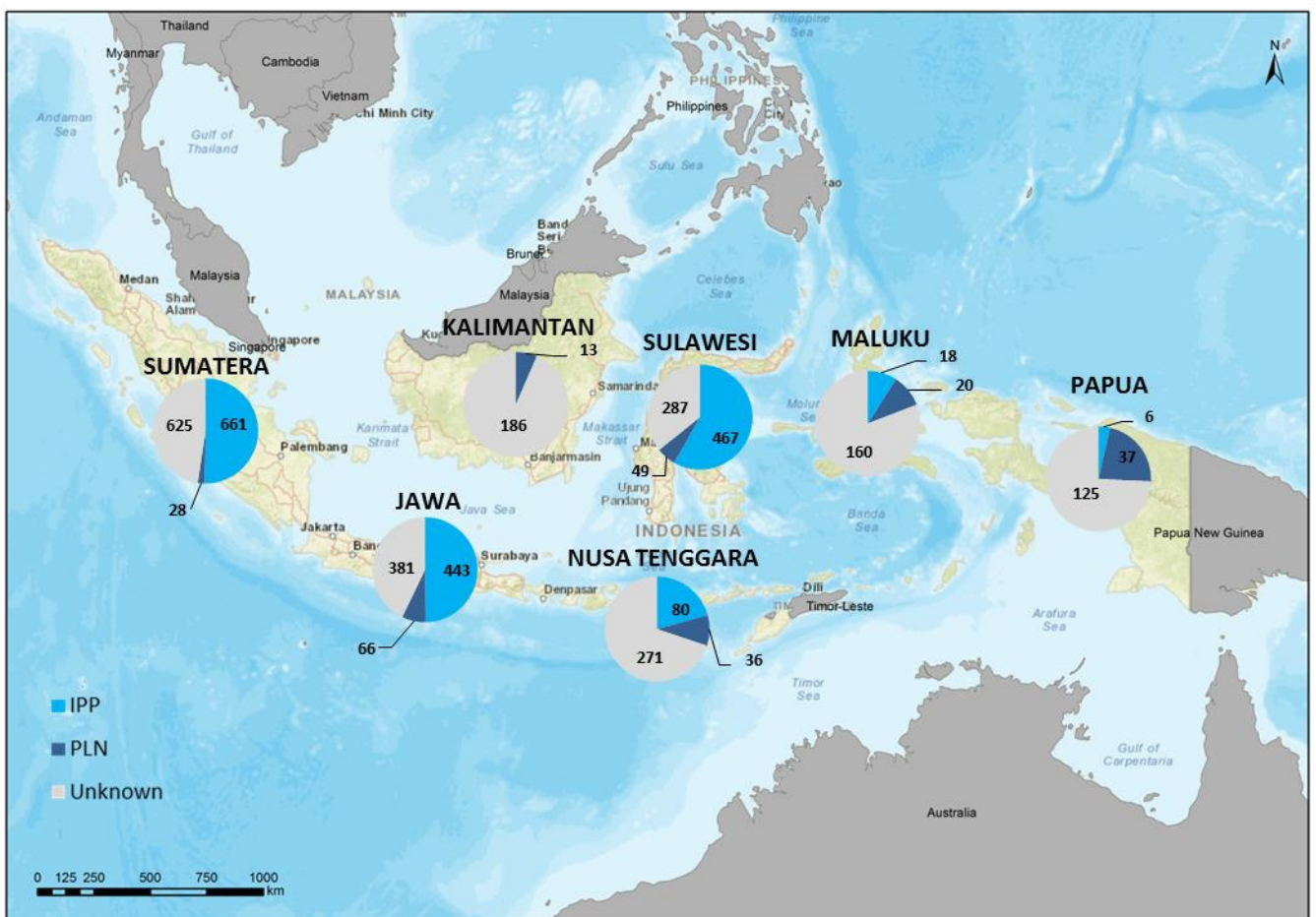


Figure 4.4 – Total capacity (MW) per Island and identified developer.

4.2 MAPS OF FINDINGS

In this section it is presented in map form all identified projects with coordinates and capacity and that are located under Indonesia’s territory of the comprehensive list described in section 2.4.6. Also, as mentioned on the previous section there were 33 projects located in East-Timor, former Indonesia’s territory, 176 projects without coordinates and 4 without capacity information. For that reason, of the 2000 entries of the comprehensive compilation list only 1963 projects respect all those necessary assumptions.

For an easy reading the maps have symbol size variation per project capacity categories and were prepared per each Wilayah, Figure 4.5 to Figure 4.24.

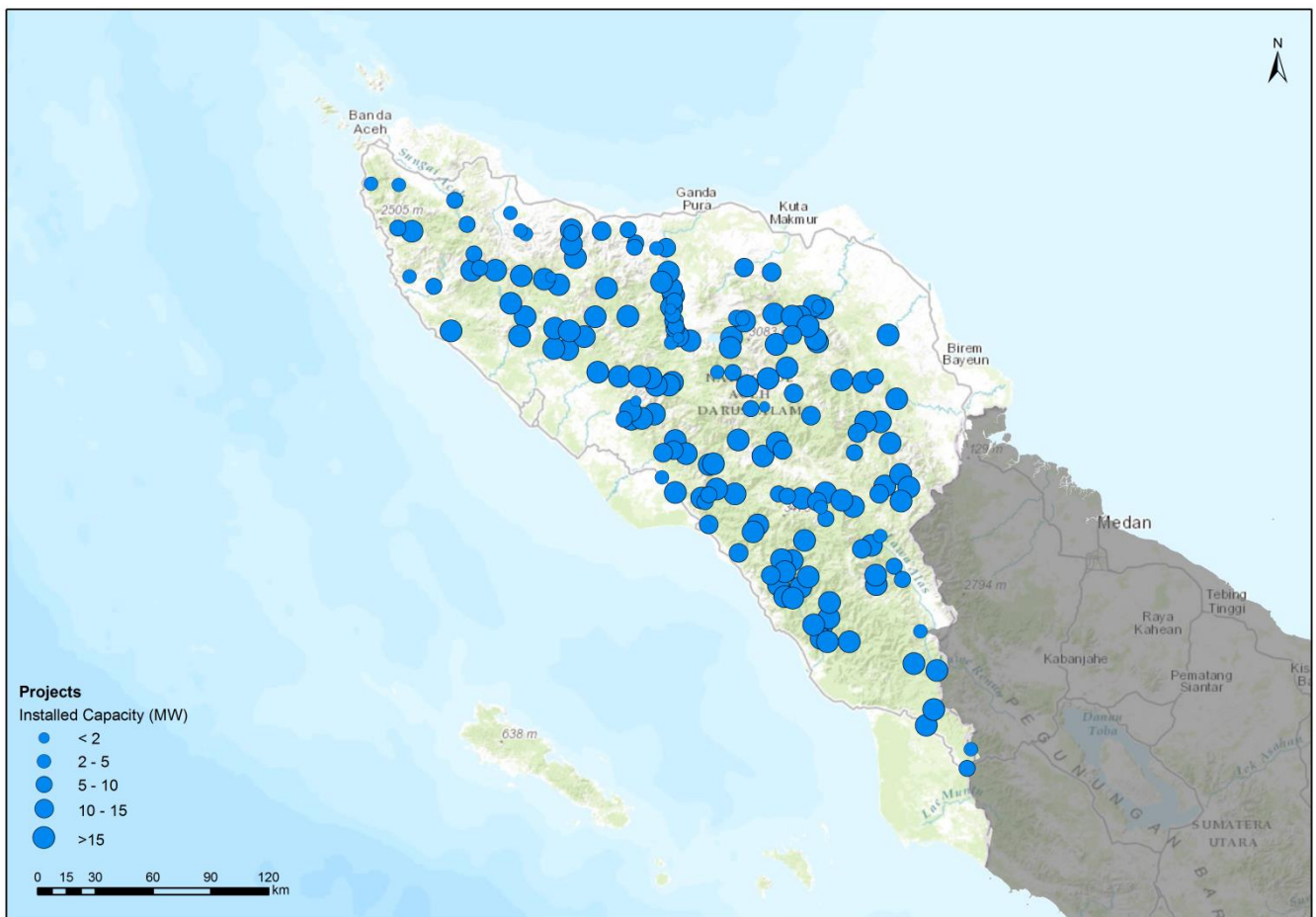


Figure 4.5 – Identified SHP – Wilayah Aceh.

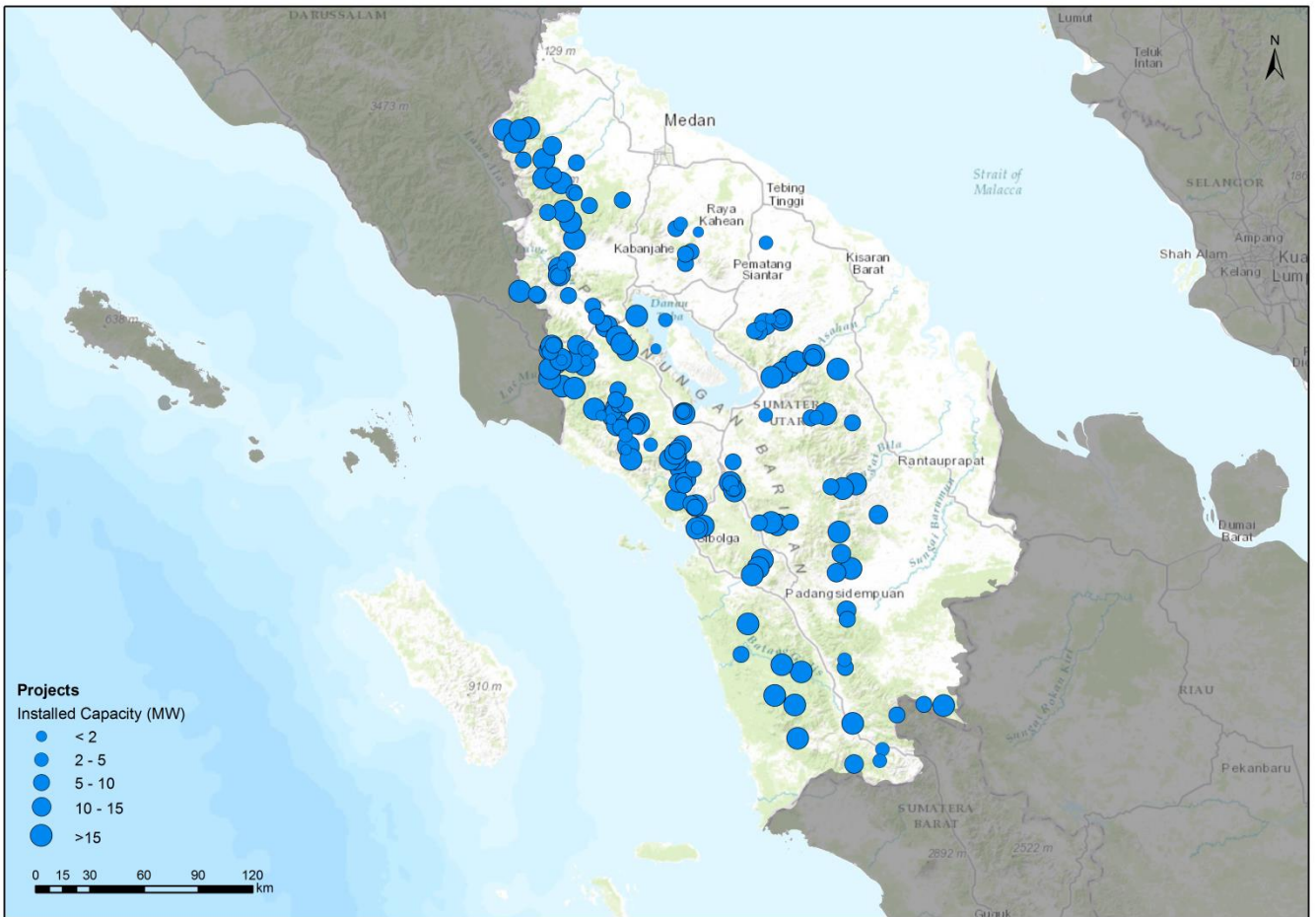


Figure 4.6 – Identified SHP – Wilayah Sumatera Utara.

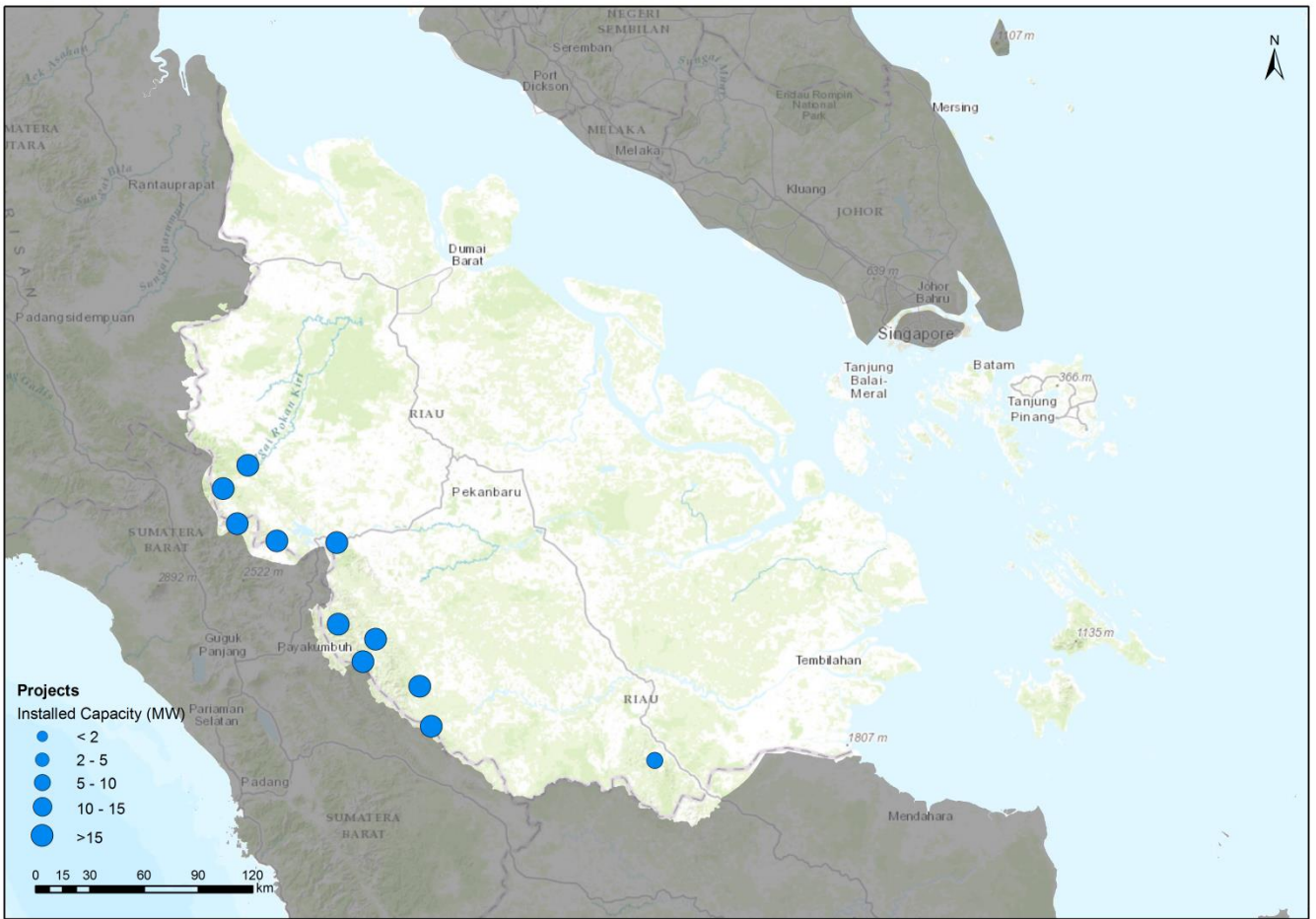


Figure 4.7 – Identified SHP – Wilayah Riau dan Kepulauan Riau.

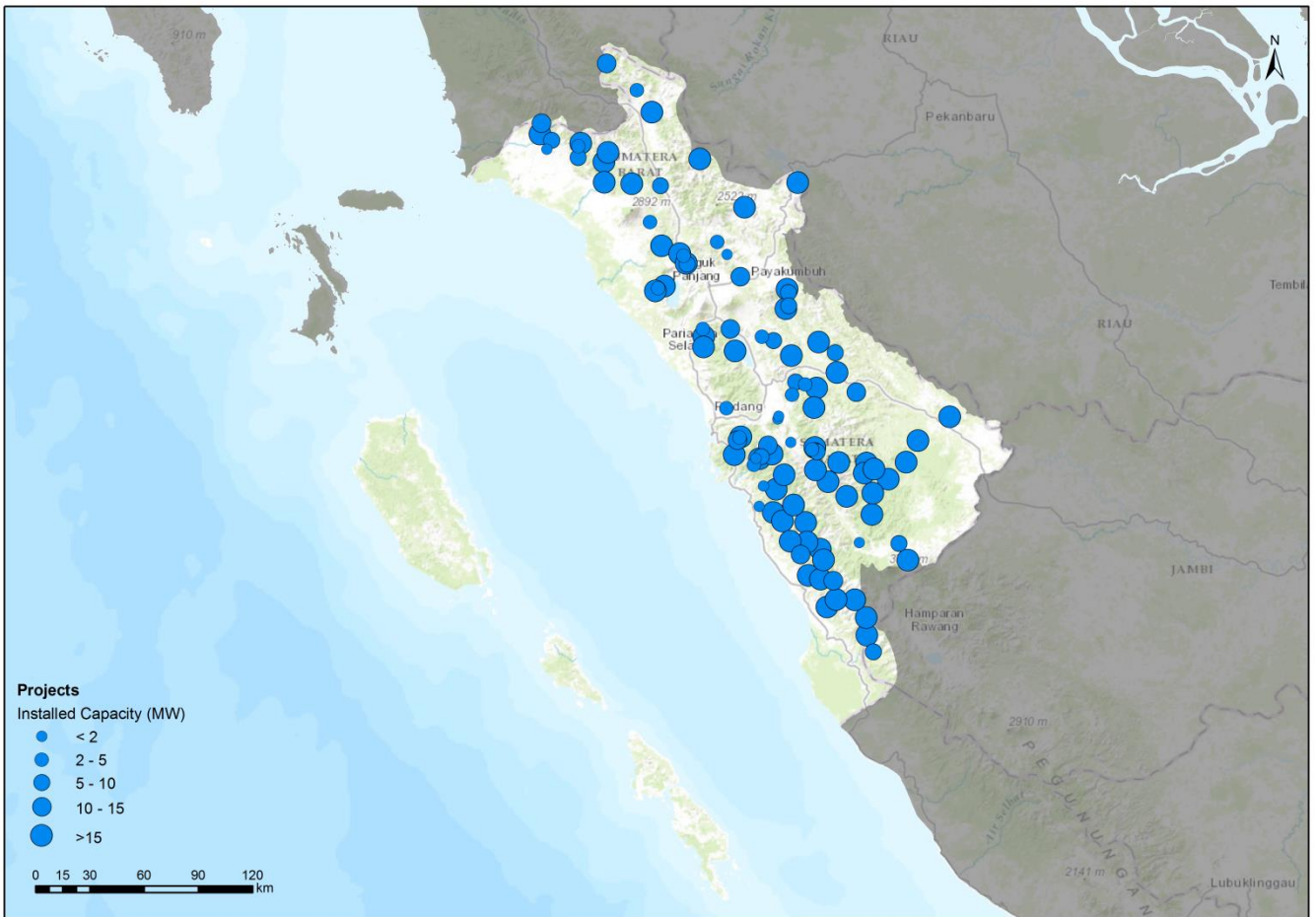


Figure 4.8 – Identified SHP – Wilayah Sumatera Barat.

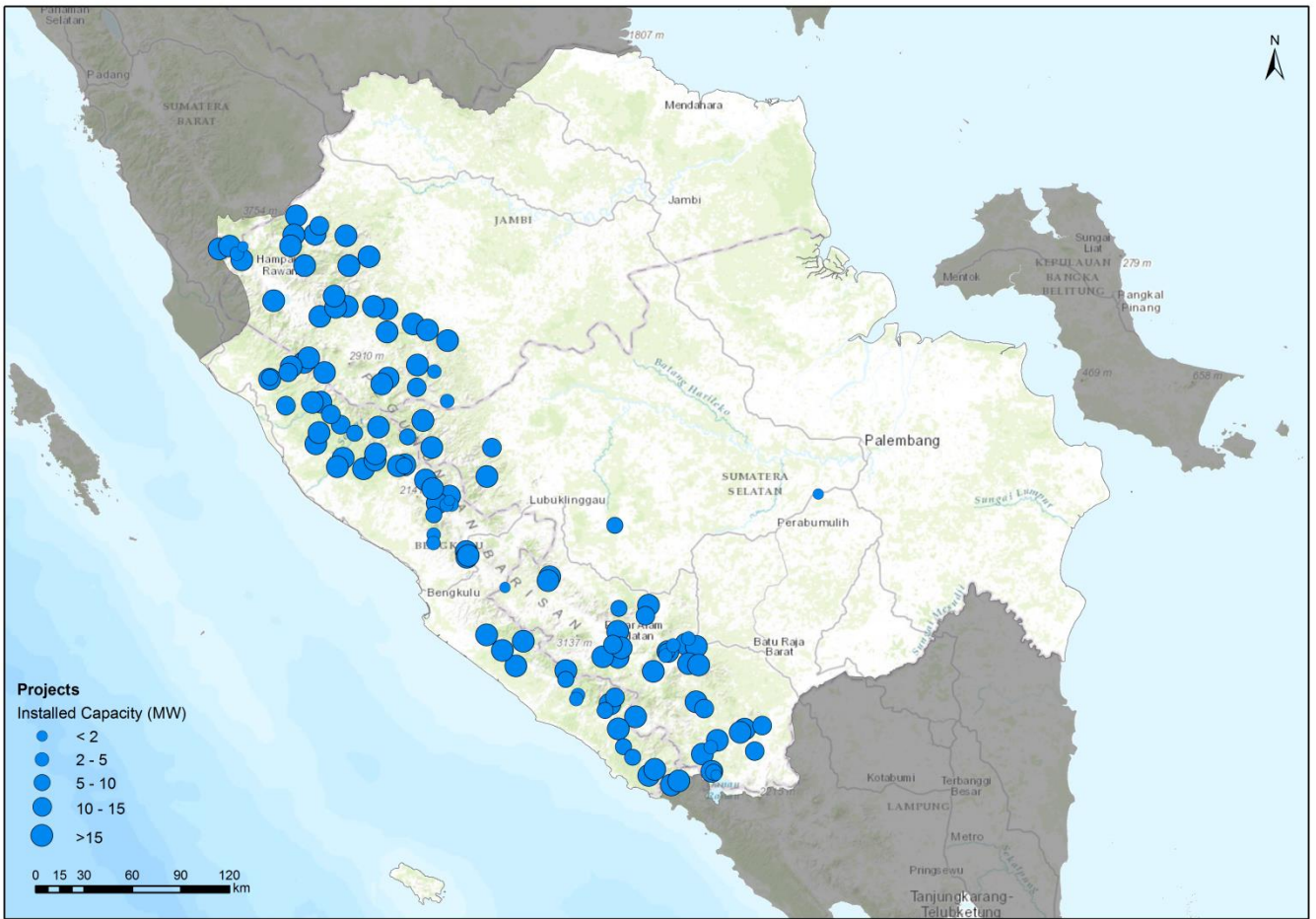


Figure 4.9 – Identified SHP – Wilayah Sumatera Selatan, Jambi dan Bengkulu.

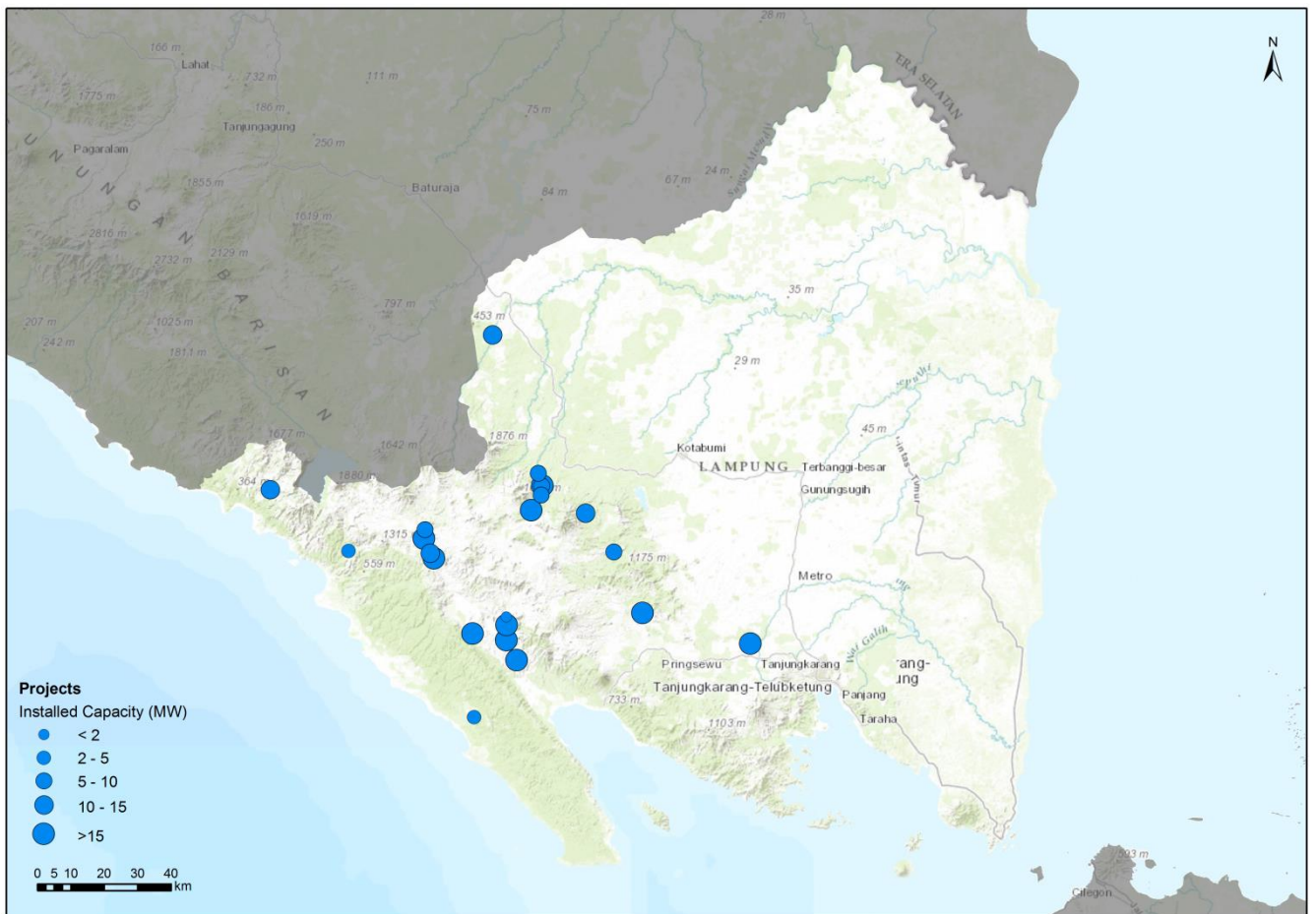


Figure 4.10 – Identified SHP – Distribusi Lampung.

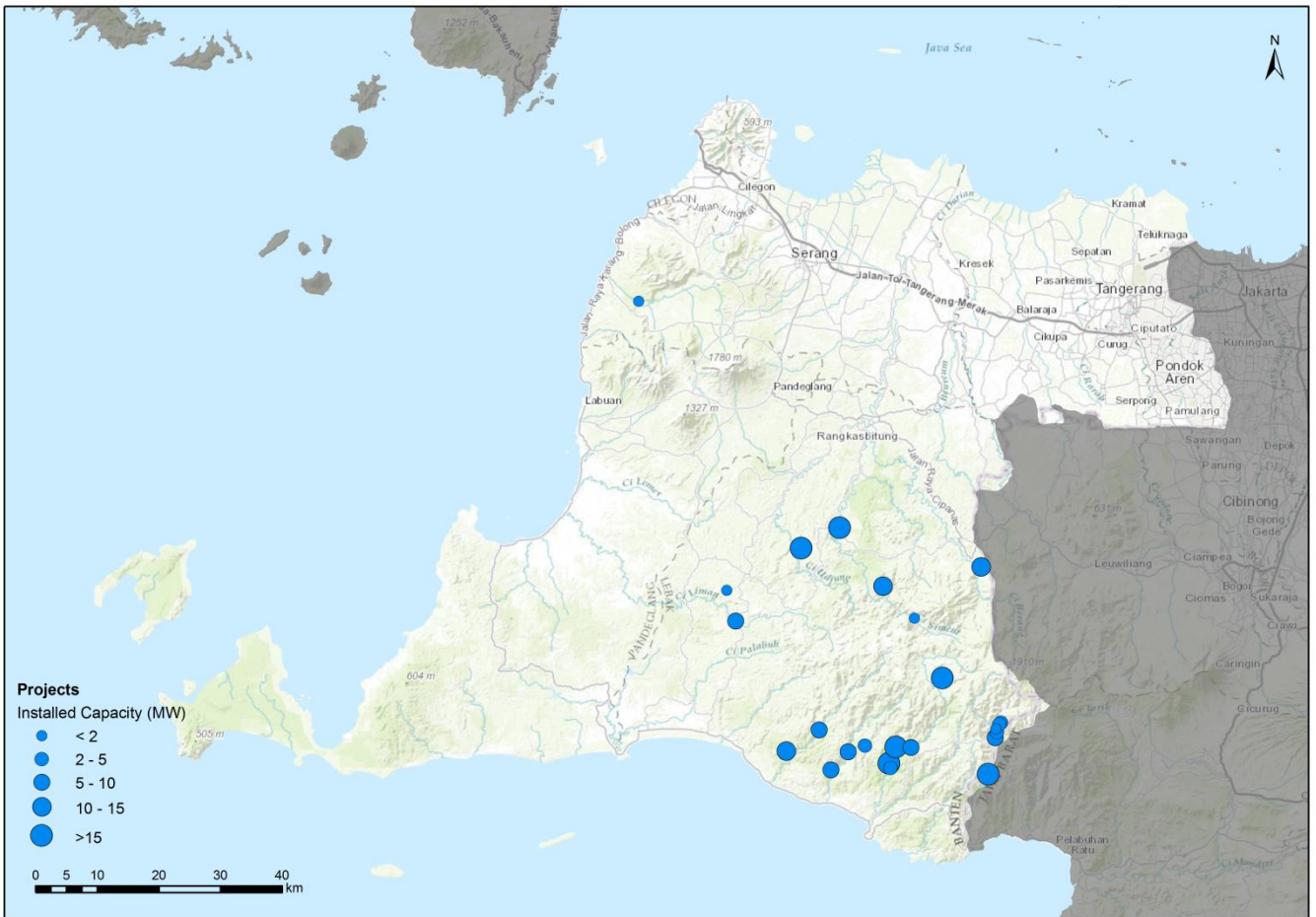


Figure 4.11 – Identified SHP – Distribusi Banten.

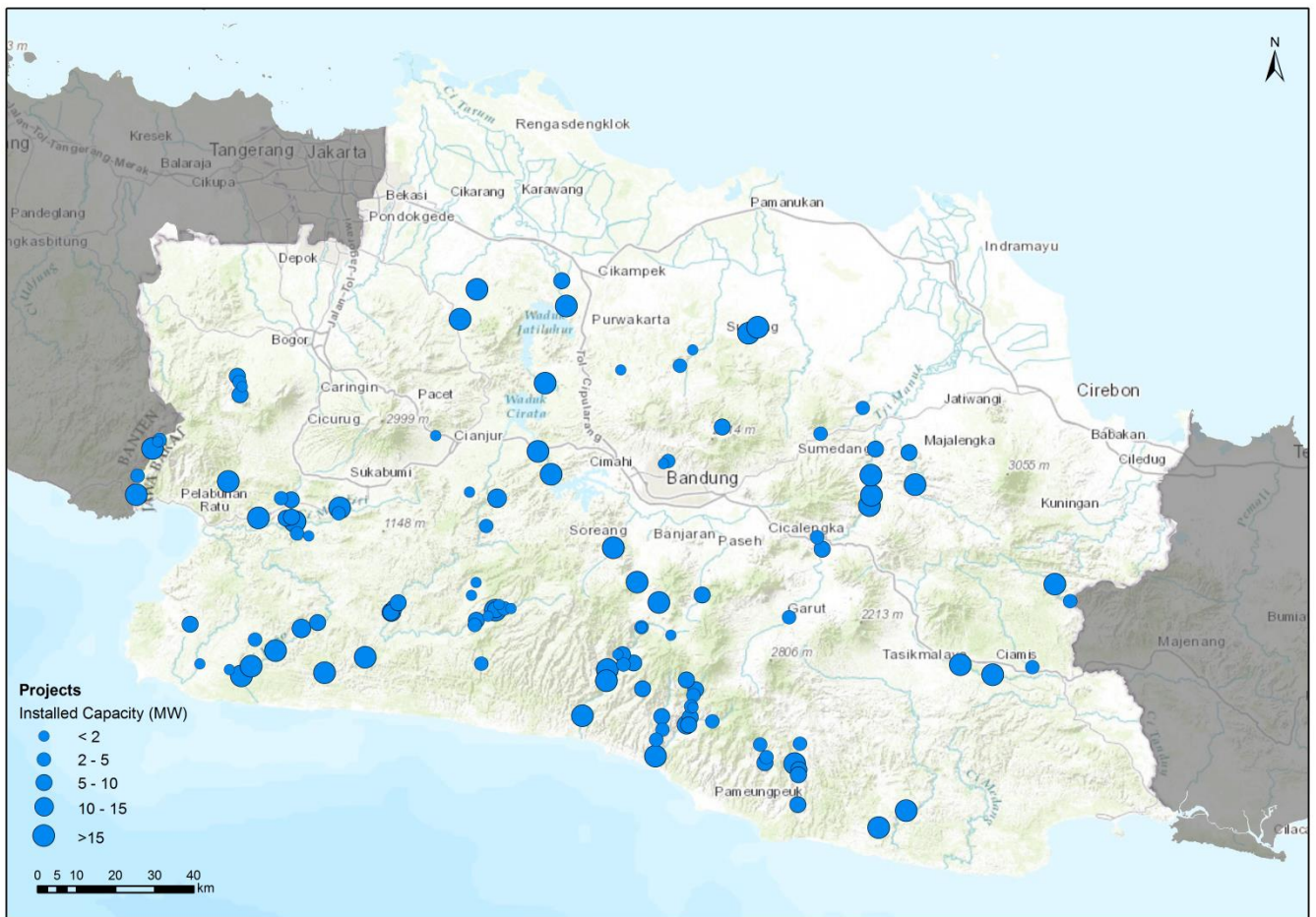


Figure 4.12 – Identified SHP – Distribusi Jawa Barat.



Figure 4.13 – Identified SHP – Distribusi Jawa Tengah dan DI Yogyakarta.



Figure 4.14 – Identified SHP – Distribusi Jawa Timur.

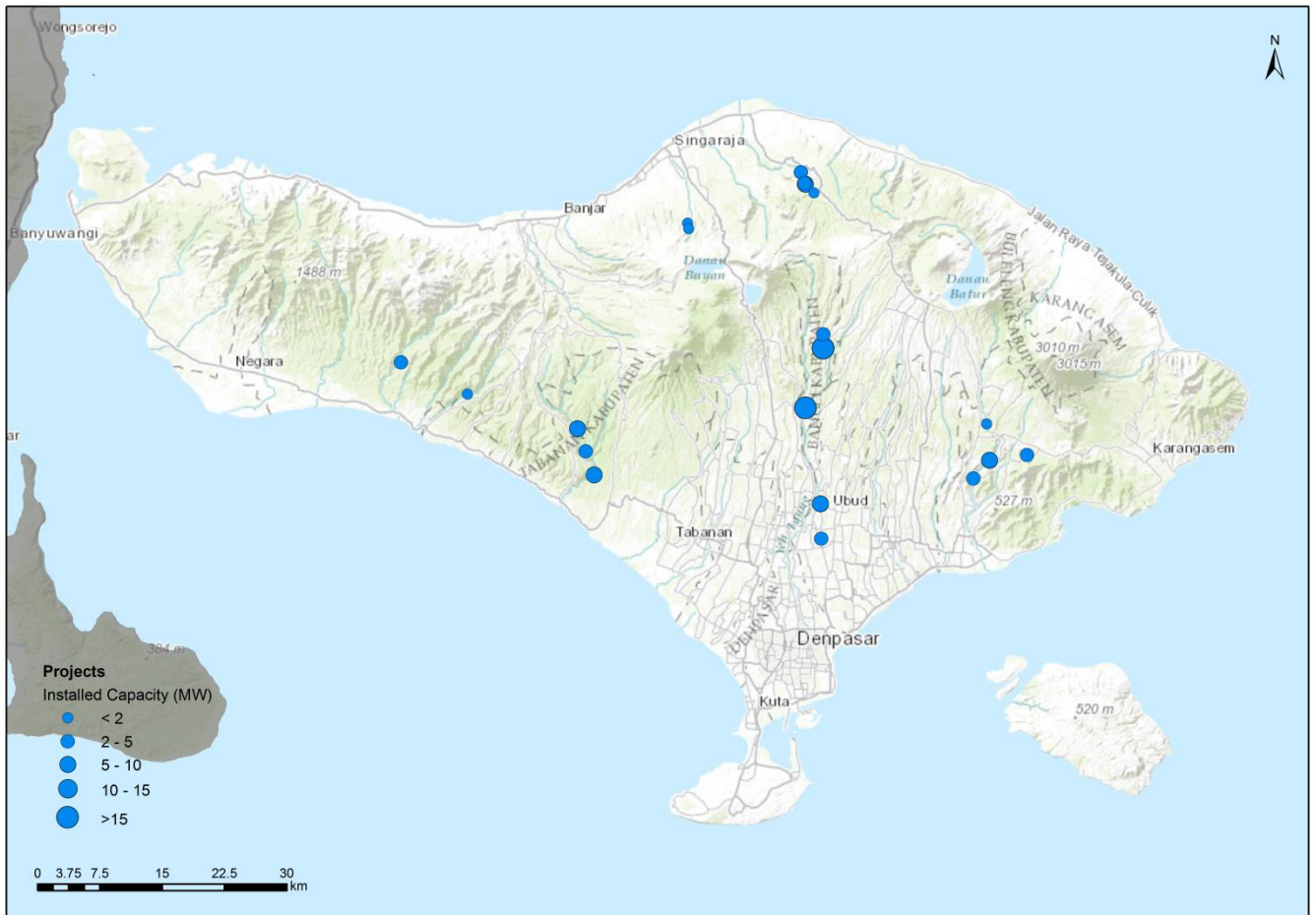


Figure 4.15 – Identified SHP – Distribusi Bali.

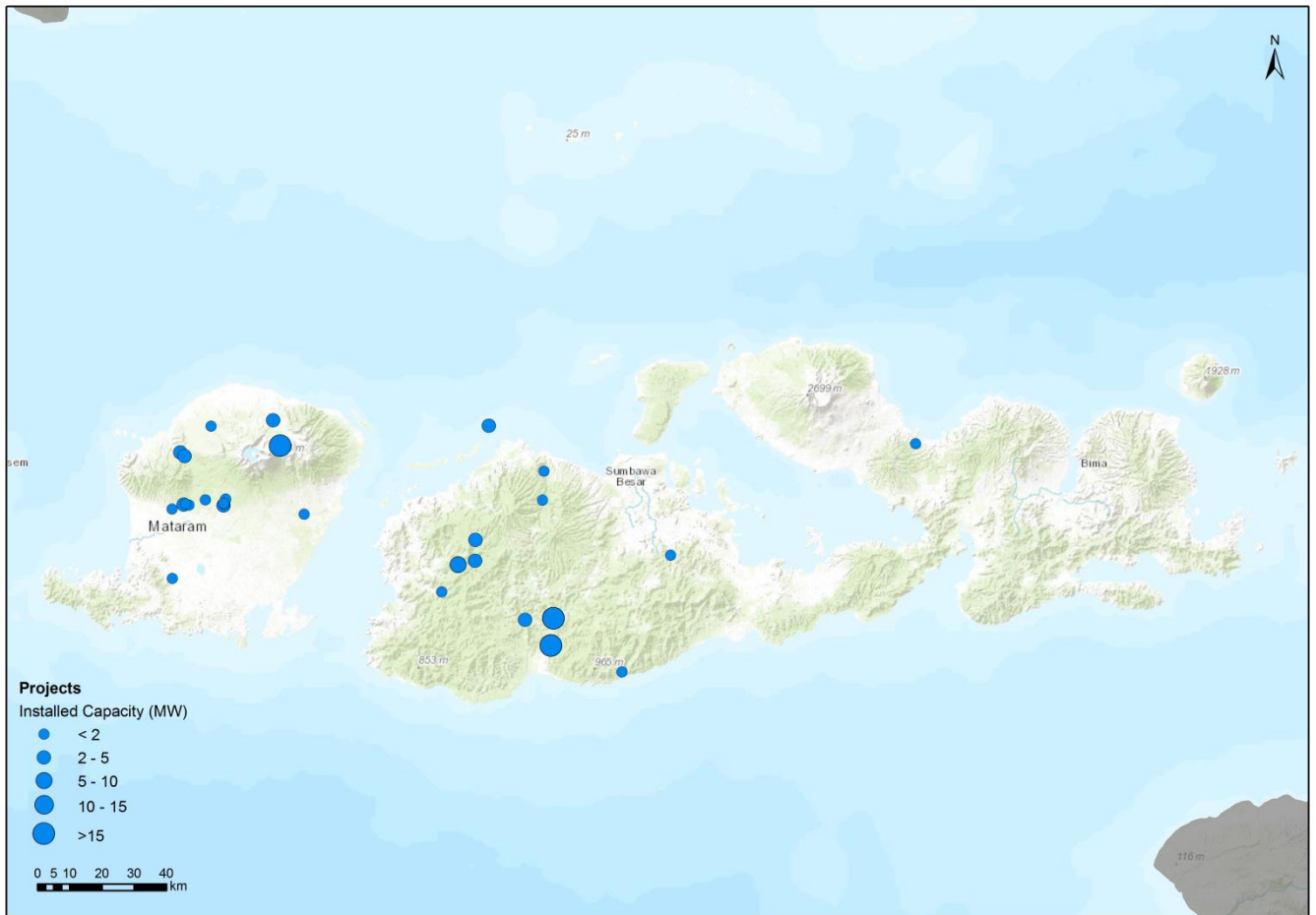


Figure 4.16 – Identified SHP – Wilayah Nusa Tenggara Barat.

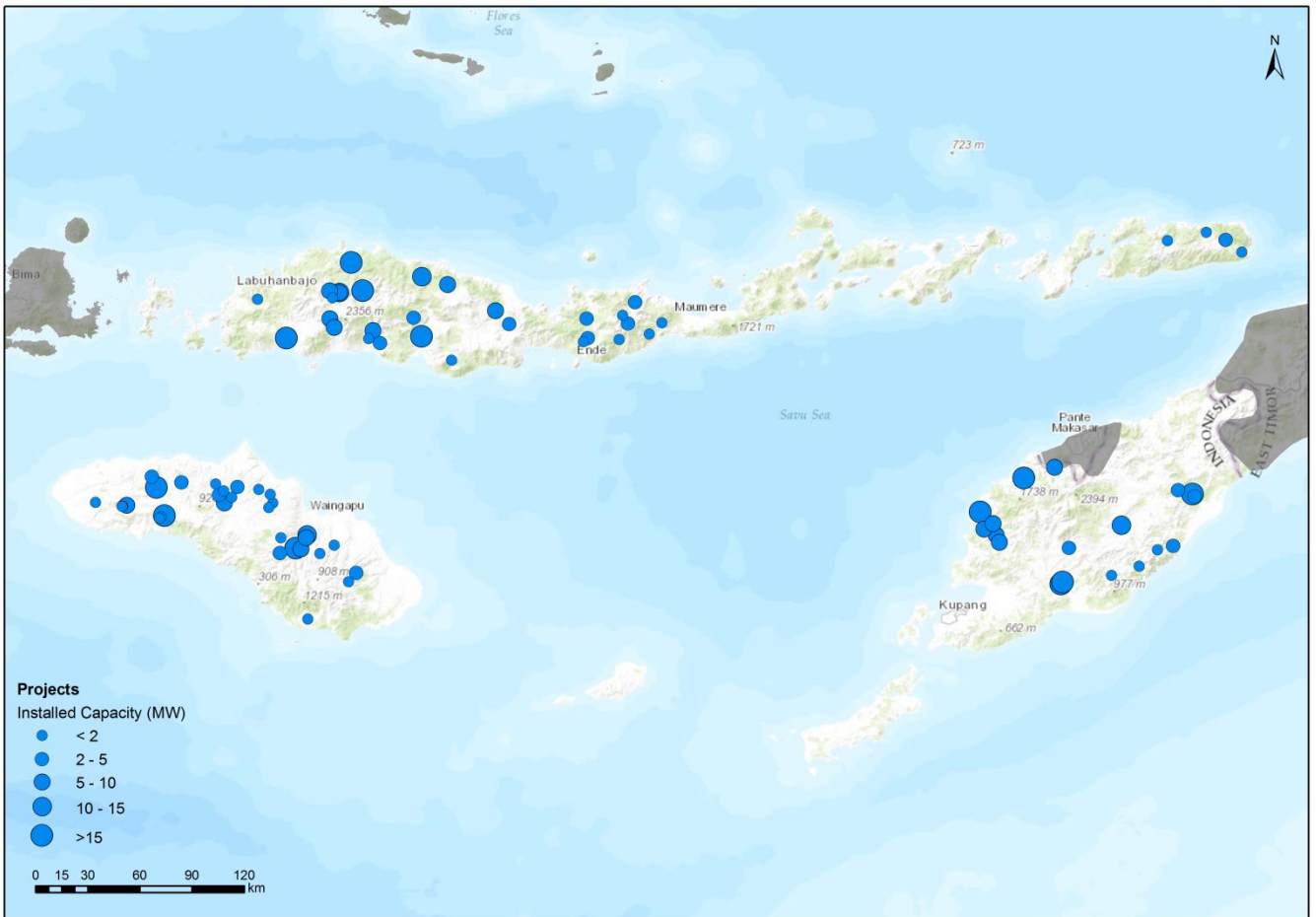


Figure 4.17 – Identified SHP – Wilayah Nusa Tenggara Timur.

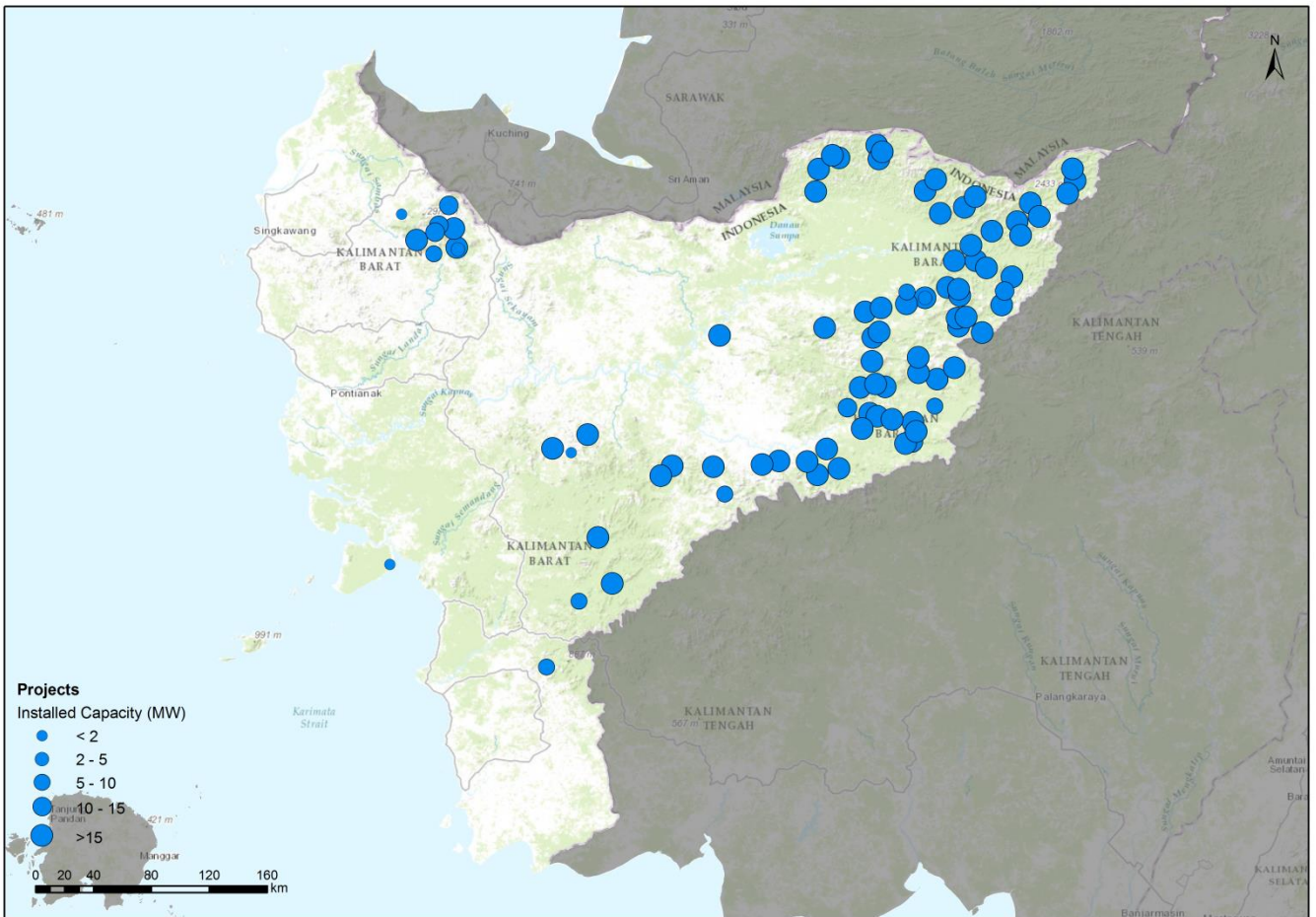


Figure 4.18 – Identified SHP – Wilayah Kalimantan Barat.

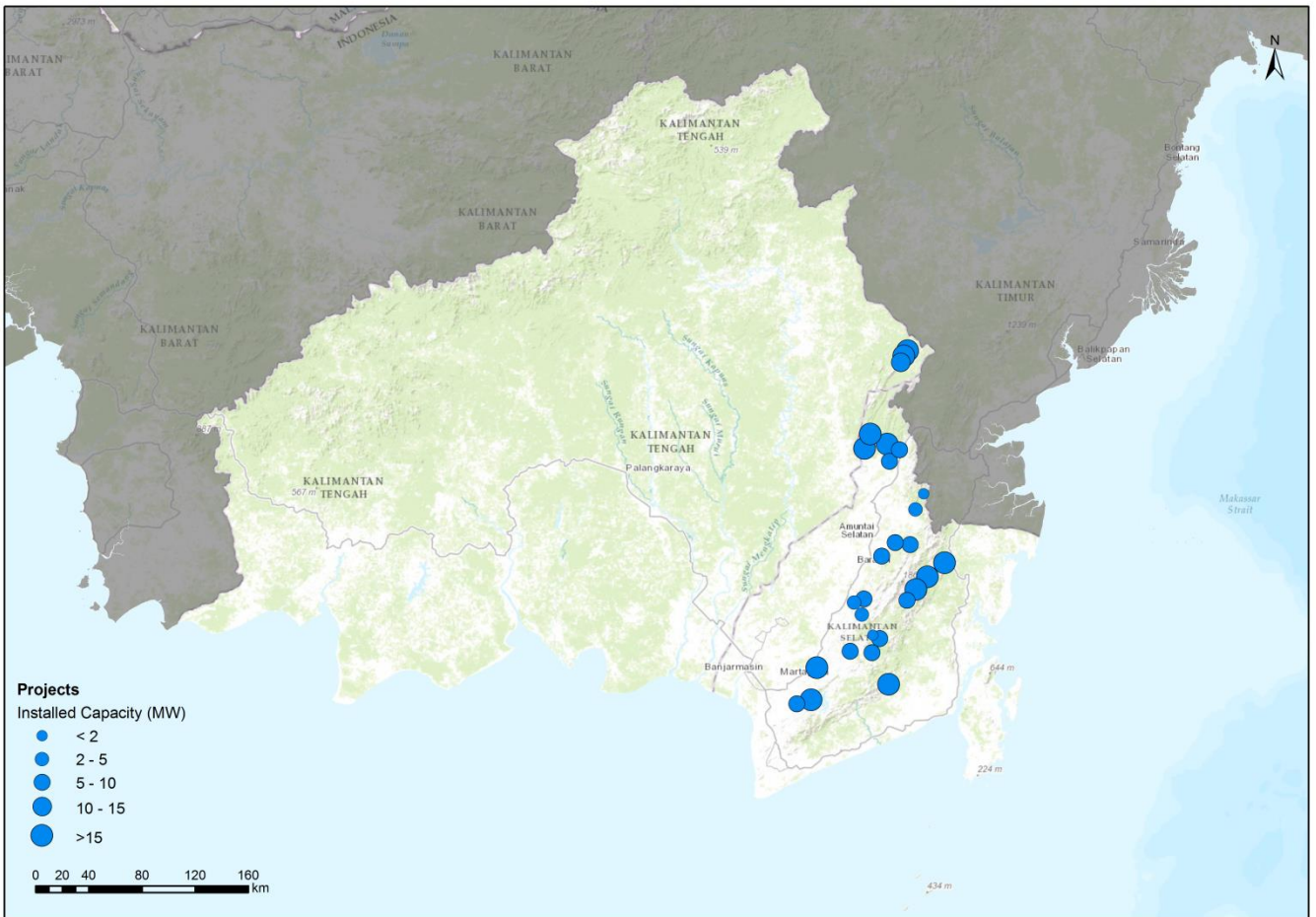


Figure 4.19 – Identified SHP – Wilayah Kalimantan Selatan dan Kalimantan Tengah.

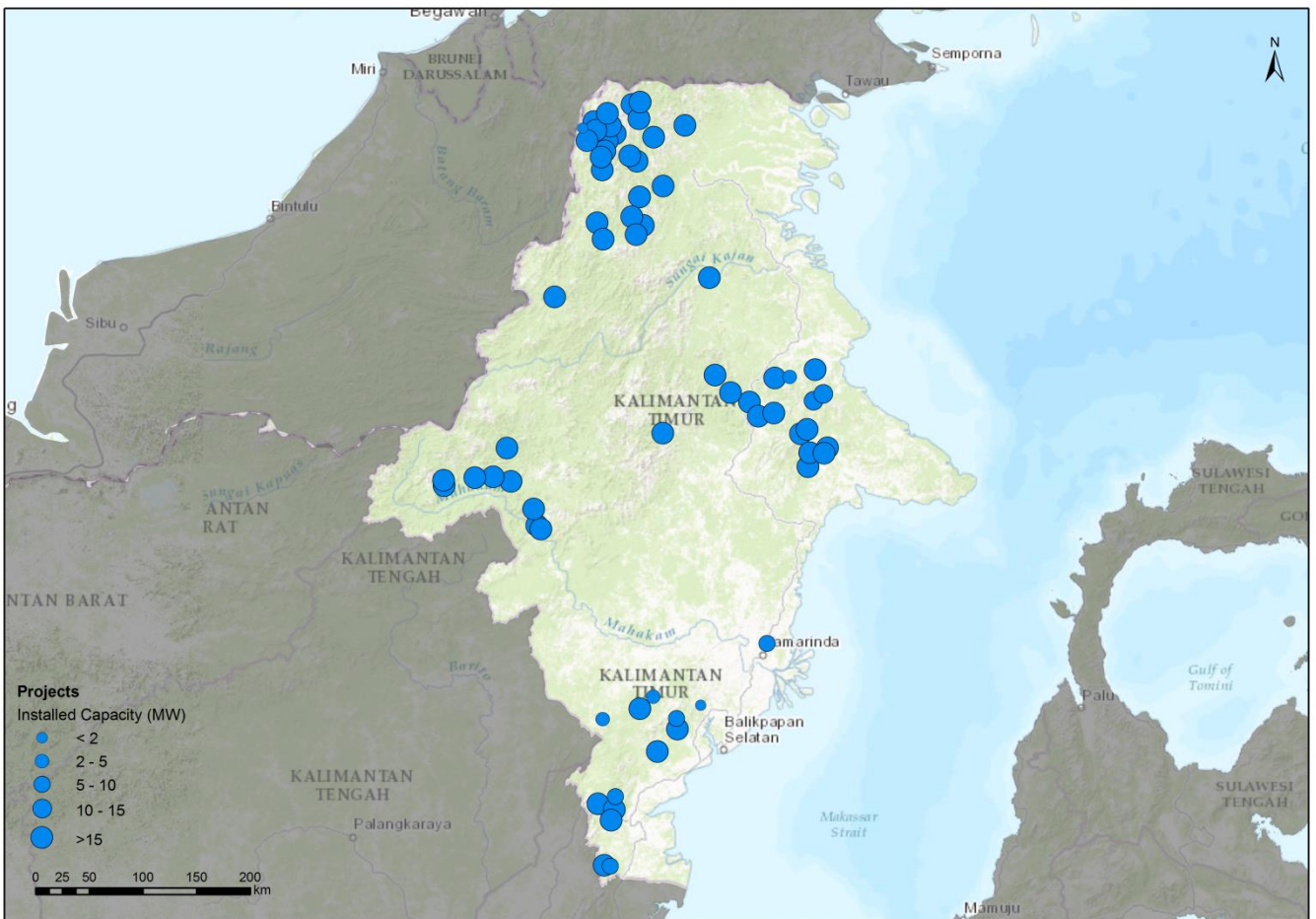


Figure 4.20 – Identified SHP – Wilayah Kalimantan Timur dan Kalimantan Utara.

SMALL HYDROPOWER MAPPING REPORT

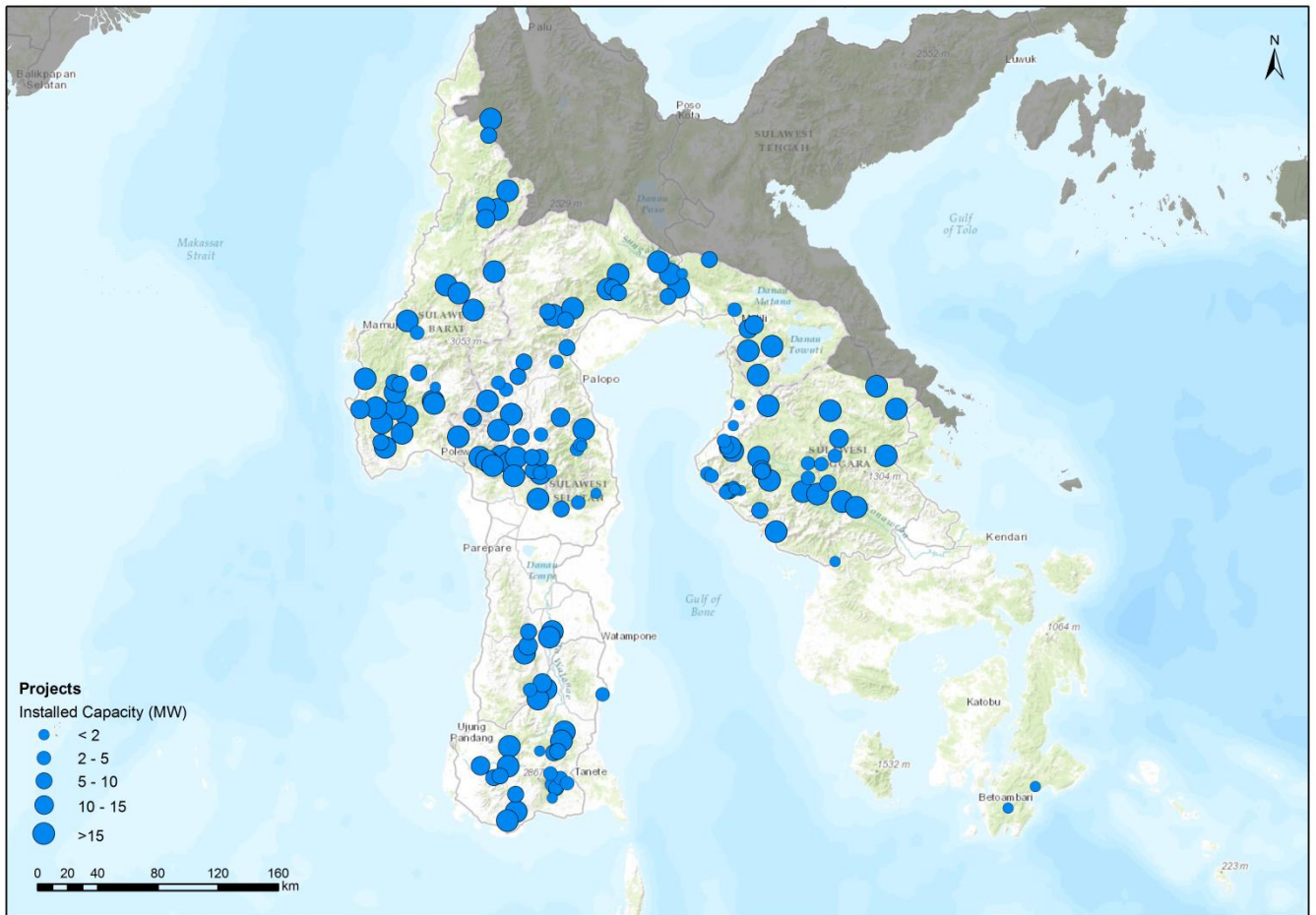


Figure 4.21 – Identified SHP – Wilayah Sulawesi Selatan, Sulawesi Tenggara dan Sulawesi Barat.

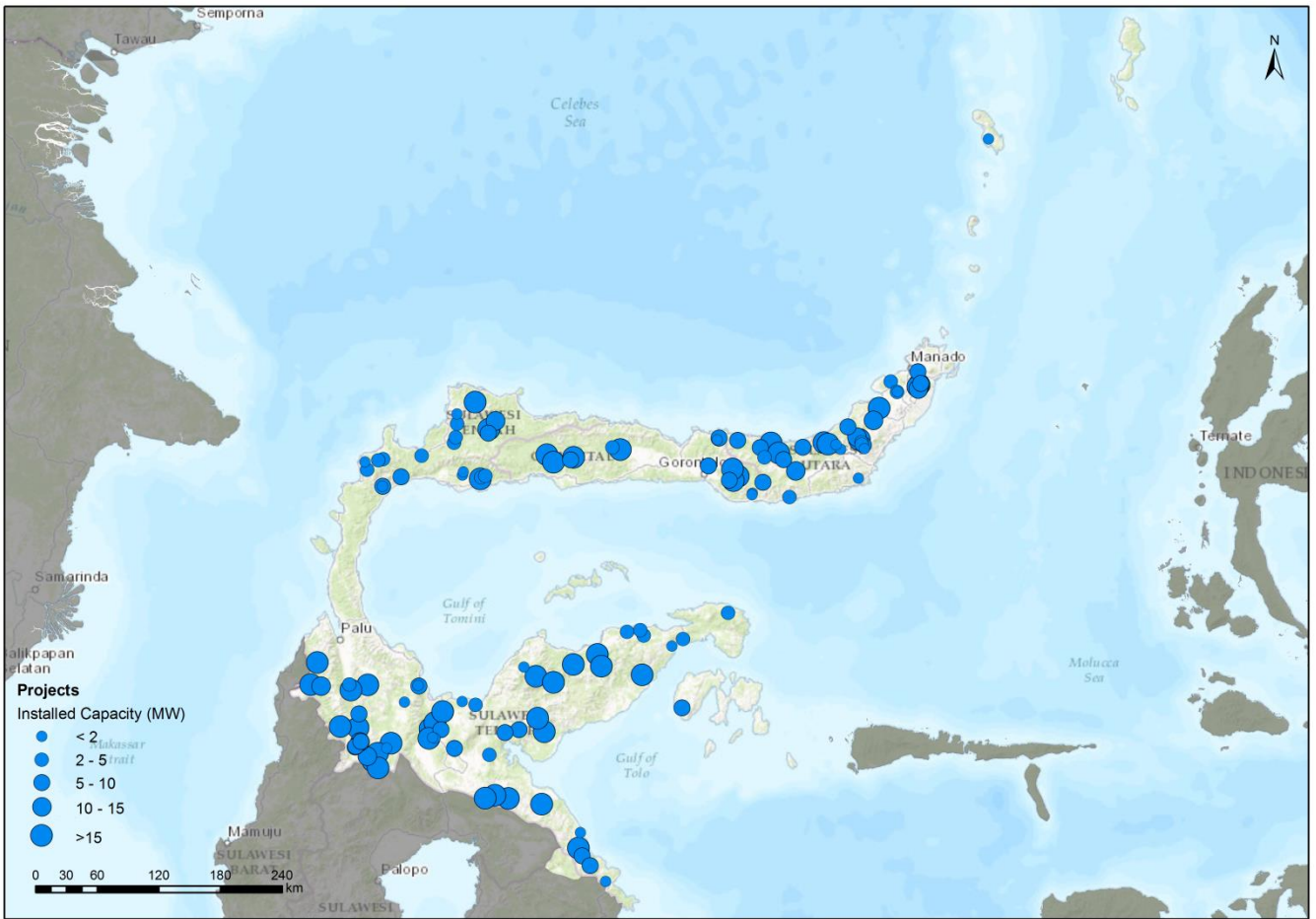


Figure 4.22 – Identified SHP – Wilayah Sulawesi Utara, Sulawesi Tengah dan Gorontalo.

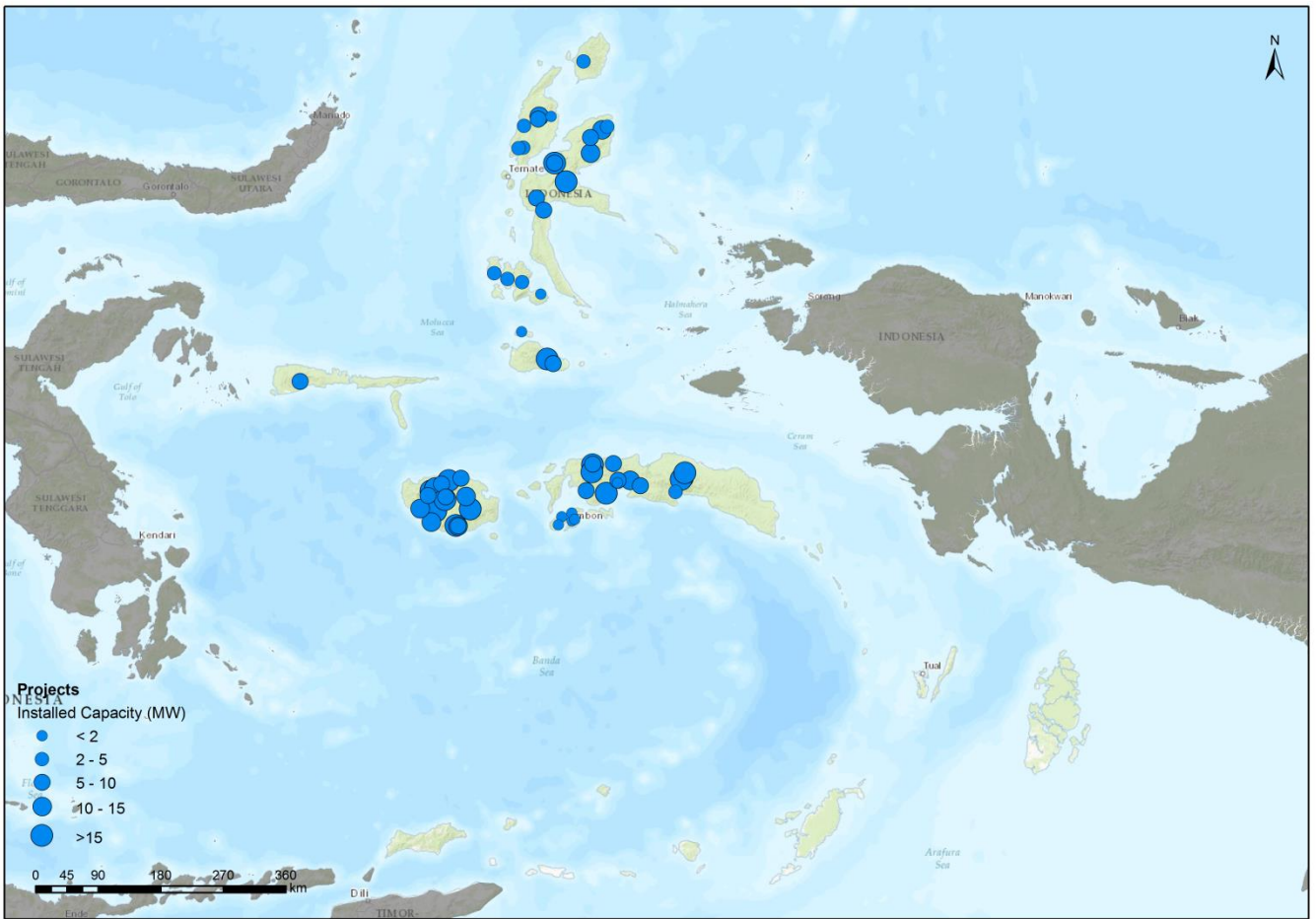


Figure 4.23 – Identified SHP – Wilayah Maluku dan Maluku Utara.

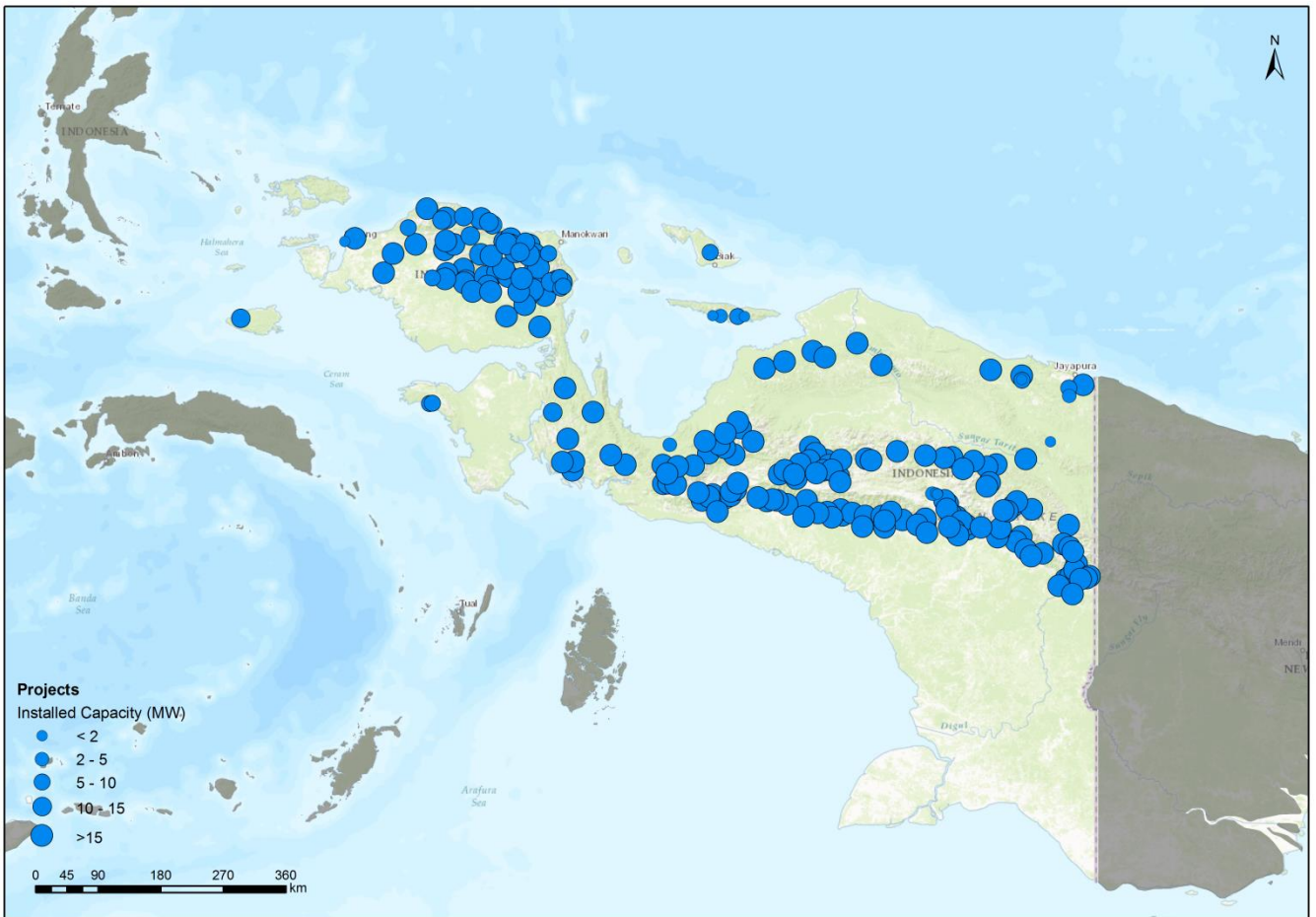


Figure 4.24 – Identified SHP – Wilayah Papua dan Papua Barat.

5 CONCLUSIONS

The purpose of this Small Hydro Mapping Report was to describe the Project approach and methodology in detail, and to describe the Consultant's activities in this Project.

Throughout the report it was possible to present all data collected, the GIS Database and Maps and Information on SHP.

On the data collected chapter, all data collected throughout the entire duration of the project was organized into data requested, background and SHP data sections. In this chapter it should be highlighted the wide-ranging type of background information covering administrative divisions to hydrological data and the massive data compilation for the SHP database with almost 2700 projects gathered, resulting on a final list with 2000 entries after project screening and merging. This was one of the most important activities of the project since it will be the base for SHP planning within PLN.

In terms of the GIS Database, every data stored was described in detail, but also it was clarified the options taken by the Consultant regarding software and hardware selection, database design and especially the hosting, operation and maintenance of the GIS Database where it was necessary the development of a plug-in for database O&M and specific capacity building. The GIS Database User's Manual and the GIS and ORDBMS Training Presentation and Materials are presented in **Annex II** and **III**, respectively.

SHP analysis and maps of finding are presented on the final part of the report, outlining nationwide statistics on Indonesia SHP. This analysis was limit to the quality and quantity of the data gathered. The data collected stores a total of 88 GW of hydropower projects, with more than 4 GW of SHP. Although the SHP represent only half of the projects, this is not an issue for the SHP planning since even hydropower project that were firstly designed as LHP may be downsized to SHP. Although, it should be assessed with caution, considering that it's not feasible to install power capacity far from the optimal design since the energy cost would be too high.

Finally, this report successfully covers the proposed objectives of *Building up a central database on small hydropower at national scale*, with the expected results: *National Small Hydro Resource Database with statistics and relevant GIS data; Small Hydro Mapping Report outlining national information on small hydropower in Indonesia, including maps of existing, planned and potential schemes; Training on Small Hydro GIS database and Small Hydro Potential Evaluation.*

REFERENCES

- [1] JICA, "Hydro Inventory Study," 1997.
- [2] V. T. Chow, D. R. Maidment e W. L. Mays, Applied Hydrology, Singapore: McGraw-Hill, 1988.
- [3] W. M. O. WMO. [Online]. Available: <http://www.wmo.int/>. [Acedido em 09 06 2014].
- [4] Badan Koordinasi Survei Dan Pemetaan Nasional & Badan Meteorologi Dan Geofisika, Atlas Curah Hujan / Atlas of Rainfall, Bogor, Jawa-Barat: Bakosurtanal, 2004.
- [5] WorldClim, "WorldClim - Global Climate Data," [Online]. Available: <http://www.worldclim.org/>. [Acedido em 09 06 2014].
- [6] GADM, "Global Administrative Areas," [Online]. Available: <http://www.gadm.org/>. [Acedido em 09 06 2014].
- [7] Badan Pusat Statistik, "Sensus Penduduk 2010," [Online]. Available: <http://sp2010.bps.go.id/>. [Acedido em 07 2016].
- [8] PLN, "Rencana Umum Pertagananana Listrika (RUPTL) 2016-2025," Jakarta, 2016.
- [9] USGS, "Shuttle Radar Topography Mission (SRTM)," [Online]. Available: <http://srtm.usgs.gov/>. [Acedido em 09 06 2014].
- [10] Info-geospasial, [Online]. Available: <http://www.info-geospasial.com/>. [Acedido em 07 2016].
- [11] MoFo, "WebGIS Forest," [Online]. Available: <http://webgis.dephut.go.id>. [Acedido em 09 06 2014].
- [12] E. S. A. ESA, "GlobCover," [Online]. Available: <http://due.esrin.esa.int/globcover/>. [Acedido em 09 06 2014].
- [13] B. I. G. BIG, "Indonesian Geospatial Information Agency," [Online]. Available: <http://www.bakosurtanal.go.id/>. [Acedido em 09 06 2014].
- [14] N. G. I. Agency, "VMAPO," [Online]. Available: <http://gis-lab.info/qa/vmap0-eng.html>. [Acedido em 09 06 2014].

- [15] JICA, "Project for the Master Plan Study of Hydropower Development in Indonesia," Jakarta, 2011.
- [16] PLN, "Rencana Umum Pertagananana Listrika (RUPTL) 2013-2022," Jakarta, 2013.
- [17] IHC, "IHC knowledgebase," [Online]. Available: http://www.indonesia-hydro.com/knowledge_base. [Acedido em 09 06 2014].
- [18] N. G. I. Agency, "GEOnet Names Server (GNS)," [Online]. Available: <http://earth-info.nga.mil/gns/html/>. [Acedido em 09 06 2014].
- [19] D. E. N. DEN, "Kebijakan Energi Nasional (KEN) 2014-2050," Jakarta, 2014.
- [20] W. D. o. P. A. WDPA, "Protected Planet," [Online]. Available: <http://www.protectedplanet.net/>. [Acedido em 09 06 2014].
- [21] J. R. Bauer, "Assessing the Robustness of Web Feature Services Necessary to Satisfy the Requirements of Coastal Management Applications," Geography Program, The College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, 2012.
- [22] MEMR, "Rencana Umum Ketenagalistrikan Nasiona 2012-2031l (RUKN)," Jakarta, 2012.
- [23] MEMR, "Pengelolaan Energi Nasional (PEN) 2006-2025," Jakarta, 2006.

ANNEX I – UNPROCESSED SHP DATA

UNPROCESSED SHP DATA

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0052	A. Putih	Aceh	4.176892	97.556688	10.80	Hydro Inventory Study_1997	
JicaPR_0001	Aceh-1	Aceh	5.151544	95.732798	5.20	Hydro Inventory Study_1997	
hp_0469	Aceh-1	Aceh	5.15000	95.71667	5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0391	Agam	Aceh	4.142238	96.707376	18.00	Hydro Inventory Study_1997	
JicaPR_0314	Agusen-1	Aceh	3.891913	97.187713	6.50	Hydro Inventory Study_1997	
hp_0474	Agusen-1	Aceh	3.88333	97.18333	6.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0315	Agusen-2	Aceh	3.882009	97.228622	6.40	Hydro Inventory Study_1997	
hp_0475	Agusen-2	Aceh	3.86667	97.21667	6.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0316	Agusen-3	Aceh	3.872101	97.299155	17.60	Hydro Inventory Study_1997	
hp_0476	Alas - 4*	Aceh	3.16667	97.91667	15.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0320	Alas-1	Aceh	3.898026	97.408106	76.30	Hydro Inventory Study_1997	
JicaPR_0321	Alas-2	Aceh	3.862541	97.484816	20.10	Hydro Inventory Study_1997	
JicaPR_0322	Alas-3	Aceh	3.832869	97.538448	37.40	Hydro Inventory Study_1997	
hp_0045	Angkup	Aceh	4.62202	96.72062	0.38	Consultant	
JicaPR_0015	Baleg	Aceh	4.729413	96.693826	9.00	Hydro Inventory Study_1997	
hp_0481	Baleg	Aceh	4.71667	96.68333	9.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0402	Barou	Aceh	4.434808	96.594435	29.20	Hydro Inventory Study_1997	
JicaPR_0374	Baru-1	Aceh	3.747813	97.091601	22.40	Hydro Inventory Study_1997	
JicaPR_0375	Baru-2	Aceh	3.715214	97.070798	15.50	Hydro Inventory Study_1997	
JicaPR_0376	Baru-3	Aceh	3.61529	97.000607	14.90	Hydro Inventory Study_1997	
JicaPR_0383	Batane	Aceh	3.899263	96.70694	77.10	Hydro Inventory Study_1997	
JicaPR_0328	Bengkung	Aceh	3.099447	97.822503	16.10	Hydro Inventory Study_1997	
JicaPR_0418	Beureyeng	Aceh	4.937865	95.75547	18.60	Hydro Inventory Study_1997	
JicaPR_0041	Bidin/Jambuaye	Aceh	4.733835	97.166683	246.00	Hydro Inventory Study_1997	
JicaPR_0035	Bidin-1	Aceh	4.700087	97.030433	19.10	Hydro Inventory Study_1997	
JicaPR_0036	Bidin-2	Aceh	4.723091	97.253014	117.20	Hydro Inventory Study_1997	
JicaPR_0018	Bruksah	Aceh	4.881774	96.642693	24.20	Hydro Inventory Study_1997	
JicaPR_0013	Celala	Aceh	4.599133	96.687319	3.40	Hydro Inventory Study_1997	
hp_0490	Celala	Aceh	4.58333	96.68333	3.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0413	Dolok-1	Aceh	4.666029	96.143018	32.20	Hydro Inventory Study_1997	
JicaPR_0414	Dolok-2	Aceh	4.57181	96.13928	36.00	Hydro Inventory Study_1997	
JicaPR_0030	Dusun-1	Aceh	4.256506	97.339448	14.10	Hydro Inventory Study_1997	
JicaPR_0031	Dusun-2	Aceh	4.362004	97.258389	11.90	Hydro Inventory Study_1997	
JicaPR_0048	Empan	Aceh	3.892738	97.657715	12.20	Hydro Inventory Study_1997	
JicaPR_0379	Ganirayen-1	Aceh	3.914652	96.900619	35.80	Hydro Inventory Study_1997	
JicaPR_0380	Ganirayen-2	Aceh	3.888439	96.862719	6.10	Hydro Inventory Study_1997	
hp_0260	Ganirayen-2	Aceh	3.88333	96.85000	6.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0429	Geupu	Aceh	5.343222	95.284833	3.10	Hydro Inventory Study_1997	
hp_0496	Geupu	Aceh	5.33333	95.28333	3.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0415	Inong	Aceh	4.870437	96.16221	22.50	Hydro Inventory Study_1997	
JicaPR_0003	Inong-1	Aceh	5.107664	96.007925	3.60	Hydro Inventory Study_1997	
hp_0499	Inong-1	Aceh	5.10000	96.00000	3.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0004	Inong-2	Aceh	5.123929	95.982528	3.30	Hydro Inventory Study_1997	
hp_0500	Inong-2	Aceh	5.11667	95.96667	3.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0005	Inong-3	Aceh	5.20597	95.936039	3.20	Hydro Inventory Study_1997	
hp_0501	Inong-3	Aceh	5.20000	95.93333	3.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0399	Isep	Aceh	4.280137	96.497348	15.30	Hydro Inventory Study_1997	
JicaPR_0357	Jambo Papeun-1	Aceh	3.67458	97.310108	35.50	Hydro Inventory Study_1997	
JicaPR_0358	Jambo Papeun-2	Aceh	3.581275	97.25283	95.20	Hydro Inventory Study_1997	
JicaPR_0360	Jambo Papeun-3	Aceh	3.528055	97.21902	26.00	Hydro Inventory Study_1997	
hp_0502	Jambo Papeun-3	Aceh	3.51667	97.21667	25.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0051	Jamboaye Kerpap	Aceh	4.46229	96.90807	2.25	Consultant	Screened out
JicaPR_0025	Jambuaye-1	Aceh	4.460081	96.975017	7.40	Hydro Inventory Study_1997	
hp_0503	Jambuaye-1	Aceh	4.45000	96.96667	7.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0026	Jambuaye-2	Aceh	4.397156	97.044142	15.70	Hydro Inventory Study_1997	
JicaPR_0029	Jambuaye-3	Aceh	4.431287	97.140596	37.20	Hydro Inventory Study_1997	
JicaPR_0032	Jambuaye-4	Aceh	4.481336	97.229042	81.70	Hydro Inventory Study_1997	
JicaPR_0033	Jambuaye-5	Aceh	4.590735	97.177321	181.80	Hydro Inventory Study_1997	
JicaPR_0037	Jambuaye-6	Aceh	4.721956	97.291402	124.40	Hydro Inventory Study_1997	
JicaPR_0043	Jambuaye-6A	Aceh	4.722868	97.357038	138.30	Hydro Inventory Study_1997	
JicaPR_0040	Jambuaye-7	Aceh	4.768221	97.377041	4.50	Hydro Inventory Study_1997	
hp_0262	Jambuaye-7	Aceh	4.76667	97.36667	4.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0002	Jrue	Aceh	5.336625	95.414329	4.80	Hydro Inventory Study_1997	
hp_0369	Jrue	Aceh	5.33333	95.40000	4.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0053	Kalapining	Aceh	4.229431	97.596448	33.30	Hydro Inventory Study_1997	
JicaPR_0386	Kenyaran	Aceh	4.132868	97.183826	16.90	Hydro Inventory Study_1997	
hp_0273	Kerpap	Aceh	4.46250	96.90222	2.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0323	Ketambe-1	Aceh	3.635205	97.576761	12.10	Hydro Inventory Study_1997	
JicaPR_0324	Ketambe-2	Aceh	3.652399	97.623163	19.90	Hydro Inventory Study_1997	
hp_0277	Ketol A	Aceh	4.69383	96.69778	1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0024	Keureutu	Aceh	4.928339	97.155391	11.10	Hydro Inventory Study_1997	
JicaPR_0359	Kluet-1	Aceh	3.585529	97.203608	41.70	Hydro Inventory Study_1997	
hp_0372	Kluet-1	Aceh	3.58333	97.20000	4.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0362	Kluet-2	Aceh	3.46714	97.188407	141.00	Hydro Inventory Study_1997	
JicaPR_0363	Kluet-3	Aceh	3.412338	97.217721	24.20	Hydro Inventory Study_1997	
hp_0509	Kluet-3	Aceh	3.40000	97.21667	23.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0367	Kluet-4	Aceh	3.279773	97.353461	65.60	Hydro Inventory Study_1997	
JicaPR_0371	Kluet-5	Aceh	3.215337	97.389232	76.70	Hydro Inventory Study_1997	
JicaPR_0327	Kompas	Aceh	3.251097	97.851236	5.00	Hydro Inventory Study_1997	
hp_0511	Kompas	Aceh	3.25000	97.85000	5.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0284	Kreung Isep	Aceh	4.32493	96.52246	1.00	PLN (3 - Minihydro IPP Project)	
hp_0845	Krueng Kalla	Aceh			0.40	PLN (3 - Minihydro IPP Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0381	Lamarayen	Aceh	3.872978	96.829921	36.20	Hydro Inventory Study_1997	
JicaPR_0378	Lamayaren/Gani	Aceh	3.891947	96.985999	37.30	Hydro Inventory Study_1997	
JicaPR_0427	Lambeso	Aceh	5.119419	95.477251	35.00	Hydro Inventory Study_1997	
JicaPR_0416	Laumeth	Aceh	4.895958	96.09552	15.10	Hydro Inventory Study_1997	
hp_0292	Lawe Gurah	Aceh	3.69684	97.66413	4.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0293	Lawe Mamas	Aceh	3.50000	97.63333	5.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0294	Lawe Mamas (PLTM)	Aceh	3.55444	97.72764	9.60	PLN (3 - Minihydro IPP Project)	Screened out
hp_0295	Lawe Sikap	Aceh	3.49256	97.76653	6.99	PLN (3 - Minihydro IPP Project)	
JicaPR_0046	Lesten-1	Aceh	3.923498	97.798259	36.00	Hydro Inventory Study_1997	
JicaPR_0047	Lesten-2	Aceh	3.984079	97.760204	40.00	Hydro Inventory Study_1997	
JicaPR_0050	Lesten-3	Aceh	4.129779	97.710487	40.70	Hydro Inventory Study_1997	
hp_0862	Lhok Pineung	Aceh			5.10	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0426	Ligan	Aceh	4.909103	95.464811	5.00	Hydro Inventory Study_1997	
hp_0518	Ligan	Aceh	4.90000	95.45000	5.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0027	Lumut-1	Aceh	4.290153	97.058671	5.70	Hydro Inventory Study_1997	
hp_0520	Lumut-1	Aceh	4.28333	97.05000	5.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0028	Lumut-2	Aceh	4.298393	97.122264	0.90	Hydro Inventory Study_1997	
hp_0521	Lumut-2	Aceh	4.28333	97.11667	0.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0325	Mamas-1	Aceh	3.468108	97.645851	102.10	Hydro Inventory Study_1997	
JicaPR_0326	Mamas-2	Aceh	3.512004	97.64313	52.40	Hydro Inventory Study_1997	
hp_0303	Mangku Sosial	Aceh	4.71339	96.99278	6.60	PLN (3 - Minihydro IPP Project)	Screened out
hp_0883	Marpunge	Aceh			0.40	PLN (3 - Minihydro IPP Project)	
JicaPR_0425	Masen	Aceh	4.862443	95.576977	8.60	Hydro Inventory Study_1997	
hp_0524	Masen	Aceh	4.85000	95.56667	8.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0406	Meulaboh/Seunagan	Aceh	4.413776	96.693406	197.20	Hydro Inventory Study_1997	
JicaPR_0400	Meulaboh-1	Aceh	4.400262	96.679316	82.10	Hydro Inventory Study_1997	
JicaPR_0401	Meulaboh-2	Aceh	4.399348	96.6182	38.00	Hydro Inventory Study_1997	
hp_0529	Meulaboh-2	Aceh	4.38333	96.61667	37.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0403	Meulaboh-3	Aceh	4.440647	96.538842	18.80	Hydro Inventory Study_1997	
JicaPR_0404	Meulaboh-5	Aceh	4.440687	96.444732	42.90	Hydro Inventory Study_1997	
hp_0530	Meulaboh-5	Aceh	4.43333	96.43333	43.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0405	Meulaboh-6	Aceh	4.460489	96.344574	29.20	Hydro Inventory Study_1997	
hp_1078	Meurebo-2	Aceh			59.00	RUPTL	
JicaPR_0006	Meurendu-1	Aceh	4.996394	96.239672	19.20	Hydro Inventory Study_1997	
JicaPR_0007	Meurendu-2	Aceh	5.059559	96.220935	18.60	Hydro Inventory Study_1997	
JicaPR_0008	Meurendu-3	Aceh	5.126448	96.220912	37.40	Hydro Inventory Study_1997	
hp_0115	Meureudu Lhoksandeng 3	Aceh	5.12695	96.48612	5.40	Consultant	
JicaPR_0034	Muara	Aceh	4.633843	97.252084	12.30	Hydro Inventory Study_1997	
JicaPR_0372	Mungkap-1	Aceh	3.201292	97.52062	22.50	Hydro Inventory Study_1997	
JicaPR_0373	Mungkap-2	Aceh	3.201434	97.418638	24.80	Hydro Inventory Study_1997	
JicaPR_0407	Pamene-1	Aceh	4.722951	96.485712	19.70	Hydro Inventory Study_1997	
JicaPR_0409	Pamene-2	Aceh	4.719921	96.33328	160.60	Hydro Inventory Study_1997	
JicaPR_0317	Pantan Dadalu-1	Aceh	3.776356	97.408851	7.60	Hydro Inventory Study_1997	
hp_0534	Pantan Dadalu-1	Aceh	3.76667	97.40000	7.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0318	Pantan Dadalu-2	Aceh	3.831481	97.386098	4.40	Hydro Inventory Study_1997	
hp_0535	Pantan Dadalu-2	Aceh	3.81667	97.38333	4.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0319	Pantan Dadalu-3	Aceh	3.856433	97.367346	12.20	Hydro Inventory Study_1997	
JicaPR_0023	Pase	Aceh	4.948951	97.026412	14.00	Hydro Inventory Study_1997	
JicaPR_0044	Peureulak	Aceh	4.634973	97.701418	34.80	Hydro Inventory Study_1997	
hp_0371	Peusangan 1-2	Aceh	4.61667	96.71667	86.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0105	Peusangan 4	Aceh	4.81962	96.69917	83.00	Consultant	Screened out
hp_0099	Peusangan Ketol	Aceh	4.75635	96.68382	1.00	Consultant	
JicaPR_0014	Peusangan-3	Aceh	4.666711	96.703677	14.60	Hydro Inventory Study_1997	
hp_0593	Peusangan-4	Aceh	4.76667	96.68333	3.90	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_1072	Peusangan-4 (FTP2)	Aceh			83.00	RUPTL	
JicaPR_0016	Peusangan-5	Aceh	4.793403	96.701943	8.10	Hydro Inventory Study_1997	
hp_0370	Peusangan-5	Aceh	4.78333	96.70000	8.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0017	Peusangan-6	Aceh	4.849994	96.689651	65.80	Hydro Inventory Study_1997	
JicaPR_0019	Peusangan-7	Aceh	4.929876	96.674837	50.00	Hydro Inventory Study_1997	
JicaPR_0020	Peusangan-8	Aceh	5.041832	96.663197	12.40	Hydro Inventory Study_1997	
fs_34	PLTM Kerpap	Aceh	4.46253	96.90308	2.20	PLN_pusat	
fs_35	PLTM Ketol A	Aceh	4.67508	96.70783	10.00	PLN_pusat_repository	
fs_29	PLTM Ketol B	Aceh	4.70013	96.69950	10.50	PLN_pusat	
fs_32	PLTM Lawe Gurah	Aceh	3.69684	97.66413	4.50	PLN_pusat_repository	
fs_28	PLTM Lawe Mamas	Aceh	3.55444	97.72764	10.00	PLN_pusat	
fs_30	PLTM Lhok Pineung	Aceh	5.11136	96.22136	5.40	PLN_pusat	
fs_33	PLTM Mangku	Aceh			6.00	PLN_pusat_repository	
fs_31	PLTM Subulussalam	Aceh	2.60910	98.06855	7.46	PLN_pusat_repository	
hp_1071	PLTM Tersebar Aceh	Aceh			65.00	RUPTL	
JicaPR_0340	Pungu	Aceh	2.699934	98.087751	4.30	Hydro Inventory Study_1997	
hp_0375	Pungu	Aceh	2.68333	98.08333	4.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0038	Ramasan-1	Aceh	4.617038	97.363048	122.70	Hydro Inventory Study_1997	
hp_0545	Ramasan-1	Aceh	4.61667	97.35000	119.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0042	Ramasan-1A	Aceh	4.602269	97.371075	127.60	Hydro Inventory Study_1997	
JicaPR_0039	Ramasan-2	Aceh	4.67713	97.328485	33.10	Hydro Inventory Study_1997	
JicaPR_0361	Raneuh	Aceh	3.511218	97.151504	14.50	Hydro Inventory Study_1997	
hp_0643	Rerebe	Aceh			0.18	PLN (3 - Minihydro IPP Project)	
JicaPR_0424	Sabe	Aceh	4.65388	95.658786	26.60	Hydro Inventory Study_1997	
JicaPR_0009	Samalanga	Aceh	5.120376	96.360515	12.00	Hydro Inventory Study_1997	
JicaPR_0428	Sebat	Aceh	5.134418	95.409399	6.90	Hydro Inventory Study_1997	
hp_0548	Sebat	Aceh	5.13333	95.40000	6.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0382	Semirah	Aceh	3.855705	96.845259	6.70	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0549	Semirah	Aceh	3.85000	96.83333	6.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0368	Sempali-1	Aceh	3.384731	97.42791	25.10	Hydro Inventory Study_1997	
JicaPR_0369	Sempali-2	Aceh	3.312327	97.424886	73.30	Hydro Inventory Study_1997	
JicaPR_0370	Sempali-3	Aceh	3.277695	97.392442	89.20	Hydro Inventory Study_1997	
JicaPR_0056	Serbajadi-1	Aceh	4.413624	97.586006	26.80	Hydro Inventory Study_1997	
JicaPR_0057	Serbajadi-2	Aceh	4.439769	97.640314	9.40	Hydro Inventory Study_1997	
hp_0329	Serbajadi-2	Aceh	4.43333	97.63333	9.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0944	Seu Pakat	Aceh			1.75	PLN (4 - Minihydro PLN Project)	
JicaPR_0384	Seumayan	Aceh	3.970632	96.643945	3.10	Hydro Inventory Study_1997	
hp_0552	Seumayan	Aceh	3.96667	96.63333	3.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0395	Seunangan-1	Aceh	4.265856	96.609251	26.50	Hydro Inventory Study_1997	
JicaPR_0396	Seunangan-2	Aceh	4.244833	96.551342	26.30	Hydro Inventory Study_1997	
JicaPR_0397	Seunangan-3	Aceh	4.241398	96.50146	31.90	Hydro Inventory Study_1997	
hp_0553	Seunangan-3	Aceh	4.23333	96.50000	31.20	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0398	Seunangan-4	Aceh	4.240539	96.466152	9.30	Hydro Inventory Study_1997	
hp_0554	Seunangan-4	Aceh	4.23333	96.45000	9.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0364	Sibubung-1	Aceh	3.50462	97.32825	33.30	Hydro Inventory Study_1997	
hp_0373	Sibubung-1	Aceh	3.50000	97.31667	32.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0365	Sibubung-2	Aceh	3.455939	97.293787	121.10	Hydro Inventory Study_1997	
JicaPR_0366	Sibubung-3	Aceh	3.404551	97.25659	22.90	Hydro Inventory Study_1997	
hp_0374	Sibubung-3	Aceh	3.40000	97.25000	22.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0417	Sikuleh-1	Aceh	5.013905	95.765571	9.40	Hydro Inventory Study_1997	
hp_0556	Sikuleh-1	Aceh	5.00000	95.75000	9.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0419	Sikuleh-2	Aceh	4.948622	95.792063	8.30	Hydro Inventory Study_1997	
hp_0557	Sikuleh-2	Aceh	4.93333	95.78333	8.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0420	Sikuleh-3	Aceh	4.937297	95.867546	46.00	Hydro Inventory Study_1997	
JicaPR_0421	Sikuleh-4	Aceh	4.783181	95.938083	36.60	Hydro Inventory Study_1997	
JicaPR_0330	Simpang Kiri-2	Aceh	2.810353	97.879133	27.20	Hydro Inventory Study_1997	
JicaPR_0045	Simpang	Aceh	3.858294	97.761892	31.40	Hydro Inventory Study_1997	
JicaPR_0055	Simpang Kiri/ser	Aceh	4.425026	97.483966	19.40	Hydro Inventory Study_1997	
JicaPR_0329	Simpang Kiri-1	Aceh	2.88416	97.915154	27.00	Hydro Inventory Study_1997	
hp_0340	Subulussalam	Aceh	2.60910	98.06855	7.35	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0377	Susoh	Aceh	3.748232	96.860816	11.10	Hydro Inventory Study_1997	
hp_0566	Tampur-1	Aceh	4.21667	97.65000	33.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0054	Tampur-2	Aceh	4.336567	97.740832	126.30	Hydro Inventory Study_1997	
JicaPR_0412	Tangla	Aceh	4.653642	96.211859	28.20	Hydro Inventory Study_1997	
JicaPR_0021	Tawar/Bidin	Aceh	4.623683	96.97057	66.40	Hydro Inventory Study_1997	
JicaPR_0022	Tawar/Jambuaye	Aceh	4.576429	96.963353	37.90	Hydro Inventory Study_1997	
hp_0347	Tembolon (Bidin 2)	Aceh	4.71129	97.02130	3.10	PLN (3 - Minihydro IPP Project)	
JicaPR_0394	Teripa/Sapi	Aceh	4.029622	96.864907	354.70	Hydro Inventory Study_1997	
JicaPR_0385	Teripa-1	Aceh	4.097708	97.206555	11.90	Hydro Inventory Study_1997	
JicaPR_0387	Teripa-2	Aceh	4.069852	97.116801	44.00	Hydro Inventory Study_1997	
JicaPR_0388	Teripa-3	Aceh	4.145085	97.001472	172.60	Hydro Inventory Study_1997	
JicaPR_0389	Teripa-4	Aceh	4.032432	96.886079	191.00	Hydro Inventory Study_1997	
hp_0570	Teripa-4	Aceh	4.01667	96.88333	184.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0390	Teripa-5A	Aceh	4.079375	96.75737	17.80	Hydro Inventory Study_1997	
JicaPR_0392	Teripa-6A	Aceh	4.095757	96.697865	11.30	Hydro Inventory Study_1997	
JicaPR_0393	Teripa-7A	Aceh	4.084062	96.648466	11.10	Hydro Inventory Study_1997	
hp_0571	Teunom	Aceh	4.90536	96.12495	1.00	PLN (3 - Minihydro IPP Project)	
hp_0348	Teunom-1	Aceh	4.90000	95.98333	24.30	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0422	Teunom-2	Aceh	4.719479	96.004785	237.20	Hydro Inventory Study_1997	
hp_0572	Teunom-2	Aceh	4.56667	96.00000	23.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0423	Teunom-3	Aceh	4.630497	95.979707	104.80	Hydro Inventory Study_1997	
hp_0573	Teunom-3	Aceh	4.61667	95.96667	12.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0408	Tingkeum	Aceh	4.853839	96.385461	17.30	Hydro Inventory Study_1997	
JicaPR_0010	Uneun-1	Aceh	5.044507	96.514501	6.20	Hydro Inventory Study_1997	
hp_0576	Uneun-1	Aceh	5.03333	96.50000	6.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0011	Uneun-2	Aceh	5.064469	96.520719	8.60	Hydro Inventory Study_1997	
hp_0577	Uneun-2	Aceh	5.05000	96.51667	8.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0051	Uning	Aceh	4.085306	97.542777	6.90	Hydro Inventory Study_1997	
hp_0351	Uning	Aceh	4.08333	97.53333	6.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0049	Utung	Aceh	3.929764	97.686668	65.20	Hydro Inventory Study_1997	
JicaPR_0012	Wie	Aceh	5.040843	96.618704	3.30	Hydro Inventory Study_1997	
hp_0582	Wie	Aceh	5.03333	96.61667	3.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0993	Wih Selah	Aceh			0.15	PLN (3 - Minihydro IPP Project)	
JicaPR_0410	Woyla-1	Aceh	4.627618	96.282292	138.10	Hydro Inventory Study_1997	
JicaPR_0411	Woyla-2	Aceh	4.566836	96.204	249.50	Hydro Inventory Study_1997	
hp_0583	Woyla-2	Aceh	4.56667	96.20000	242.10	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0452	Ayung	Bali	-8.31750	115.25117	2.34	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0098	Ayung-1 (Sidan)	Bali	-8.332577	115.251261	23.00	Hydro Inventory Study_1997	
JicaEX_0099	Ayung-2 (Selat)	Bali	-8.397146	115.231921	19.20	Hydro Inventory Study_1997	
JicaEX_0100	Ayung-3 (Buangga)	Bali			1.80	Hydro Inventory Study_1997	
JicaPR_1083	Ayung-4	Bali	-8.50087	115.248	7.80	Hydro Inventory Study_1997	
hp_1000	Ayung-4	Bali			7.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1084	Ayung-5A	Bali	-8.5384	115.249	2.70	Hydro Inventory Study_1997	
hp_1001	Ayung-5A	Bali			2.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1085	Balian-1	Bali	-8.41977	114.985	7.20	Hydro Inventory Study_1997	
hp_0718	Balian-1	Bali			7.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1086	Balian-2	Bali	-8.44403	114.994	4.10	Hydro Inventory Study_1997	
hp_0719	Balian-2	Bali			4.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1087	Balian-3	Bali	-8.46976	115.003	5.90	Hydro Inventory Study_1997	
hp_0720	Balian-3	Bali			5.90	PLN (2 - MHPP in HPPS)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_1080	Daya-1	Bali	-8.1645	115.241	1.20	Hydro Inventory Study_1997	
hp_0779	Daya-1	Bali			1.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1081	Daya-2	Bali	-8.14235	115.227	4.40	Hydro Inventory Study_1997	
hp_0780	Daya-2	Bali			4.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0832	Karangasem	Bali			0.25	PLN (3 - Minihydro IPP Project)	
hp_0214	Muara	Bali	-8.20333	115.10556	1.40	PLN (3 - Minihydro IPP Project)	Screened out
fs_144	PLTM Muara	Bali	-8.20333	115.10556	1.44	PLN_pusat_repository	
fs_145	PLTM Sambangan	Bali	-8.1975	115.10431	1.85	PLN_pusat_repository	
fs_146	PLTM Tukad Daya	Bali	-8.15400	115.23116	2.14	PLN_pusat_repository	
fs_147	PLTM Yeh Ayung 1	Bali	-8.3175	115.25117	2.30	PLN_pusat_repository	
JicaPR_1088	Pulukan	Bali	-8.38223	114.866	1.40	Hydro Inventory Study_1997	
hp_0918	Pulukan	Bali			1.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0197	Sambangan	Bali	-8.19750	115.10431	1.85	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_1089	Sumbul	Bali	-8.34793	114.794	2.40	Hydro Inventory Study_1997	
hp_0953	Sumbul	Bali			2.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0190	Sunduwati	Bali	-8.44788	115.47166	2.20	PLN (3 - Minihydro IPP Project)	
hp_0188	Telagawaja	Bali	-8.47334	115.41366	4.00	PLN (3 - Minihydro IPP Project)	
hp_0187	Telagawaja Ayu	Bali	-8.41458	115.42787	1.00	PLN (3 - Minihydro IPP Project)	
JicaPR_1082	Teldewaja	Bali	-8.4538	115.431	7.00	Hydro Inventory Study_1997	
hp_0968	Teldewaja	Bali			7.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0185	Tukad Daya	Bali	-8.15534	115.23180	8.20	PLN (3 - Minihydro IPP Project)	
hp_0457	Bulakan	Banten	-6.63973	106.03626	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0066	Cibareno	Banten	-6.81857	106.43510	2.90	Consultant	Screened out
hp_0174	Cibareno	Banten	-6.80436	106.43439	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0491	Cibareno-1	Banten	-6.83333	106.43333	17.50	PLN (1 - Masterplan of HEMP Development List)	Screened out
JicaPR_0534	Cibareno-2	Banten	-6.86594	106.422	21.80	Hydro Inventory Study_1997	
JicaPR_0432	Ciberang	Banten	-6.56427	106.411	13.70	Hydro Inventory Study_1997	
hp_0172	Cidano	Banten	-6.17711	105.91161	1.50	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0540	Cihara	Banten	-6.83227	106.127	10.20	Hydro Inventory Study_1997	
hp_0146	Cikidang	Banten	-6.79957	106.43295	2.00	PLN (3 - Minihydro IPP Project)	
hp_0145	Cikotok	Banten	-6.85657	106.27907	4.20	PLN (3 - Minihydro IPP Project)	
JicaPR_0536	Cimadur-1	Banten	-6.72563	106.355	43.20	Hydro Inventory Study_1997	
JicaPR_0537	Cimadur-2	Banten	-6.82596	106.287	27.70	Hydro Inventory Study_1997	
JicaPR_0538	Cimadur-3	Banten	-6.84977	106.277	31.50	Hydro Inventory Study_1997	
JicaPR_0430	Cisemut-1	Banten	-6.59199	106.268	13.70	Hydro Inventory Study_1997	
JicaPR_0431	Cisemut-2	Banten	-6.50667	106.205	16.00	Hydro Inventory Study_1997	
JicaPR_0539	Cisiih	Banten	-6.85963	106.192	9.70	Hydro Inventory Study_1997	
hp_0059	Cisiih Leutik	Banten	-6.82544	106.23713	1.70	Consultant	Screened out
hp_0163	Cisiih Leutik	Banten	-6.82375	106.24186	4.00	PLN (3 - Minihydro IPP Project)	
hp_0058	Cisimeut	Banten	-6.63186	106.30387	3.30	Consultant	Screened out
hp_0162	Cisimeut	Banten	-6.63744	106.31200	2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0160	Cisungsang II	Banten	-6.79280	106.43778	3.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0433	Clujung	Banten	-6.53628	106.149	16.40	Hydro Inventory Study_1997	
hp_0148	Karang Ropong (Cibareno 1)	Banten	-6.81275	106.43169	5.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0212	Nagajaya	Banten	-6.82706	106.30900	6.00	PLN (3 - Minihydro IPP Project)	Screened out
fs_102	PLTM Bojong Cisono	Banten	-6.81739	106.44831	1.50	PLN_pusat_repository	
fs_106	PLTM Bulakan	Banten	-6.64283	106.05327	7.00	PLN_pusat_repository	
fs_107	PLTM Cibareno	Banten	-6.80436	106.43439	3.00	PLN_pusat_repository	
fs_108	PLTM Cidano	Banten	-6.17711	105.91161	1.50	PLN_pusat_repository	
fs_109	PLTM Cisiih Cimandiri	Banten	-6.83319	106.21742	8.00	PLN_pusat_repository	
fs_110	PLTM Cisimeut	Banten	-6.63867	106.31417	2.00	PLN_pusat_repository	
fs_103	PLTM Cisungsang 2	Banten	-6.7928	106.43778	3.00	PLN_pusat_repository	
fs_104	PLTM Karang ropong	Banten			6.00	PLN_pusat_repository	
fs_105	PLTM Lebak Tundun	Banten	-6.80131	106.17515	8.00	PLN_pusat_repository	
fs_111	PLTM Nagajaya	Banten	-6.82706	106.30900	6.00	PLN_pusat_repository	
hp_0140	Situmulya	Banten	-6.79064	106.44015	3.00	PLN (3 - Minihydro IPP Project)	
hp_0231	Air Putih	Bengkulu	-3.07467	102.16558	9.90	PLN (3 - Minihydro IPP Project)	
hp_0232	Air Tenam	Bengkulu	-4.26306	103.06531	7.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0215	Alas-1	Bengkulu	-4.04913	102.830429	26.70	Hydro Inventory Study_1997	
JicaPR_0216	Alas-2	Bengkulu	-4.187031	102.788644	89.50	Hydro Inventory Study_1997	
hp_0710	Argo Makmur	Bengkulu			0.10	PLN (4 - Minihydro PLN Project)	
hp_0233	Aur Gading (IPP)	Bengkulu	-3.50301	102.32918	2.70	PLN (3 - Minihydro IPP Project)	
hp_0238	Batu Ampar	Bengkulu	-4.37045	103.12502	3.00	PLN (3 - Minihydro IPP Project)	
hp_0239	Batu Balai/Manna	Bengkulu	-4.34876	103.13411	4.00	PLN (3 - Minihydro IPP Project)	
hp_0102	Batubalai	Bengkulu	-4.35317	103.13479	4.00	Consultant	Screened out
JicaPR_0234	Berau	Bengkulu	-2.741052	101.505326	14.50	Hydro Inventory Study_1997	
JicaPR_0239	Dikit-2	Bengkulu	-2.523223	101.538561	51.70	Hydro Inventory Study_1997	
JicaPR_0240	Dikit-3	Bengkulu	-2.55598	101.518332	12.70	Hydro Inventory Study_1997	
JicaPR_0241	Dikit-4	Bengkulu	-2.592496	101.418471	51.50	Hydro Inventory Study_1997	
JicaPR_0233	Ipuh	Bengkulu	-2.951345	101.676156	79.10	Hydro Inventory Study_1997	
JicaPR_0232	Ipuh Ilau	Bengkulu	-2.846886	101.81144	14.90	Hydro Inventory Study_1997	
JicaPR_0229	Ipuh Panjang-1	Bengkulu	-2.720311	101.701953	37.70	Hydro Inventory Study_1997	
JicaPR_0230	Ipuh Panjang-2	Bengkulu	-2.889746	101.693669	28.10	Hydro Inventory Study_1997	
JicaPR_0231	Ipuh Tengah	Bengkulu	-2.788997	101.756311	11.50	Hydro Inventory Study_1997	
hp_0837	Kepala Curup #1	Bengkulu			1.00	PLN (4 - Minihydro PLN Project)	
hp_0838	Kepala Curup #2	Bengkulu			0.60	PLN (4 - Minihydro PLN Project)	
hp_1023	Kepla Curup (Barata)	Bengkulu			0.50	RUPTL	Screened out
hp_1022	Kepla Curup (Toshiba)	Bengkulu			1.00	RUPTL	Screened out
hp_1087	Ketahun-3	Bengkulu			61.00	RUPTL	
hp_0275	Ketaun 1 (IPP)	Bengkulu	-3.28857	102.43139	4.22	PLN (3 - Minihydro IPP Project)	Screened out
hp_0405	Ketaun 2 (IPP)	Bengkulu	-3.28736	102.40539	2.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0022	Ketaun-1	Bengkulu	-3.243549	102.419508	84.00	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0404	Ketaun-1*	Bengkulu	-3.23333	102.41667	86.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0221	Ketaun-3	Bengkulu	-3.068187	102.170082	61.00	Hydro Inventory Study_1997	
JicaPR_0222	Ketaun-4	Bengkulu	-3.075013	102.133442	39.90	Hydro Inventory Study_1997	
hp_0048	Ketelang	Bengkulu	-3.29111	102.40211	2.60	Consultant	
hp_0021	Lebong	Bengkulu	-3.19152	102.30800	12.00	Consultant	Screened out
JicaPR_0210	Luas-3	Bengkulu	-4.53773	103.359517	60.60	Hydro Inventory Study_1997	
JicaPR_0211	Mantai	Bengkulu	-4.636	103.386546	10.00	Hydro Inventory Study_1997	
hp_0412	Mantai	Bengkulu	-4.65000	103.38333	1.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0214	Mauna-1	Bengkulu	-4.213322	103.066675	105.80	Hydro Inventory Study_1997	
JicaPR_0204	Menula-1	Bengkulu	-4.826498	103.696511	19.50	Hydro Inventory Study_1997	
JicaPR_0205	Menula-2	Bengkulu	-4.849588	103.655199	27.20	Hydro Inventory Study_1997	
hp_0304	Muara Sahung	Bengkulu	-4.59489	103.33897	9.90	PLN (3 - Minihydro IPP Project)	Screened out
hp_0114	Musi	Bengkulu	-3.56564	102.50558	21.00	Consultant	Screened out
JicaEX_0019	Musi-1	Bengkulu	-3.551746	102.512679	210.00	Hydro Inventory Study_1997	
JicaPR_0187	Musi-1A	Bengkulu	-3.573129	102.524107	16.70	Hydro Inventory Study_1997	
hp_0306	Nakai 1	Bengkulu	-3.45082	102.33321	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0307	Nakai 2	Bengkulu	-3.45648	102.32999	4.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0206	Nasal-1	Bengkulu	-4.761957	103.562085	31.20	Hydro Inventory Study_1997	
JicaPR_0207	Nasal-2	Bengkulu	-4.796217	103.529383	41.30	Hydro Inventory Study_1997	
JicaPR_0219	Nokan-1	Bengkulu	-3.282486	102.350868	20.40	Hydro Inventory Study_1997	
JicaPR_0220	Nokan-2	Bengkulu	-3.347438	102.330385	7.40	Hydro Inventory Study_1997	
hp_0532	Nokan-2	Bengkulu	-3.35000	102.31667	7.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0309	Padang Guci	Bengkulu	-4.43573	103.28419	6.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0212	Padang Guci-1	Bengkulu	-4.363365	103.339787	11.90	Hydro Inventory Study_1997	
JicaPR_0213	Padang Guci-2	Bengkulu	-4.399388	103.314281	21.40	Hydro Inventory Study_1997	
hp_0310	Padang Guci-2	Bengkulu	-4.40000	103.30000	21.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
fs_43	PLTA Lebong	Bengkulu	-3.00833	102.00833	16.00	PLN_pusat_repository	
fs_44	PLTM Air Dikit	Bengkulu	-2.58289	101.41822	6.00	PLN_pusat_repository	
fs_45	PLTM Ketahun 1	Bengkulu	-3.28857	102.43166	4.22	PLN_pusat_repository	
fs_40	PLTM Manna	Bengkulu	-4.26306	103.06531	7.36	PLN_pusat_repository	
fs_38	PLTM Nakai 1	Bengkulu	-2.54918	102.33321	3.20	PLN_pusat	
fs_41	PLTM Nakai 2	Bengkulu	-3.45648	102.32999	5.00	PLN_pusat_repository	
fs_42	PLTM Padang Guci	Bengkulu	-4.43573	103.28419	6.00	PLN_pusat_repository	
fs_39	PLTM Tunggang	Bengkulu	-2.91423	102.18463	10.00	PLN_pusat	
JicaPR_0208	Sanbat Kiri	Bengkulu	-4.69605	103.437464	8.50	Hydro Inventory Study_1997	
hp_0547	Sanbat Kiri	Bengkulu	-4.70000	103.43333	8.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0225	Seblat-1	Bengkulu	-2.858715	102.023442	100.40	Hydro Inventory Study_1997	
JicaPR_0226	Seblat-3	Bengkulu	-2.892294	101.889908	7.50	Hydro Inventory Study_1997	
hp_0325	Seblat-3	Bengkulu	-2.90000	101.88333	7.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0227	Seblat-4	Bengkulu	-3.032045	101.827753	235.20	Hydro Inventory Study_1997	
JicaPR_0228	Seblat-5	Bengkulu	-3.079903	101.795073	30.30	Hydro Inventory Study_1997	
JicaPR_0218	Seluma	Bengkulu	-4.014923	102.626704	86.70	Hydro Inventory Study_1997	
hp_0560	Simpang Aur	Bengkulu	-3.58333	102.51667	29.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0342	Sungai Air Dikit	Bengkulu	-2.58294	101.41817	6.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0223	Suwah-1	Bengkulu	-3.043304	102.004174	25.80	Hydro Inventory Study_1997	
JicaPR_0224	Suwah-2	Bengkulu	-3.091346	101.940776	30.10	Hydro Inventory Study_1997	
JicaPR_0217	Talo-1	Bengkulu	-4.101326	102.714944	19.60	Hydro Inventory Study_1997	
hp_0967	Tebing Kaning	Bengkulu			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0235	Teramang	Bengkulu	-2.721567	101.656801	22.70	Hydro Inventory Study_1997	
hp_0009	Tes	Bengkulu	-3.20645	102.31874	16.00	Consultant	Screened out
hp_0599	Tes (Lama)	Bengkulu	-3.26667	102.41667	1.32	PLN (4 - Minihydro PLN Project)	
JicaEX_0024	Tes-1	Bengkulu	-3.200583	102.325213	16.00	Hydro Inventory Study_1997	
JicaEX_0023	Tes-2	Bengkulu	-3.152535	102.285727	17.00	Hydro Inventory Study_1997	
hp_0400	Tunggang	Bengkulu	-3.10107	102.18135	10.00	PLN (3 - Minihydro IPP Project)	Screened out
fs_37	PLTM Ketaun 2	Bengkulu	-2.71362	102.40523	2.12	PLN_pusat	
fs_36	PLTM Muara Sahung	Bengkulu	-3.40512	103.33898	10.00	PLN_pusat	
fs_125	PLTM Banjaran Kebonmanis	Jawa Tengah	-7.34078	109.21999	2.20	PLN_pusat_repository	
fs_120	PLTM Banyumlayu	Jawa Tengah			0.46	PLN_pusat_repository	
fs_121	PLTM Bendosari	Jawa Tengah	-7.05601	109.97946	4.00	PLN_pusat_repository	
fs_126	PLTM Binangun	Jawa Tengah	-7.057844	109.79602	3.75	PLN_pusat_repository	
fs_122	PLTM Dadapayam	Jawa Tengah	-7.03222	110.05194	2.86	PLN_pusat_repository	
fs_128	PLTM Damar	Jawa Tengah	-7.04547	110.04905	2.07	PLN_pusat_repository	
fs_112	PLTM Danawarih	Jawa Tengah	-6.93119	109.13200	0.30	PLN_pusat	
fs_129	PLTM Jimat	Jawa Tengah			0.50	PLN_pusat_repository	
fs_114	PLTM Karekan	Jawa Tengah	-7.27862	109.77772	6.11	PLN_pusat_repository	
fs_130	PLTM Kincang	Jawa Tengah			0.32	PLN_pusat_repository	
fs_123	PLTM Kunci Putih	Jawa Tengah	-7.20855	110.50295	0.95	PLN_pusat_repository	
fs_124	PLTM Lebak Barang	Jawa Tengah	-7.12200	109.66437	7.00	PLN_pusat_repository	
fs_116	PLTM Logawa	Jawa Tengah	-7.32792	109.18163	2.95	PLN_pusat_repository	
fs_115	PLTM Logawa - Baseh Karangpelem	Jawa Tengah	-7.35303	109.18088	1.86	PLN_pusat_repository	
fs_118	PLTM Logawa - Sunyalangu	Jawa Tengah	-7.33625	109.18333	2.00	PLN_pusat_repository	
fs_131	PLTM Logawa Babakan	Jawa Tengah	-7.36454	109.17961	1.34	PLN_pusat_repository	
fs_113	PLTM Pagerpelah	Jawa Tengah	-7.28944	109.70333	3.09	PLN_pusat_repository	
fs_132	PLTM Pageruyung	Jawa Tengah	-7.06528	110.00306	4.40	PLN_pusat_repository	
fs_117	PLTM Rakit	Jawa Tengah	-7.43333	109.52917	0.50	PLN_pusat_repository	
fs_127	PLTM Serayu	Jawa Tengah	-7.39354	109.88486	8.60	PLN_pusat_repository	
fs_119	PLTM Singgi	Jawa Tengah			0.20	PLN_pusat_repository	
fs_133	PLTM Timbangreja	Jawa Tengah	-7.07917	109.13363	0.40	PLN_pusat_repository	
fs_220	Kuala Kilo	Sulawesi Tengah	-1.29455	120.55325	10.00	PLN_wilayah	
fs_221	Kuala Tengah	Sulawesi Tengah	-1.29145	120.54560		PLN_wilayah	
fs_218	PLTM Alani	Sulawesi Tengah	-1.48750	122.85833	7.00	PLN_wilayah	
fs_167	PLTM Bambalo 2	Sulawesi Tengah	-1.43186	120.93211	1.80	PLN_pusat_repository	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
fs_159	PLTM Batu No Botak	Sulawesi Tengah	0.99625	120.89122	5.00	PLN_pusat	
fs_168	PLTM Bengkoli	Sulawesi Tengah	0.67939	120.19926	2.50	PLN_pusat_repository	
fs_219	PLTM Biak	Sulawesi Tengah	-0.88333	122.86667	4.00	PLN_wilayah	
fs_160	PLTM Bongkasoa-Simpoyo	Sulawesi Tengah	-1.12944	121.47218	1.40	PLN_pusat	
fs_161	PLTM Dako	Sulawesi Tengah	1.08347	120.88933	1.40	PLN_pusat	
fs_224	PLTM Kabalo	Sulawesi Tengah	-1.45833	121.05091	2.20	PLN_wilayah	
fs_210	PLTM Karangana I	Sulawesi Tengah	-1.82874	119.99662	9.00	PLN_wilayah	
fs_211	PLTM Karangana II	Sulawesi Tengah	-1.80533	120.02150	10.00	PLN_wilayah	
fs_212	PLTM Karangana III	Sulawesi Tengah	-1.78000	120.04483	8.50	PLN_wilayah	
fs_222	PLTM Lobu	Sulawesi Tengah	-0.85380	122.52202	5.00	PLN_wilayah	
fs_213	PLTM Mapahi	Sulawesi Tengah	-1.78014	120.04794	7.00	PLN_wilayah	
fs_223	PLTM Masewo	Sulawesi Tengah	-1.82215	120.00194	8.00	PLN_wilayah	
fs_214	PLTM Palasa	Sulawesi Tengah	0.44947	120.23644	7.40	PLN_wilayah	
fs_226	PLTM Paranonge	Sulawesi Tengah			5.00	PLN_wilayah	
fs_169	PLTM Ponju	Sulawesi Tengah	0.59611	120.10167	3.00	PLN_pusat_repository	
fs_163	PLTM Pono	Sulawesi Tengah	-1.53919	120.02951	6.07	PLN_pusat	
fs_215	PLTM Sabuku	Sulawesi Tengah	0.53270	120.39845	6.00	PLN_wilayah	
fs_162	PLTM Sampaga	Sulawesi Tengah	0.66306	120.08194	1.22	PLN_pusat	
fs_228	PLTM Sinombulung	Sulawesi Tengah	0.53056	121.10237	4.00	PLN_wilayah	
fs_227	PLTM Siyuntoyo	Sulawesi Tengah	0.54403	121.13694	3.00	PLN_wilayah	
fs_216	PLTM Tabong	Sulawesi Tengah	0.91341	121.16114	7.00	PLN_wilayah	
fs_225	PLTM Tinombo	Sulawesi Tengah	0.44962	120.23606	1.70	PLN_wilayah	
fs_229	PLTM Tiirtanagaya	Sulawesi Tengah	0.57508	120.94298		PLN_wilayah	
fs_166	PLTM Tomasa	Sulawesi Tengah	-1.67613	120.74639	10.00	PLN_pusat_repository	
fs_217	PLTM Tomata	Sulawesi Tengah	-2.25417	120.95278	10.00	PLN_wilayah	
fs_164	PLTM Wawopada	Sulawesi Tengah	-1.89473	121.17180	3.00	PLN_pusat	
fs_165	PLTM Yaentu	Sulawesi Tengah	-1.84075	120.86486	10.00	PLN_pusat	
JicaEX_0001	Aceh-2	Aceh	5.265332	95.675243	7.33	Hydro Inventory Study_1997	
JicaEX_0005	Jambu Aye-8	Aceh	4.759414	97.395082	160.00	Hydro Inventory Study_1997	
JicaEX_0031	Lawe Alas-4	Aceh	3.067451	97.92939	321.60	Hydro Inventory Study_1997	
JicaEX_0002	Peusangan-1	Aceh	4.608792	96.775141	44.20	Hydro Inventory Study_1997	
JicaEX_0003	Peusangan-2	Aceh	4.630259	96.718483	42.20	Hydro Inventory Study_1997	
JicaEX_0004	Peusangan-4	Aceh	4.765835	96.689249	30.89	Hydro Inventory Study_1997	
JicaEX_0006	Tampur-1	Aceh	4.22922	97.664756	428.00	Hydro Inventory Study_1997	
JicaEX_0033	Teunom-1	Aceh	4.911528	95.98831	24.25	Hydro Inventory Study_1997	
fs_143	PLTM Semawung	DI Yogyakarta	-7.66149	110.26385	0.60	PLN_pusat_repository	
hp_1049	Bayu Samas	DI Yogyakarta			50.00	RUPTL	
JicaPR_0487	Oyo-1	DI Yogyakarta	-7.91227	110.522	7.40	Hydro Inventory Study_1997	
JicaPR_0488	Oyo-2	DI Yogyakarta	-7.95195	110.435	9.70	Hydro Inventory Study_1997	
hp_0939	Semawung	DI Yogyakarta			0.60	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0490	Serang	DI Yogyakarta	-7.81661	110.174	1.10	Hydro Inventory Study_1997	
hp_0960	Talang Krasak	DI Yogyakarta			0.40	PLN (4 - Minihydro PLN Project)	
fs_138	PLTM Balelo	Jawa Timur	-8.16583	113.79278	4.40	PLN_pusat_repository	
fs_134	PLTM Jompo 1	Jawa Timur	-8.0625	113.67222	2.12	PLN_pusat_repository	
fs_135	PLTM Jompo 2	Jawa Timur	-8.08106	113.66725	3.17	PLN_pusat_repository	
fs_136	PLTM Kanzy 1	Jawa Timur	-7.80381	112.74568	2.30	PLN_pusat_repository	
fs_140	PLTM Ketajek	Jawa Timur	-8.08111	113.59111	3.26	PLN_pusat_repository	
fs_141	PLTM Lodagung	Jawa Timur	-8.14199	112.24838	1.30	PLN_pusat_repository	
fs_139	PLTM Pandan Laras 2	Jawa Timur	-7.88860	113.47108	7.40	PLN_pusat_repository	
fs_137	PLTM Pandan Laras 3	Jawa Timur	-7.87821	113.44005	2.21	PLN_pusat_repository	
fs_142	PLTM Zeelandia	Jawa Timur	-8.08831	113.47008	2.14	PLN_pusat_repository	
hp_0247	Bone	Gorontalo	0.50461	123.27106	7.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0712	Bone-1	Gorontalo	0.537425	123.351	31.10	Hydro Inventory Study_1997	
JicaPR_0713	Bone-3	Gorontalo	0.60135	123.302	20.90	Hydro Inventory Study_1997	
JicaPR_0714	Bulongo	Gorontalo	0.628127	123.089	8.10	Hydro Inventory Study_1997	
hp_0809	Iya	Gorontalo			2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0445	Mongango	Gorontalo	0.85691	123.16601	1.20	PLN (4 - Minihydro PLN Project)	
JicaPR_0715	Paguyaman-1	Gorontalo	0.791759	122.248684	4.04	Hydro Inventory Study_1997	
JicaPR_0716	Paguyaman-2	Gorontalo	0.770679	122.318989	16.61	Hydro Inventory Study_1997	
fs_178	PLTM Bone	Gorontalo	0.50212	123.27036	7.40	PLN_pusat	
fs_230	PLTM Iya	Gorontalo	0.38886	123.47288	2.00	PLN_wilayah	
fs_177	PLTM Taludaa 2	Gorontalo	0.37588	123.47061	2.00	PLN_pusat_repository	
JicaPR_0717	Randangan-1	Gorontalo	0.703935	121.910705	17.81	Hydro Inventory Study_1997	
JicaPR_0718	Randangan-2	Gorontalo	0.681099	121.882636	5.58	Hydro Inventory Study_1997	
JicaPR_0719	Randangan-3	Gorontalo	0.726881	121.676725	77.19	Hydro Inventory Study_1997	
JicaPR_0720	Randangan-4	Gorontalo	0.661779	121.734799	39.53	Hydro Inventory Study_1997	
hp_0606	Taludaa	Gorontalo			3.00	PLN (3 - Minihydro IPP Project)	
hp_0668	Taludaa 2	Gorontalo			2.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0097	Genyem	Papua Barat	-2.58555	140.021	22.90	Hydro Inventory Study_1997	
JicaEX_0096	Warsamson	Papua Barat	-0.811463	131.398198	49.20	Hydro Inventory Study_1997	
JicaPR_0242	Air Batang-1	Jambi	-1.867652	101.136881	43.90	Hydro Inventory Study_1997	
JicaPR_0244	Air Batang-1	Jambi	-1.851591	101.194905	17.20	Hydro Inventory Study_1997	
JicaPR_0155	Anai	Jambi	-2.286162	102.217253	21.50	Hydro Inventory Study_1997	
JicaPR_0157	Asai-1	Jambi	-2.620004	102.043763	44.50	Hydro Inventory Study_1997	
JicaPR_0158	Asai-2	Jambi	-2.586251	102.078279	62.60	Hydro Inventory Study_1997	
JicaPR_0160	Asai-3	Jambi	-2.514402	102.241559	48.80	Hydro Inventory Study_1997	
JicaPR_0161	Asai-4	Jambi	-2.378904	102.409036	86.30	Hydro Inventory Study_1997	
JicaPR_0238	Dikit-1	Jambi	-2.499534	101.60804	152.80	Hydro Inventory Study_1997	
JicaPR_0149	Kerinci/Silaut	Jambi	-2.156626	101.44026	279.90	Hydro Inventory Study_1997	
JicaPR_0159	Keruh	Jambi	-2.639153	102.235511	11.60	Hydro Inventory Study_1997	
JicaPR_0236	Langkup-1	Jambi	-2.554873	101.723813	122.90	Hydro Inventory Study_1997	
JicaPR_0237	Langkup-2	Jambi	-2.473876	101.636209	85.10	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaEX_0015	Merangin-2	Jambi	-2.244333	101.697992	350.00	Hydro Inventory Study_1997	
hp_0464	Merangin-2	Jambi	-2.16667	101.60000	35.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0150	Merangin-3	Jambi	-2.19358	101.786489	59.30	Hydro Inventory Study_1997	
JicaPR_0152	Merangin-4	Jambi	-2.187294	101.849033	187.60	Hydro Inventory Study_1997	
JicaEX_0016	Merangin-5	Jambi	-2.188112	101.996568	23.92	Hydro Inventory Study_1997	
hp_0587	Merangin-5	Jambi	-2.18333	101.98333	23.90	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0147	Napal Melintang	Jambi	-1.85510	101.26853	0.58	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0153	Nila	Jambi	-2.202794	102.071125	30.50	Hydro Inventory Study_1997	
JicaPR_0151	Penetai	Jambi	-2.130808	101.778411	17.70	Hydro Inventory Study_1997	
fs_68	PLTM Napal Melintang	Jambi	-1.8551	101.26853	0.50	PLN_pusat_repository	
JicaPR_0144	Relepat	Jambi	-1.794867	101.844003	34.00	Hydro Inventory Study_1997	
JicaPR_0156	Rengai	Jambi	-2.319472	102.297667	17.60	Hydro Inventory Study_1997	
JicaPR_0148	Siulak-1	Jambi	-1.92989	101.262314	30.60	Hydro Inventory Study_1997	
JicaPR_0145	Tabir-1	Jambi	-1.960324	101.613303	28.50	Hydro Inventory Study_1997	
JicaPR_0146	Tabir-2	Jambi	-1.961059	101.858605	36.00	Hydro Inventory Study_1997	
JicaPR_0147	Tabir-3	Jambi	-1.912254	101.971432	35.20	Hydro Inventory Study_1997	
JicaPR_0139	Tebo-1	Jambi	-1.850923	101.534522	17.80	Hydro Inventory Study_1997	
JicaPR_0140	Tebo-2	Jambi	-1.79003	101.552269	24.60	Hydro Inventory Study_1997	
JicaPR_0141	Tebo-3	Jambi	-1.684673	101.567192	53.20	Hydro Inventory Study_1997	
JicaPR_0154	Tembesi	Jambi	-2.329497	102.072399	88.90	Hydro Inventory Study_1997	
JicaPR_0142	Ule-1	Jambi	-1.786825	101.670929	50.20	Hydro Inventory Study_1997	
JicaPR_0143	Ule-2	Jambi	-1.739982	101.693421	14.10	Hydro Inventory Study_1997	
JicaPR_0439	Balekambang	Jawa Barat	-7.03714	107.969	4.90	Hydro Inventory Study_1997	
hp_0717	Balekambang	Jawa Barat			4.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0430	Bengkok/Dago	Jawa Barat	-6.86154	107.62512	3.85	PLN (4 - Minihydro PLN Project)	
hp_0246	Bojong Cisono	Jawa Barat	-6.81739	106.44831	1.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0179	Caringin	Jawa Barat	-6.89583	106.40222	4.30	PLN (3 - Minihydro IPP Project)	Screened out
hp_0686	Cianten 1	Jawa Barat			2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0178	Cianten 1B	Jawa Barat	-6.70972	106.63778	6.20	PLN (3 - Minihydro IPP Project)	
hp_0685	Cianten 2	Jawa Barat			5.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0684	Cianten 3	Jawa Barat			5.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_0177	Ciarinem	Jawa Barat	-7.46144	107.72686	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0176	Ciasem	Jawa Barat	-6.64492	107.66148	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0132	Cibalapulang	Jawa Barat	-7.19867	106.99260	9.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0068	Cibalapulang 1	Jawa Barat	-7.21007	106.98626	11.50	Consultant	
hp_0067	Cibalapulang 2	Jawa Barat	-7.22644	106.98233	6.50	Consultant	Screened out
hp_0598	Cibalapulang-2	Jawa Barat	-7.21086	106.98556	6.50	PLN (3 - Minihydro IPP Project)	
hp_0175	Cibalapulang-3	Jawa Barat	-7.18831	107.00247	6.00	PLN (3 - Minihydro IPP Project)	
hp_0110	Cibareno 1	Jawa Barat	-6.82914	106.43619	5.00	Consultant	Screened out
JicaPR_0533	Cibareno-1	Jawa Barat	-6.8332	106.437	18.00	Hydro Inventory Study_1997	
JicaPR_0535	Cibareno-3	Jawa Barat	-6.93926	106.399	38.90	Hydro Inventory Study_1997	
hp_0131	Cibatarua	Jawa Barat	-7.40148	107.68349	5.00	PLN (3 - Minihydro IPP Project)	
hp_0418	Cibatarua Panyairan	Jawa Barat	-7.38894	107.68830	8.23	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0438	Cibatu	Jawa Barat	-7.06464	107.98	9.70	Hydro Inventory Study_1997	
hp_0756	Cibatu	Jawa Barat			9.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0757	Cibinong	Jawa Barat			0.20	PLN (4 - Minihydro PLN Project)	
hp_0173	Cibuni	Jawa Barat	-7.20138	107.24696	3.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0065	Cibuni Pusaka 1	Jawa Barat	-7.21934	107.21003	1.00	Consultant	
JicaPR_0519	Cibuni-1	Jawa Barat	-7.2059	107.227	30.20	Hydro Inventory Study_1997	
JicaPR_0520	Cibuni-2	Jawa Barat	-7.22898	107.183	7.00	Hydro Inventory Study_1997	
hp_1002	Cibuni-2	Jawa Barat			7.00	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0068	Cibuni-3	Jawa Barat	-7.313859	106.927331	172.00	Hydro Inventory Study_1997	
JicaEX_0069	Cibuni-4	Jawa Barat	-7.349599	106.833068	71.11	Hydro Inventory Study_1997	
hp_0416	Cicatih	Jawa Barat	-6.95155	106.75570	6.40	PLN (3 - Minihydro IPP Project)	Screened out
hp_0252	Ciherang	Jawa Barat	-6.65200	107.51592	1.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0064	Cijampang	Jawa Barat	-7.14147	107.18180	1.10	Consultant	
hp_1014	Cijampang 2A	Jawa Barat			1.10	PLN (3 - Minihydro IPP Project)	
hp_0429	Cijedil	Jawa Barat	-6.80355	107.08891	0.79	PLN (4 - Minihydro PLN Project)	
hp_0171	Cikaengan	Jawa Barat	-7.51161	107.92881	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0253	Cikaengan Najaten	Jawa Barat	-7.65353	107.92356	7.20	PLN (3 - Minihydro IPP Project)	
hp_0170	Cikaengan-2	Jawa Barat	-7.57345	107.92641	7.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0513	Cikaingan	Jawa Barat	-7.55911	107.917	19.00	Hydro Inventory Study_1997	
JicaEX_0041	Cikalong	Jawa Barat	-7.18764	107.604	19.20	Hydro Inventory Study_1997	
hp_0001	Cikalong	Jawa Barat	-7.11493	107.55040	19.20	Consultant	Screened out
hp_0169	Cikandang	Jawa Barat	-7.45261	107.67525	6.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0514	Cikandang-1	Jawa Barat	-7.47016	107.667	12.20	Hydro Inventory Study_1997	
JicaPR_0515	Cikandang-2	Jawa Barat	-7.54184	107.596	20.80	Hydro Inventory Study_1997	
hp_0683	Cikaniki 1	Jawa Barat			2.50	PLN (3 - Minihydro IPP Project)	
hp_0682	Cikaniki 2	Jawa Barat			3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0525	Cikarang-2	Jawa Barat	-7.32891	106.545	0.60	Hydro Inventory Study_1997	
hp_0758	Cikarang-2	Jawa Barat			0.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0428	Cikaso	Jawa Barat	-7.23438	106.81656	5.30	PLN (3 - Minihydro IPP Project)	
JicaPR_0524	Cikaso/Cicurug	Jawa Barat	-7.34237	106.613	2.00	Hydro Inventory Study_1997	
hp_0759	Cikaso/Cicurug	Jawa Barat			2.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0521	Cikaso-1	Jawa Barat	-7.24783	106.779	10.10	Hydro Inventory Study_1997	
JicaPR_0522	Cikaso-2	Jawa Barat	-7.29897	106.72	70.00	Hydro Inventory Study_1997	
JicaEX_0070	Cikaso-3	Jawa Barat	-7.334211	106.664365	29.80	Hydro Inventory Study_1997	
JicaPR_0523	Cikaso-4	Jawa Barat	-7.35676	106.642	75.80	Hydro Inventory Study_1997	
hp_0168	Cikawung Atas	Jawa Barat	-7.32708	107.54531	5.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0167	Cikawung Bawah	Jawa Barat	-7.33067	107.52225	2.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0166	Cikopo-2	Jawa Barat	-7.36611	107.66694	6.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0165	Cilaki	Jawa Barat	-7.30806	107.51944	7.40	PLN (3 - Minihydro IPP Project)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0681	Cilaki 1A	Jawa Barat			3.14	PLN (3 - Minihydro IPP Project)	
hp_0680	Cilaki 1B	Jawa Barat			9.69	PLN (3 - Minihydro IPP Project)	
hp_0063	Cilaki Malabar	Jawa Barat	-7.24500	107.56416	0.80	Consultant	
JicaPR_0516	Cilaki-1	Jawa Barat	-7.34234	107.485	36.60	Hydro Inventory Study_1997	
JicaPR_0517	Cilaki-2	Jawa Barat	-7.36847	107.483	17.20	Hydro Inventory Study_1997	
JicaPR_0518	Cilaki-3	Jawa Barat	-7.44904	107.428	45.90	Hydro Inventory Study_1997	
JicaPR_0512	Cilangka	Jawa Barat	-7.70613	108.111	43.40	Hydro Inventory Study_1997	
hp_0254	Cilayu Kulon	Jawa Barat	-7.38650	107.56592	5.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0255	Cileat	Jawa Barat	-6.78345	107.74950	5.18	PLN (3 - Minihydro IPP Project)	Screened out
hp_0062	Cileteuh	Jawa Barat	-7.25708	106.50147	1.80	Consultant	Screened out
JicaPR_0526	Cileteh	Jawa Barat	-7.23785	106.523	9.20	Hydro Inventory Study_1997	
hp_0760	Cileteh	Jawa Barat			9.20	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0034	Ciliman	Jawa Barat	-6.597846	106.040141	1.00	Hydro Inventory Study_1997	
hp_0361	Cimandiri	Jawa Barat	-6.98228	106.86539	3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0527	Cimandiri-1	Jawa Barat	-6.96951	106.868	26.40	Hydro Inventory Study_1997	
JicaPR_0528	Cimandiri-2	Jawa Barat	-7.00178	106.765	69.00	Hydro Inventory Study_1997	
JicaEX_0071	Cimandiri-3	Jawa Barat	-6.993222	106.680488	238.00	Hydro Inventory Study_1997	
JicaPR_0529	Cimandiri-6	Jawa Barat	-6.9473	106.733	3.60	Hydro Inventory Study_1997	
hp_1003	Cimandiri-6	Jawa Barat			3.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0530	Cimandiri-7	Jawa Barat	-7.03426	106.796	1.80	Hydro Inventory Study_1997	
hp_0679	Cimandiri-7	Jawa Barat			1.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0531	Cimandiri-8	Jawa Barat	-7.02894	106.77	4.70	Hydro Inventory Study_1997	
hp_1004	Cimandiri-8	Jawa Barat			4.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0532	Cimandiri-9	Jawa Barat	-6.90936	106.611	71.00	Hydro Inventory Study_1997	
hp_0762	Cinta Mekar	Jawa Barat			0.12	PLN (3 - Minihydro IPP Project)	
JicaPR_0444	Cipanas/Cipeles	Jawa Barat	-6.79904	107.977	3.00	Hydro Inventory Study_1997	
hp_0763	Cipanas/Cipeles	Jawa Barat			3.00	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0044	Cipasang	Jawa Barat	-6.964596	108.089928	400.00	Hydro Inventory Study_1997	
hp_0764	Cipayung	Jawa Barat			0.24	PLN (4 - Minihydro PLN Project)	
JicaPR_0435	Cipunegara-1	Jawa Barat	-6.56723	107.811	101.50	Hydro Inventory Study_1997	
JicaPR_0436	Cipunegara-2	Jawa Barat	-6.55391	107.832	37.90	Hydro Inventory Study_1997	
JicaEX_0037	Cirata	Jawa Barat	-6.68261	107.342	500.00	Hydro Inventory Study_1997	
hp_0033	Cirata	Jawa Barat	-6.70062	107.36785	18.00	Consultant	Screened out
hp_0144	Cirompang	Jawa Barat	-7.47471	107.61495	8.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0256	Cirompang Mekarmukti	Jawa Barat	-7.50369	107.59730	4.00	PLN (3 - Minihydro IPP Project)	
hp_0143	Cisanggiri	Jawa Barat	-7.51452	107.83763	3.00	PLN (3 - Minihydro IPP Project)	
hp_0061	Cisanggiri Jayamukti	Jawa Barat	-7.55698	107.84808	7.00	Consultant	
hp_0060	Cisereuh	Jawa Barat	-7.27306	106.67253	2.10	Consultant	
hp_0765	Cisiih	Jawa Barat			9.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0161	Cisono	Jawa Barat	-6.81332	106.45292	3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0505	Citanduy-1	Jawa Barat	-7.33112	108.299	28.40	Hydro Inventory Study_1997	
JicaPR_0506	Citanduy-2	Jawa Barat	-7.35415	108.374	20.00	Hydro Inventory Study_1997	
JicaPR_0507	Citanduy-3	Jawa Barat	-7.33647	108.465	2.60	Hydro Inventory Study_1997	
hp_0766	Citanduy-3	Jawa Barat			2.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0508	Citanduy-4	Jawa Barat	-7.14559	108.517	31.70	Hydro Inventory Study_1997	
JicaPR_0509	Citanduy-5	Jawa Barat	-7.18444	108.552	4.80	Hydro Inventory Study_1997	
hp_0767	Citanduy-5	Jawa Barat			4.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0434	Citarum-1	Jawa Barat	-7.06197	107.499	19.20	Hydro Inventory Study_1997	
JicaPR_0511	Ciwulan	Jawa Barat	-7.66726	108.174	203.90	Hydro Inventory Study_1997	
hp_0057	Curug	Jawa Barat	-6.44648	107.37930	6.80	Consultant	
hp_0056	Curug Citambur	Jawa Barat	-7.19257	107.23479	0.62	Consultant	
hp_0055	Curug Malela	Jawa Barat	-7.01120	107.20571	3.20	Consultant	
hp_0777	Curugagung	Jawa Barat			0.15	PLN (3 - Minihydro IPP Project)	
hp_0032	Dago	Jawa Barat	-6.86814	107.61390	0.70	Consultant	
JicaPR_0437	Garut	Jawa Barat	-7.22134	107.904	3.70	Hydro Inventory Study_1997	
hp_0615	Garut	Jawa Barat			3.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0811	Jambelair (Melong)	Jawa Barat			0.10	PLN (3 - Minihydro IPP Project)	
JicaEX_0045	Jatigede	Jawa Barat	-6.894198	108.092749	175.00	Hydro Inventory Study_1997	
hp_0415	Jatigede	Jawa Barat	-6.85000	108.08333	11.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_1030	Jatigede (FTP2)	Jawa Barat			55.00	RUPTL	
JicaEX_0036	Jatiluhur	Jawa Barat	-6.50479	107.391	150.00	Hydro Inventory Study_1997	
hp_0030	Jatiluhur	Jawa Barat	-6.52372	107.38974	175.00	Consultant	Screened out
hp_0263	Jatisari	Jawa Barat	-7.54363	107.85192	5.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0441	Kadu Malik	Jawa Barat	-6.91608	108.195	85.80	Hydro Inventory Study_1997	
hp_0151	Kalapa Nunggal	Jawa Barat	-7.34086	107.19411	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0268	Kanzy-5	Jawa Barat	-7.48098	107.61213	5.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0274	Kerta Mukti	Jawa Barat	-6.99056	106.75719	6.30	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0042	Kracak	Jawa Barat	-6.4663	107.185	16.57	Hydro Inventory Study_1997	
hp_0024	Kracak	Jawa Barat	-6.61695	106.64421	18.90	Consultant	Screened out
JicaEX_0040	Lamajan	Jawa Barat	-7.17919	107.579	19.20	Hydro Inventory Study_1997	
hp_0023	Lamajan	Jawa Barat	-7.14115	107.55404	19.20	Consultant	Screened out
hp_0035	Malabar	Jawa Barat	-7.24496	107.56364	3.00	Consultant	
hp_0887	Matenggeng	Jawa Barat			887.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0206	Pakenjeng Atas	Jawa Barat	-7.42676	107.67798	3.60	PLN (3 - Minihydro IPP Project)	
hp_0205	Pakenjeng Bawah	Jawa Barat	-7.47019	107.67244	5.70	PLN (3 - Minihydro IPP Project)	
JicaEX_0046	Parakan Kondang	Jawa Barat	-6.77469	108.129	9.92	Hydro Inventory Study_1997	
hp_0139	Parakan Kondang	Jawa Barat	-6.83419	108.10257	9.90	PLN (4 - Minihydro PLN Project)	Screened out
JicaPR_0440	Pasir Kalong	Jawa Barat	-6.9406	108.094	199.90	Hydro Inventory Study_1997	
JicaPR_0442	Pasir Kuda	Jawa Barat	-6.84248	108.18	8.40	Hydro Inventory Study_1997	
hp_0911	Pasir Kuda	Jawa Barat			8.40	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0039	Plengan	Jawa Barat	-7.17045	107.703	5.15	Hydro Inventory Study_1997	
hp_0439	Plengan	Jawa Barat	-7.16940	107.55470	6.87	PLN (4 - Minihydro PLN Project)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0108	Pusaka 1	Jawa Barat	-7.21932	107.21082	8.00	Consultant	Screened out
hp_0107	Pusaka 3	Jawa Barat	-7.24212	107.17112	3.00	Consultant	Screened out
hp_0199	Pusaka-1	Jawa Barat	-7.20250	107.23028	8.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_0130	Pusaka-3	Jawa Barat	-7.24088	107.17182	3.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0035	Rajamandala	Jawa Barat	-6.839847	107.325512	58.00	Hydro Inventory Study_1997	
hp_0590	Rajamandala	Jawa Barat	-6.83333	107.31667	58.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaEX_0038	Saguling	Jawa Barat	-6.89251	107.356	700.00	Hydro Inventory Study_1997	
hp_0016	Saguling	Jawa Barat	-6.86539	107.35170	7.00	Consultant	Screened out
hp_0937	Selamangu	Jawa Barat			0.15	PLN (4 - Minihydro PLN Project)	
hp_0191	Sindang Cai	Jawa Barat	-6.61018	107.68025	0.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_0082	Talun	Jawa Barat	-7.26297	107.63132	0.21	Consultant	
JicaEX_0043	Ubrug	Jawa Barat	-6.53487	107.146	17.10	Hydro Inventory Study_1997	
hp_0007	Ubrug	Jawa Barat	-6.94990	106.75559	27.90	Consultant	Screened out
JicaPR_0443	Ujung Jaya/Paseh	Jawa Barat	-6.7394	108.074	2.50	Hydro Inventory Study_1997	
hp_0978	Ujung Jaya/Paseh	Jawa Barat			2.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0104	Upper Cisokan	Jawa Barat	-6.94777	107.23007	14.00	Consultant	
hp_1048	Upper Cisokan Pump Storage (FTP2)	Jawa Barat			1 040.00	RUPTL	
hp_0578	Upper Cisokan-PS	Jawa Barat	-6.93333	107.16667	1.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0354	Waeroa	Jawa Barat	-7.30750	107.50892	0.40	PLN (3 - Minihydro IPP Project)	
hp_0698	Adipasir 1	Jawa Tengah			0.34	PLN (3 - Minihydro IPP Project)	
hp_0694	Adipasir 2	Jawa Tengah			0.34	PLN (3 - Minihydro IPP Project)	
hp_0129	Adipasir 3	Jawa Tengah	-7.42824	109.53886	0.32	PLN (3 - Minihydro IPP Project)	
hp_0070	Adipasir Dua	Jawa Tengah	-7.42583	109.54451	0.34	Consultant	
hp_0113	Adipasir Satu	Jawa Tengah	-7.42343	109.54767	0.34	Consultant	
hp_0164	Ambal	Jawa Tengah	-7.26356	109.70816	2.10	PLN (3 - Minihydro IPP Project)	
hp_0716	Balasalpuh	Jawa Tengah			0.20	PLN (4 - Minihydro PLN Project)	
hp_0218	Banjara Kebonmanis	Jawa Tengah	-7.34078	109.21999	2.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0445	Bantarsari	Jawa Tengah	-7.17967	108.875	20.60	Hydro Inventory Study_1997	
hp_0417	Banyubiru	Jawa Tengah	-7.33246	110.42933	0.17	PLN (3 - Minihydro IPP Project)	
hp_0210	Banyumlayu	Jawa Tengah	-7.40791	109.66828	0.46	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0448	Bela	Jawa Tengah	-7.05196	109.963	10.80	Hydro Inventory Study_1997	
hp_1043	Bendosari	Jawa Tengah			4.00	RUPTL	Screened out
JicaPR_0492	Bener	Jawa Tengah	-7.54673	110.035	0.40	Hydro Inventory Study_1997	
hp_0735	Bener	Jawa Tengah			0.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0181	Binangun	Jawa Tengah	-7.05784	109.79602	3.75	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0491	Bogowonto-1	Jawa Tengah	-7.53048	110.031	3.60	Hydro Inventory Study_1997	
hp_0739	Bogowonto-1	Jawa Tengah			3.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0493	Bogowonto-2	Jawa Tengah	-7.56729	110.03	5.20	Hydro Inventory Study_1997	
hp_0740	Bogowonto-2	Jawa Tengah			5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0494	Bogowonto-3	Jawa Tengah	-7.61545	110.037	5.90	Hydro Inventory Study_1997	
hp_0741	Bogowonto-3	Jawa Tengah			5.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0495	Bogowonto-4	Jawa Tengah	-7.64558	110.044	3.80	Hydro Inventory Study_1997	
hp_0742	Bogowonto-4	Jawa Tengah			3.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0754	Cenal	Jawa Tengah			0.90	PLN (4 - Minihydro PLN Project)	
JicaPR_0510	Citanduy-6	Jawa Tengah	-7.26688	108.573	62.10	Hydro Inventory Study_1997	
JicaPR_0449	Curug Sewu-1	Jawa Tengah	-7.08879	110.11	5.40	Hydro Inventory Study_1997	
hp_0775	Curug Sewu-1	Jawa Tengah			5.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0450	Curug Sewu-2	Jawa Tengah	-7.07643	110.136	2.80	Hydro Inventory Study_1997	
hp_0776	Curug Sewu-2	Jawa Tengah			2.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0678	Dadapayam	Jawa Tengah			3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1036	Damar	Jawa Tengah			2.10	RUPTL	Screened out
JicaEX_0067	Garung	Jawa Tengah	-7.28667	109.929	26.40	Hydro Inventory Study_1997	
hp_0031	Garung	Jawa Tengah	-7.29247	109.92268	26.40	Consultant	Screened out
JicaPR_0496	Geger Menjangan	Jawa Tengah	-7.67979	110.05	4.20	Hydro Inventory Study_1997	
hp_0793	Geger Menjangan	Jawa Tengah			4.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0159	Gelang	Jawa Tengah	-7.43972	109.51639	0.30	PLN (3 - Minihydro IPP Project)	
JicaEX_0064	Gintung	Jawa Tengah	-7.34364	109.433049	19.18	Hydro Inventory Study_1997	
hp_0156	Gunung Wugul	Jawa Tengah	-7.31167	109.71250	3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0455	Gunung Wulan	Jawa Tengah	-7.16981	110.64	4.40	Hydro Inventory Study_1997	
hp_0797	Gunung Wulan	Jawa Tengah			4.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0155	Harjosari	Jawa Tengah	-7.14395	109.53253	9.90	PLN (3 - Minihydro IPP Project)	
hp_0029	Jelog and Timo	Jawa Tengah	-7.24410	110.48146	32.48	Consultant	Screened out
JicaEX_0048	Jelok	Jawa Tengah	-7.11545	110.688	20.48	Hydro Inventory Study_1997	
hp_0153	Jimat	Jawa Tengah	-7.37558	109.88908	0.50	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0456	Jragung	Jawa Tengah	-7.08248	110.577	3.20	Hydro Inventory Study_1997	
hp_0816	Jragung	Jawa Tengah			3.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0820	Kali Kuning	Jawa Tengah			0.80	PLN (4 - Minihydro PLN Project)	
hp_0821	Kalianget	Jawa Tengah			0.16	PLN (4 - Minihydro PLN Project)	
JicaPR_0489	Kaloran	Jawa Tengah	-7.28166	110.257	4.90	Hydro Inventory Study_1997	
hp_0825	Kaloran	Jawa Tengah			4.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0447	Karang Anyar	Jawa Tengah	-7.02539	109.438	13.70	Hydro Inventory Study_1997	
JicaPR_0498	Karang Sambung	Jawa Tengah	-7.53092	109.68	19.60	Hydro Inventory Study_1997	
hp_0831	Karang Tengah	Jawa Tengah			0.32	PLN (4 - Minihydro PLN Project)	
JicaPR_0503	Kebanaran	Jawa Tengah	-7.43395	109.604	7.00	Hydro Inventory Study_1997	
hp_0834	Kebanaran	Jawa Tengah			7.00	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0050	Kedungombo	Jawa Tengah	-7.26777	110.836	22.50	Hydro Inventory Study_1997	
hp_0027	Kedungombo	Jawa Tengah	-7.25647	110.83947	23.00	Consultant	Screened out
JicaEX_0047	Ketenger	Jawa Tengah	-7.11684	109.341	7.04	Hydro Inventory Study_1997	
hp_0126	Ketenger	Jawa Tengah	-7.33317	109.22080	8.40	PLN (4 - Minihydro PLN Project)	Screened out
hp_1086	Klinc.ang	Jawa Tengah			0.30	RUPTL	Screened out
hp_0125	Kincang	Jawa Tengah	-7.42065	109.55098	0.32	PLN (3 - Minihydro IPP Project)	Screened out
hp_0425	Klambu	Jawa Tengah	-7.01804	110.80381	1.17	PLN (4 - Minihydro PLN Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0047	Klaving Palumbungan	Jawa Tengah	-7.27532	109.36315	1.32	Consultant	
hp_0224	Kunci Putih	Jawa Tengah	-7.21595	110.50220	0.95	PLN (3 - Minihydro IPP Project)	Screened out
hp_0223	Lambur	Jawa Tengah	-7.12505	109.51433	8.00	PLN (3 - Minihydro IPP Project)	
hp_0296	Lebak Barang	Jawa Tengah	-7.12200	109.66437	6.99	PLN (3 - Minihydro IPP Project)	Screened out
hp_0040	Logawa Babakan	Jawa Tengah	-7.37222	109.18263	1.34	Consultant	Screened out
hp_0039	Logawa Baseh	Jawa Tengah	-7.36375	109.17901	1.86	Consultant	Screened out
hp_0219	Logawa Baseh	Jawa Tengah	-7.32394	109.18211	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1082	Logawa Baseh Karangpelem	Jawa Tengah			1.90	RUPTL	Screened out
hp_0217	Logawa Sunyalangu	Jawa Tengah	-7.33631	109.18322	1.52	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0451	Lutut-I	Jawa Tengah	-7.13909	110.162	17.90	Hydro Inventory Study_1997	
hp_1079	Matenggeng PS	Jawa Tengah			900.00	RUPTL	Screened out
JicaEX_0063	Maung	Jawa Tengah	-7.343849	109.720916	360.00	Hydro Inventory Study_1997	
hp_0526	Maung	Jawa Tengah	-7.33333	109.71667	36.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0215	Merden	Jawa Tengah	-7.65556	109.79908	0.40	PLN (3 - Minihydro IPP Project)	
JicaEX_0066	Mrica	Jawa Tengah	-7.39727	109.609	184.50	Hydro Inventory Study_1997	
hp_0019	Mrica (PB Soedirman)	Jawa Tengah	-7.39510	109.60860	184.50	Consultant	
hp_0896	Ngargoyoso	Jawa Tengah			0.60	PLN (4 - Minihydro PLN Project)	
hp_0900	Oyo-1	Jawa Tengah			7.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0901	Oyo-2	Jawa Tengah			9.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0497	Padegolan	Jawa Tengah	-7.63792	109.784	20.20	Hydro Inventory Study_1997	
hp_0208	Pagarpelah	Jawa Tengah	-7.28944	109.70333	3.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0207	Pageruyung	Jawa Tengah	-7.06528	110.00306	4.40	PLN (3 - Minihydro IPP Project)	Screened out
hp_0364	Pageruyung (Damar)	Jawa Tengah	-7.04547	110.04905	2.70	PLN (3 - Minihydro IPP Project)	Screened out
hp_0204	Palumbungan	Jawa Tengah	-7.27430	109.35649	1.60	PLN (3 - Minihydro IPP Project)	
hp_0442	Pejengkolan	Jawa Tengah	-7.65934	109.77162	1.40	PLN (4 - Minihydro PLN Project)	
hp_0098	Plumbungan	Jawa Tengah	-7.41148	109.56830	1.60	Consultant	
hp_0201	Preng-1	Jawa Tengah	-7.36310	109.87813	1.80	PLN (3 - Minihydro IPP Project)	
hp_0200	Preng-2	Jawa Tengah	-7.38245	109.87255	4.50	PLN (3 - Minihydro IPP Project)	
hp_0450	Prukut Sambirata	Jawa Tengah	-7.35147	109.13255	1.50	PLN (3 - Minihydro IPP Project)	
JicaPR_0502	Ps. Klaving	Jawa Tengah	-7.2374	109.414	14.10	Hydro Inventory Study_1997	
hp_1058	Pugeran	Jawa Tengah			6.00	RUPTL	
JicaPR_0452	Putih	Jawa Tengah	-7.14546	110.197	11.70	Hydro Inventory Study_1997	
hp_0138	Rakit	Jawa Tengah	-7.43244	109.52952	0.50	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0065	Rawalo-1	Jawa Tengah	-7.524974	109.197657	0.64	Hydro Inventory Study_1997	
JicaPR_0453	RowOPENING	Jawa Tengah	-7.25565	110.47	20.10	Hydro Inventory Study_1997	
JicaPR_0454	Sambirejo	Jawa Tengah	-7.19422	110.548	7.90	Hydro Inventory Study_1997	
hp_0934	Sambirejo	Jawa Tengah			7.90	PLN (2 - MHPP in HPPS)	Screened out
hp_1018	Selorejo	Jawa Tengah			1.40	RUPTL	Screened out
hp_0433	Sempor	Jawa Tengah	-7.56776	109.48777	1.00	PLN (4 - Minihydro PLN Project)	
hp_0942	Serang	Jawa Tengah			1.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0195	Serayu	Jawa Tengah	-7.39354	109.88486	8.62	PLN (3 - Minihydro IPP Project)	Screened out
hp_0945	Sidorejo	Jawa Tengah			1.40	PLN (4 - Minihydro PLN Project)	
hp_0332	Sigebang	Jawa Tengah	-7.38944	109.59447	0.50	PLN (3 - Minihydro IPP Project)	
hp_0135	Singgi	Jawa Tengah	-7.40148	109.68982	0.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0084	Siteki	Jawa Tengah	-7.40529	109.56817	1.20	Consultant	
JicaPR_0499	Solomerto	Jawa Tengah	-7.42493	109.88	10.40	Hydro Inventory Study_1997	
hp_0956	Susukan	Jawa Tengah			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0504	Tajum	Jawa Tengah	-7.42546	109.042	5.40	Hydro Inventory Study_1997	
hp_0959	Tajum	Jawa Tengah			5.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0432	Tapen	Jawa Tengah	-7.38682	109.60085	0.75	PLN (4 - Minihydro PLN Project)	
JicaPR_0501	Telogo	Jawa Tengah	-7.31877	109.657	23.90	Hydro Inventory Study_1997	
hp_0186	Timbangreja	Jawa Tengah	-7.06353	109.13664	0.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0049	Timo	Jawa Tengah	-7.13518	110.67	12.00	Hydro Inventory Study_1997	
hp_1017	Timo	Jawa Tengah			12.00	RUPTL	Screened out
hp_0975	Tonjong	Jawa Tengah			0.21	PLN (4 - Minihydro PLN Project)	
JicaPR_0500	Tulis	Jawa Tengah	-7.36776	109.784	9.50	Hydro Inventory Study_1997	
hp_0184	Tulis	Jawa Tengah	-7.28118	109.84269	9.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0431	Tulis	Jawa Tengah	-7.31510	109.76966	9.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0076	Tulis Limbangan	Jawa Tengah	-7.37964	109.76486	5.00	Consultant	
hp_0075	Tulis Windusari	Jawa Tengah	-7.31939	109.80864	4.00	Consultant	
hp_0074	Urang Ambal	Jawa Tengah	-7.27493	109.70710	2.10	Consultant	Screened out
JicaEX_0062	Wadaslintang	Jawa Tengah	-7.56426	109.81	16.00	Hydro Inventory Study_1997	
hp_0006	Wadaslintang	Jawa Tengah	-7.60872	109.78177	16.40	Consultant	Screened out
hp_0581	Wanganaji	Jawa Tengah	-7.30417	109.91528	0.14	PLN (3 - Minihydro IPP Project)	
JicaPR_0446	Watu Kumpul	Jawa Tengah	-7.1059	109.42	30.70	Hydro Inventory Study_1997	
hp_0995	Winong	Jawa Tengah			0.50	PLN (4 - Minihydro PLN Project)	
hp_0996	Wonodadi	Jawa Tengah			0.21	PLN (4 - Minihydro PLN Project)	
JicaEX_0051	Wonogiri	Jawa Tengah	-7.83566	110.925	12.40	Hydro Inventory Study_1997	
hp_0004	Wonogiri (Gajahmungkur)	Jawa Tengah	-7.83726	110.92667	12.40	Consultant	Screened out
hp_0706	Ampel Gading	Jawa Timur			1.00	PLN (4 - Minihydro PLN Project)	
hp_0049	Ampelgading	Jawa Timur	-8.26003	112.91086	1.00	Consultant	Screened out
hp_0227	Balelo	Jawa Timur	-8.10395	113.58023	4.30	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0477	Barek	Jawa Timur	-8.37799	112.567	10.60	Hydro Inventory Study_1997	
JicaPR_0473	Baung	Jawa Timur	-7.7739	112.782	7.80	Hydro Inventory Study_1997	
hp_0728	Baung	Jawa Timur			7.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0458	Bendo	Jawa Timur	-7.93505	111.599	6.20	Hydro Inventory Study_1997	
hp_0734	Bendo	Jawa Timur			6.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0463	Blobo	Jawa Timur	-8.11744	112.604	8.90	Hydro Inventory Study_1997	
hp_0612	Blobo	Jawa Timur			8.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0486	Brungkah	Jawa Timur	-8.08445	111.139	1.20	Hydro Inventory Study_1997	
hp_0613	Brungkah	Jawa Timur			1.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0427	Giringan	Jawa Timur	-7.72242	111.67325	3.20	PLN (4 - Minihydro PLN Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0426	Golang	Jawa Timur	-7.70974	111.66307	2.70	PLN (4 - Minihydro PLN Project)	
JicaPR_0484	Grindulu-1	Jawa Timur	-8.06894	111.333	5.50	Hydro Inventory Study_1997	
hp_0796	Grindulu-1	Jawa Timur			5.50	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0061	Grindulu-2	Jawa Timur	-8.116388	111.193041	16.28	Hydro Inventory Study_1997	
hp_0497	Grindulu-PS-3	Jawa Timur	-8.13333	111.20000	1.00	PLN (1 - Masterplan of HEPP Development List)	
JicaPR_0457	Jipang	Jawa Timur	-7.17802	111.59	67.20	Hydro Inventory Study_1997	
hp_0152	Jompo 1 (Jompo Atas)	Jawa Timur	-8.06250	113.67222	2.12	PLN (3 - Minihydro IPP Project)	Screened out
hp_0451	Jompo 2 (Jompo Bawah)	Jawa Timur	-8.08106	113.66725	3.16	PLN (3 - Minihydro IPP Project)	Screened out
hp_0504	K. Konto-PS	Jawa Timur	-7.85000	112.38333	1.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0150	Kali Tengah (Sungai Tengah)	Jawa Timur	-8.10944	113.51861	1.41	PLN (3 - Minihydro IPP Project)	
hp_0505	Kalikonto-2	Jawa Timur	-7.88333	112.40000	62.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0822	Kalimaron (PLN)	Jawa Timur			0.40	PLN (4 - Minihydro PLN Project)	
hp_0823	Kalimaron Seloliman	Jawa Timur			0.30	PLN (3 - Minihydro IPP Project)	
hp_0267	Kanzyl-1	Jawa Timur	-7.80381	112.74568	2.36	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0054	Karangates	Jawa Timur	-8.16422	112.44	105.00	Hydro Inventory Study_1997	
hp_0028	Karangates (Iir Sutami)	Jawa Timur	-8.16165	112.44579	15.00	Consultant	Screened out
hp_0592	Karangates Ext.	Jawa Timur	-8.15000	112.43333	1.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0470	Kelantar	Jawa Timur	-7.9885	111.869	3.60	Hydro Inventory Study_1997	
hp_0835	Kelantar	Jawa Timur			3.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0464	Kepanjen	Jawa Timur	-8.16001	112.586	11.40	Hydro Inventory Study_1997	
JicaPR_0467	Kesamben	Jawa Timur	-8.17587	112.332	15.30	Hydro Inventory Study_1997	
hp_1088	Kesamben	Jawa Timur			37.00	RUPTL	Screened out
hp_0468	Ketajek	Jawa Timur	-8.07533	113.57133	3.26	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0459	Lamong	Jawa Timur	-7.32101	112.314	5.60	Hydro Inventory Study_1997	
hp_0852	Lamong	Jawa Timur			5.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0465	Lesti-3	Jawa Timur	-8.22904	112.694	6.80	Hydro Inventory Study_1997	
hp_0627	Lesti-3	Jawa Timur			6.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0298	Lodagung	Jawa Timur	-8.14554	112.24641	1.30	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0052	Lodoyo	Jawa Timur	-8.14278	112.153	4.50	Hydro Inventory Study_1997	
hp_0123	Lodoyo	Jawa Timur	-8.15008	112.19075	4.50	PLN (4 - Minihydro PLN Project)	Screened out
hp_1083	Lodoyo	Jawa Timur			10.00	RUPTL	
JicaPR_0480	Lorog-1	Jawa Timur	-8.12127	111.424	2.30	Hydro Inventory Study_1997	
hp_0866	Lorog-1	Jawa Timur			2.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0481	Lorog-2	Jawa Timur	-8.15656	111.437	6.00	Hydro Inventory Study_1997	
hp_0867	Lorog-2	Jawa Timur			6.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0482	Lorog-3	Jawa Timur	-8.1746	111.409	9.30	Hydro Inventory Study_1997	
hp_0868	Lorog-3	Jawa Timur			9.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0483	Lorog-4	Jawa Timur	-8.18369	111.374	6.10	Hydro Inventory Study_1997	
hp_0869	Lorog-4	Jawa Timur			6.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0462	Lumbang Sari	Jawa Timur	-8.08722	112.625	3.70	Hydro Inventory Study_1997	
hp_0871	Lumbang Sari	Jawa Timur			3.70	PLN (2 - MHPP in HPPS)	Screened out
hp_1021	Madiun	Jawa Timur			8.10	RUPTL	
JicaPR_0460	Malang	Jawa Timur	-8.0058	112.637	6.60	Hydro Inventory Study_1997	
hp_0875	Malang	Jawa Timur			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0057	Mandalan	Jawa Timur	-7.87756	112.349	23.00	Hydro Inventory Study_1997	
hp_0884	Marun	Jawa Timur			0.80	PLN (4 - Minihydro PLN Project)	
hp_0020	Mendalan	Jawa Timur	-7.85593	112.32279	23.00	Consultant	Screened out
JicaPR_0466	Metro	Jawa Timur	-8.13284	112.564	1.80	Hydro Inventory Study_1997	
hp_0636	Metro	Jawa Timur			1.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0444	Ngebel	Jawa Timur	-7.81485	111.62068	2.20	PLN (4 - Minihydro PLN Project)	
hp_0209	Pacet	Jawa Timur	-7.67692	112.53835	1.50	PLN (3 - Minihydro IPP Project)	
JicaPR_0479	Panggul	Jawa Timur	-8.20231	111.514	11.70	Hydro Inventory Study_1997	
JicaPR_0478	Penguluran	Jawa Timur	-8.4138	112.655	3.30	Hydro Inventory Study_1997	
hp_0641	Penguluran	Jawa Timur			3.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0323	Sampean Baru	Jawa Timur	-7.82611	113.93722	1.80	PLN (4 - Minihydro PLN Project)	
JicaPR_0475	Sanen	Jawa Timur	-8.36055	113.821	10.40	Hydro Inventory Study_1997	
JicaEX_0058	Selorejo	Jawa Timur	-7.87706	112.335	4.50	Hydro Inventory Study_1997	
hp_0328	Selorejo	Jawa Timur	-7.87216	112.35516	4.48	PLN (4 - Minihydro PLN Project)	Screened out
JicaEX_0055	Sengguruh	Jawa Timur	-8.18061	112.543	29.00	Hydro Inventory Study_1997	
hp_0013	Sengguruh	Jawa Timur	-8.18374	112.54937	29.00	Consultant	Screened out
JicaPR_0468	Sengon	Jawa Timur	-8.00734	111.696	7.80	Hydro Inventory Study_1997	
hp_0940	Sengon	Jawa Timur			7.80	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0056	Siman	Jawa Timur	-7.84597	112.322	10.80	Hydro Inventory Study_1997	
hp_0012	Siman	Jawa Timur	-7.82939	112.30896	1.80	Consultant	Screened out
JicaPR_0469	Song	Jawa Timur	-7.99547	111.836	6.10	Hydro Inventory Study_1997	
hp_0949	Song	Jawa Timur			6.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0461	Tambak Sari	Jawa Timur	-8.03925	112.635	10.10	Hydro Inventory Study_1997	
hp_0568	Tanggal	Jawa Timur	-7.43972	112.59972	0.60	PLN (4 - Minihydro PLN Project)	
JicaPR_0485	Tinatar	Jawa Timur	-8.0633	111.142	2.20	Hydro Inventory Study_1997	
hp_0655	Tinatar	Jawa Timur			2.20	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0060	Tulung Agung	Jawa Timur	-8.25654	111.813	36.00	Hydro Inventory Study_1997	
hp_0008	Tulungagung (Sidem)	Jawa Timur	-8.25317	111.79443	36.00	Consultant	Screened out
JicaPR_0476	Umbulsari	Jawa Timur	-8.30466	112.926	7.20	Hydro Inventory Study_1997	
hp_0980	Umbulsari	Jawa Timur			7.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0471	Upper Konto-1	Jawa Timur	-7.84976	112.45	12.40	Hydro Inventory Study_1997	
JicaPR_0472	Upper Konto-2	Jawa Timur	-7.87384	112.406	4.10	Hydro Inventory Study_1997	
hp_0981	Upper Konto-2	Jawa Timur			4.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0474	Wanasari	Jawa Timur	-7.87943	113.89	3.80	Hydro Inventory Study_1997	
hp_0989	Wanasari	Jawa Timur			3.80	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0053	Wlingi	Jawa Timur	-8.15686	112.219	54.00	Hydro Inventory Study_1997	
hp_0005	Wlingi	Jawa Timur	-8.14037	112.24915	54.00	Consultant	Screened out
JicaEX_0059	Wonorejo	Jawa Timur	-8.02814	111.81	6.30	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0134	Wonorejo	Jawa Timur	-8.01978	111.80717	6.50	PLN (4 - Minihydro PLN Project)	Screened out
hp_0998	Wot Lamah	Jawa Timur			0.25	PLN (4 - Minihydro PLN Project)	
hp_0182	Zeelandia	Jawa Timur	-8.08831	113.47008	2.18	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0685	Ambalau-1	Kalimantan Barat	-0.375113	112.949	41.30	Hydro Inventory Study_1997	
JicaPR_0686	Ambalau-2	Kalimantan Barat	-0.360986	112.989	53.40	Hydro Inventory Study_1997	
JicaPR_0687	Ambalau-3	Kalimantan Barat	-0.300108	113.016	16.80	Hydro Inventory Study_1997	
JicaPR_0688	Ambalau-4	Kalimantan Barat	-0.142368	113.131	9.50	Hydro Inventory Study_1997	
hp_0705	Ambalau-4	Kalimantan Barat			9.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0689	Ambalau-5	Kalimantan Barat	-0.242847	112.996	81.30	Hydro Inventory Study_1997	
JicaPR_0690	Ambalau-6	Kalimantan Barat	-0.224989	112.866	31.00	Hydro Inventory Study_1997	
JicaPR_0691	Ambalau-7	Kalimantan Barat	-0.205495	112.773	455.40	Hydro Inventory Study_1997	
JicaPR_0636	Angai	Kalimantan Barat	1.17799	113.958	15.20	Hydro Inventory Study_1997	
hp_0726	Batu Menang Tumbangtiti	Kalimantan Barat			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0701	Belimbing-1	Kalimantan Barat	-0.573697	111.428	27.50	Hydro Inventory Study_1997	
JicaPR_0702	Belimbing-2	Kalimantan Barat	-0.513251	111.498	28.30	Hydro Inventory Study_1997	
JicaPR_0675	Boyan	Kalimantan Barat	0.344192	112.446	38.00	Hydro Inventory Study_1997	
JicaPR_0640	Bungan	Kalimantan Barat	0.919466	113.665	71.10	Hydro Inventory Study_1997	
JicaPR_0633	Centarang	Kalimantan Barat	-1.35309	110.919	7.90	Hydro Inventory Study_1997	
hp_0755	Centarang	Kalimantan Barat			7.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0693	Demu	Kalimantan Barat	-0.150451	112.589	13.60	Hydro Inventory Study_1997	
JicaPR_0710	Donge	Kalimantan Barat	0.802519	110.015	6.80	Hydro Inventory Study_1997	
hp_0786	Donge	Kalimantan Barat			6.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0699	Ela Hilir	Kalimantan Barat	-0.505264	112.057	17.00	Hydro Inventory Study_1997	
JicaPR_0698	Ela Hulu	Kalimantan Barat	-0.482453	112.162	20.60	Hydro Inventory Study_1997	
hp_0814	Jitan	Kalimantan Barat			3.43	PLN (4 - Minihydro PLN Project)	
hp_0265	Kalis	Kalimantan Barat	0.53066	113.07224	3.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0661	Kalis-1	Kalimantan Barat	0.530145	113.071	19.80	Hydro Inventory Study_1997	
JicaPR_0662	Kalis-2	Kalimantan Barat	0.566304	112.958	6.50	Hydro Inventory Study_1997	
hp_0824	Kalis-2	Kalimantan Barat			6.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0634	Kapuas-1	Kalimantan Barat	1.33085	113.987	41.50	Hydro Inventory Study_1997	
JicaPR_0637	Kapuas-2	Kalimantan Barat	1.11921	113.726	146.90	Hydro Inventory Study_1997	
JicaPR_0638	Kapuas-3	Kalimantan Barat	1.00252	113.643	214.80	Hydro Inventory Study_1997	
JicaPR_0641	Kapuas-4	Kalimantan Barat	0.944165	113.487	490.40	Hydro Inventory Study_1997	
JicaPR_0642	Kapuas-5	Kalimantan Barat	0.856899	113.357	53.80	Hydro Inventory Study_1997	
JicaPR_0648	Kapuas-6	Kalimantan Barat	0.759657	113.252	124.10	Hydro Inventory Study_1997	
JicaPR_0630	Kawah	Kalimantan Barat	-1.24298	111.125	17.80	Hydro Inventory Study_1997	
JicaPR_0700	Kelawai	Kalimantan Barat	-0.687801	111.826	8.60	Hydro Inventory Study_1997	
hp_0836	Kelawai	Kalimantan Barat			8.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0663	Kenyau-1	Kalimantan Barat	1.4779	112.771	83.60	Hydro Inventory Study_1997	
JicaPR_0664	Kenyau-2	Kalimantan Barat	1.4366	112.804	20.20	Hydro Inventory Study_1997	
JicaPR_0665	Kenyau-3	Kalimantan Barat	1.39253	112.784	24.10	Hydro Inventory Study_1997	
JicaPR_0666	Kenyau-4	Kalimantan Barat	1.39842	112.536	88.60	Hydro Inventory Study_1997	
JicaPR_0667	Kenyau-5	Kalimantan Barat	1.41557	112.495	68.40	Hydro Inventory Study_1997	
JicaPR_0668	Kenyau-6	Kalimantan Barat	1.3306	112.408	314.30	Hydro Inventory Study_1997	
JicaPR_0669	Kenyau-7	Kalimantan Barat	1.19078	112.391	37.10	Hydro Inventory Study_1997	
JicaPR_0632	Kerabai	Kalimantan Barat	-0.957325	111.036	27.40	Hydro Inventory Study_1997	
JicaPR_0643	Keriyau-1	Kalimantan Barat	0.486162	113.547	35.10	Hydro Inventory Study_1997	
JicaPR_0644	Keriyau-2	Kalimantan Barat	0.573194	113.566	12.30	Hydro Inventory Study_1997	
JicaPR_0645	Keriyau-3	Kalimantan Barat	0.659865	113.611	48.50	Hydro Inventory Study_1997	
JicaPR_0646	Keriyau-4	Kalimantan Barat	0.715331	113.453	26.30	Hydro Inventory Study_1997	
JicaPR_0647	Keriyau-5	Kalimantan Barat	0.760141	113.387	124.70	Hydro Inventory Study_1997	
JicaPR_0706	Landak-1	Kalimantan Barat	0.938116	110.024	12.00	Hydro Inventory Study_1997	
JicaPR_0707	Landak-2	Kalimantan Barat	0.982245	110.048	13.20	Hydro Inventory Study_1997	
JicaPR_0708	Landak-3	Kalimantan Barat	0.959574	110.14	15.40	Hydro Inventory Study_1997	
JicaPR_0709	Landak-4	Kalimantan Barat	0.843362	110.158	21.60	Hydro Inventory Study_1997	
JicaPR_0692	Lekawi	Kalimantan Barat	-0.281731	112.68	15.90	Hydro Inventory Study_1997	
hp_0299	Mahap	Kalimantan Barat	-0.43111	110.87020	1.31	PLN (4 - Minihydro PLN Project)	
JicaPR_0649	Mandai-1	Kalimantan Barat	0.314194	113.425	16.20	Hydro Inventory Study_1997	
JicaPR_0650	Mandai-2	Kalimantan Barat	0.3533	113.28	71.30	Hydro Inventory Study_1997	
JicaPR_0651	Mandai-3	Kalimantan Barat	0.410819	113.325	35.80	Hydro Inventory Study_1997	
JicaPR_0652	Mandai-4	Kalimantan Barat	0.402923	113.271	47.80	Hydro Inventory Study_1997	
JicaPR_0653	Mandai-5	Kalimantan Barat	0.543741	113.287	144.80	Hydro Inventory Study_1997	
JicaPR_0654	Mandai-6	Kalimantan Barat	0.584159	113.28	19.70	Hydro Inventory Study_1997	
JicaPR_0655	Mandai-7	Kalimantan Barat	0.594505	113.209	148.60	Hydro Inventory Study_1997	
hp_0527	Melanggar	Kalimantan Barat	0.83203	110.16748	2.50	PLN (4 - Minihydro PLN Project)	
JicaPR_0676	Melawi-1	Kalimantan Barat	0.096293	113.252	92.00	Hydro Inventory Study_1997	
JicaPR_0677	Melawi-2	Kalimantan Barat	0.025343	113.146	92.30	Hydro Inventory Study_1997	
JicaPR_0678	Melawi-3	Kalimantan Barat	0.160465	113.028	30.30	Hydro Inventory Study_1997	
JicaPR_0679	Melawi-4	Kalimantan Barat	0.064748	113.029	57.60	Hydro Inventory Study_1997	
JicaPR_0680	Melawi-5	Kalimantan Barat	-0.022562	112.822	138.90	Hydro Inventory Study_1997	
JicaPR_0681	Melawi-6	Kalimantan Barat	0.135767	112.74	22.90	Hydro Inventory Study_1997	
JicaPR_0682	Melawi-7	Kalimantan Barat	-0.00432	112.764	52.60	Hydro Inventory Study_1997	
JicaPR_0683	Melawi-8	Kalimantan Barat	-0.025741	112.668	69.00	Hydro Inventory Study_1997	
JicaPR_0684	Melawi-9	Kalimantan Barat	-0.187169	112.726	621.40	Hydro Inventory Study_1997	
hp_0890	Menang Riam Danau	Kalimantan Barat			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0696	Mentatai-1	Kalimantan Barat	-0.56818	112.402	23.20	Hydro Inventory Study_1997	
JicaPR_0697	Mentatai-2	Kalimantan Barat	-0.486215	112.337	17.50	Hydro Inventory Study_1997	
JicaPR_0671	Mentebah	Kalimantan Barat	0.467533	112.797	16.90	Hydro Inventory Study_1997	
hp_0420	Merasap	Kalimantan Barat	1.04955	109.81587	1.50	PLN (4 - Minihydro PLN Project)	
hp_0528	Merasap Extention	Kalimantan Barat	-1.12639	109.74309	0.75	PLN (4 - Minihydro PLN Project)	
hp_1077	Nanga Pinoh	Kalimantan Barat			98.00	RUPTL	
JicaEX_0080	Pade Kembangung	Kalimantan Barat	0.888844	109.908602	30.00	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_1074	Pade Kembangung	Kalimantan Barat			30.00	RUPTL	Screened out
JicaPR_0656	Pari-1/Mandala	Kalimantan Barat	1.15823	113.382	43.90	Hydro Inventory Study_1997	
JicaPR_0657	Pari-2/Mandala	Kalimantan Barat	1.09191	113.315	48.20	Hydro Inventory Study_1997	
JicaPR_0631	Pesaguan	Kalimantan Barat	-1.76315	110.717	7.10	Hydro Inventory Study_1997	
hp_0913	Pesaguan	Kalimantan Barat			7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0079	Pinoh	Kalimantan Barat	-0.518753	111.75318	198.40	Hydro Inventory Study_1997	
hp_0933	Sajingan	Kalimantan Barat			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0703	Sekadau-1	Kalimantan Barat	-0.319838	110.972	21.80	Hydro Inventory Study_1997	
JicaPR_0704	Sekadau-2	Kalimantan Barat	-0.405485	110.755	43.10	Hydro Inventory Study_1997	
JicaPR_0705	Sekayan	Kalimantan Barat	1.10432	110.111	13.40	Hydro Inventory Study_1997	
JicaPR_0658	Seluwa/Mandala	Kalimantan Barat	1.05527	113.165	25.80	Hydro Inventory Study_1997	
JicaPR_0694	Serawai-1	Kalimantan Barat	-0.529072	112.536	17.50	Hydro Inventory Study_1997	
JicaPR_0695	Serawai-2	Kalimantan Barat	-0.408057	112.458	18.90	Hydro Inventory Study_1997	
JicaPR_0659	Sibau-1	Kalimantan Barat	1.26512	113.137	31.60	Hydro Inventory Study_1997	
JicaPR_0660	Sibau-2	Kalimantan Barat	1.19504	113.07	169.10	Hydro Inventory Study_1997	
JicaEX_0078	Silat	Kalimantan Barat	0.296658	111.793756	28.70	Hydro Inventory Study_1997	
JicaPR_0670	Suruk	Kalimantan Barat	0.492864	112.955	19.20	Hydro Inventory Study_1997	
JicaPR_0635	Tahun	Kalimantan Barat	1.25837	114.003	84.00	Hydro Inventory Study_1997	
JicaPR_0639	Tanjan	Kalimantan Barat	1.03601	113.781	26.40	Hydro Inventory Study_1997	
JicaPR_0672	Tebaung-1	Kalimantan Barat	0.284994	112.745	53.20	Hydro Inventory Study_1997	
JicaPR_0673	Tebaung-2	Kalimantan Barat	0.318619	112.786	46.30	Hydro Inventory Study_1997	
JicaPR_0674	Tebaung-3	Kalimantan Barat	0.442583	112.697	33.00	Hydro Inventory Study_1997	
JicaPR_0628	Amandit-1	Kalimantan Selatan	-2.83223	115.368	5.20	Hydro Inventory Study_1997	
hp_0703	Amandit-1	Kalimantan Selatan			5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0077	Amandit-2	Kalimantan Selatan	-2.856459	115.302235	2.50	Hydro Inventory Study_1997	
JicaPR_0620	Ayu-1	Kalimantan Selatan	-1.78595	115.527	18.50	Hydro Inventory Study_1997	
JicaPR_0621	Ayu-2	Kalimantan Selatan	-1.90309	115.541	9.10	Hydro Inventory Study_1997	
hp_0607	Ayu-2	Kalimantan Selatan			9.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0627	Batangalai	Kalimantan Selatan	-2.54452	115.489	6.20	Hydro Inventory Study_1997	
hp_0725	Batangalai	Kalimantan Selatan			6.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0623	Halung-1	Kalimantan Selatan	-2.12225	115.771	1.10	Hydro Inventory Study_1997	
hp_0799	Halung-1	Kalimantan Selatan			1.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0624	Halung-2	Kalimantan Selatan	-2.22648	115.717	5.00	Hydro Inventory Study_1997	
hp_0800	Halung-2	Kalimantan Selatan			5.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0467	Kusan*	Kalimantan Selatan	-3.41667	115.55000	65.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0610	Kusan-1	Kalimantan Selatan	-3.1008	115.474	8.50	Hydro Inventory Study_1997	
hp_1006	Kusan-1	Kalimantan Selatan			8.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0611	Kusan-2	Kalimantan Selatan	-3.19534	115.422	6.00	Hydro Inventory Study_1997	
hp_1007	Kusan-2	Kalimantan Selatan			6.00	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0074	Kusan-3	Kalimantan Selatan	-3.408918	115.537749	67.70	Hydro Inventory Study_1997	
JicaPR_0625	Pitap-1	Kalimantan Selatan	-2.46558	115.681	6.60	Hydro Inventory Study_1997	
hp_0914	Pitap-1	Kalimantan Selatan			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0626	Pitap-2	Kalimantan Selatan	-2.45285	115.58	6.40	Hydro Inventory Study_1997	
hp_0915	Pitap-2	Kalimantan Selatan			6.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0612	Puntin	Kalimantan Selatan	-3.54089	114.913	7.10	Hydro Inventory Study_1997	
hp_0919	Puntin	Kalimantan Selatan			7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0076	Riam Kanan	Kalimantan Selatan	-3.51494	115.013	30.00	Hydro Inventory Study_1997	
hp_0088	Riam Kanan (Moh Noor)	Kalimantan Selatan	-3.51715	115.00929	3.00	Consultant	Screened out
JicaEX_0075	Riam Kiwa	Kalimantan Selatan	-3.295973	115.051183	42.00	Hydro Inventory Study_1997	
JicaPR_0606	Sampanahan-1	Kalimantan Selatan	-2.84262	115.659	7.10	Hydro Inventory Study_1997	
hp_0647	Sampanahan-1	Kalimantan Selatan			7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0607	Sampanahan-2	Kalimantan Selatan	-2.76915	115.721	30.80	Hydro Inventory Study_1997	
JicaPR_0608	Sampanahan-3	Kalimantan Selatan	-2.68314	115.798	40.80	Hydro Inventory Study_1997	
JicaPR_0609	Sampanahan-4	Kalimantan Selatan	-2.58738	115.915	130.40	Hydro Inventory Study_1997	
JicaPR_0618	Tabalong-1	Kalimantan Selatan	-1.71774	115.412	16.30	Hydro Inventory Study_1997	
JicaPR_0619	Tabalong-2	Kalimantan Selatan	-1.81582	115.374	23.50	Hydro Inventory Study_1997	
JicaPR_0629	Tapin	Kalimantan Selatan	-2.9373	115.355	4.40	Hydro Inventory Study_1997	
hp_0654	Tapin	Kalimantan Selatan			4.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0622	Ui	Kalimantan Selatan	-1.82504	115.608	5.20	Hydro Inventory Study_1997	
hp_0977	Ui	Kalimantan Selatan			5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0613	Upper Riam Kiwa-1	Kalimantan Selatan	-3.07723	115.428	1.40	Hydro Inventory Study_1997	
hp_0982	Upper Riam Kiwa-1	Kalimantan Selatan			1.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0614	Upper Riam Kiwa-2	Kalimantan Selatan	-3.186	115.275	9.90	Hydro Inventory Study_1997	
hp_0983	Upper Riam Kiwa-2	Kalimantan Selatan			9.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0615	Luang-1	Kalimantan Tengah	-1.23609	115.616	11.30	Hydro Inventory Study_1997	
JicaPR_0616	Luang-2	Kalimantan Tengah	-1.19051	115.639	18.40	Hydro Inventory Study_1997	
hp_0536	Pinoh	Kalimantan Tengah	-0.51667	114.73333	198.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0617	Teweh	Kalimantan Tengah	-1.1551	115.664	18.50	Hydro Inventory Study_1997	
JicaPR_0579	Baai-1	Kalimantan Timur	1.12715	117.572	31.80	Hydro Inventory Study_1997	
JicaPR_0580	Baai-2	Kalimantan Timur	1.24539	117.587	26.50	Hydro Inventory Study_1997	
JicaPR_0581	Baai-3	Kalimantan Timur	1.24018	117.708	24.20	Hydro Inventory Study_1997	
JicaPR_0592	Bangan Kanan	Kalimantan Timur	-0.900079	116.163	20.70	Hydro Inventory Study_1997	
JicaPR_0593	Bangan Kiwa	Kalimantan Timur	-0.799807	116.277	4.60	Hydro Inventory Study_1997	
hp_0722	Bangan Kiwa	Kalimantan Timur			4.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0587	Boh-2	Kalimantan Timur	1.00377	115.082	1157.00	Hydro Inventory Study_1997	
JicaPR_0582	Coha-1	Kalimantan Timur	1.01277	114.518	58.50	Hydro Inventory Study_1997	
JicaPR_0583	Coha-2	Kalimantan Timur	0.967707	114.523	67.10	Hydro Inventory Study_1997	
JicaPR_0572	Inaran	Kalimantan Timur	1.88022	117.421	4.70	Hydro Inventory Study_1997	
hp_0806	Inaran	Kalimantan Timur			4.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0576	Karangan-1	Kalimantan Timur	1.40233	117.511	46.90	Hydro Inventory Study_1997	
JicaPR_0577	Karangan-2	Kalimantan Timur	1.43934	117.567	25.10	Hydro Inventory Study_1997	
JicaPR_0578	Karangan-3	Kalimantan Timur	1.28508	117.737	53.30	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaEX_0072	Kayan-2	Kalimantan Timur	2.710948	116.744977	500.00	Hydro Inventory Study_1997	
hp_1024	Kelai	Kalimantan Timur			55.00	RUPTL	
JicaPR_0567	Kelai-1	Kalimantan Timur	1.8938	116.793	996.40	Hydro Inventory Study_1997	
JicaEX_0073	Kelai-2	Kalimantan Timur	1.665103	117.082518	168.00	Hydro Inventory Study_1997	
hp_0586	Kelai-2	Kalimantan Timur	1.66667	117.08333	168.00	PLN (1 - Masterplan of HEPD Development List)	Screened out
JicaPR_0571	Kelai-3	Kalimantan Timur	1.86972	117.294	137.20	Hydro Inventory Study_1997	
JicaPR_0602	Kendilo-1	Kalimantan Timur	-1.69636	115.811	48.40	Hydro Inventory Study_1997	
JicaPR_0605	Kendilo-2	Kalimantan Timur	-1.83446	115.923	16.40	Hydro Inventory Study_1997	
JicaPR_0603	Kesungai-1	Kalimantan Timur	-1.6366	115.959	6.60	Hydro Inventory Study_1997	
hp_0839	Kesungai-1	Kalimantan Timur			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0604	Kesungai-2	Kalimantan Timur	-1.74389	115.948	22.10	Hydro Inventory Study_1997	
JicaPR_0569	Lasan-1	Kalimantan Timur	1.57713	117.286	37.80	Hydro Inventory Study_1997	
JicaPR_0570	Lasan-2	Kalimantan Timur	1.54889	117.156	73.90	Hydro Inventory Study_1997	
JicaPR_0568	Longgi	Kalimantan Timur	1.74683	116.924	40.40	Hydro Inventory Study_1997	
JicaPR_0588	Medang-1	Kalimantan Timur	0.772698	115.272	24.50	Hydro Inventory Study_1997	
JicaPR_0589	Medang-2	Kalimantan Timur	0.63589	115.299	42.60	Hydro Inventory Study_1997	
JicaPR_0590	Medang-3	Kalimantan Timur	0.604913	115.332	33.60	Hydro Inventory Study_1997	
JicaPR_0585	Nyaan	Kalimantan Timur	1.04126	114.934	71.00	Hydro Inventory Study_1997	
JicaPR_0601	Nyugin	Kalimantan Timur	-2.21044	115.864	19.10	Hydro Inventory Study_1997	
JicaPR_0595	Pampangan	Kalimantan Timur	-0.35456	117.229	9.60	Hydro Inventory Study_1997	
hp_0910	Pampangan	Kalimantan Timur			9.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0596	Riko-1	Kalimantan Timur	-0.980787	116.472	9.70	Hydro Inventory Study_1997	
hp_0646	Riko-1	Kalimantan Timur			9.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0597	Riko-2	Kalimantan Timur	-1.07098	116.478	21.40	Hydro Inventory Study_1997	
JicaPR_0600	Samu	Kalimantan Timur	-2.21782	115.914	6.60	Hydro Inventory Study_1997	
hp_0648	Samu	Kalimantan Timur			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0598	Selamayut	Kalimantan Timur	-0.871141	116.674	1.70	Hydro Inventory Study_1997	
hp_0938	Selamayut	Kalimantan Timur			1.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0573	Suwaran	Kalimantan Timur	1.94061	117.633	24.10	Hydro Inventory Study_1997	
JicaPR_0574	Tabalar-1	Kalimantan Timur	1.67989	117.621	14.50	Hydro Inventory Study_1997	
JicaPR_0575	Tabalar-2	Kalimantan Timur	1.73698	117.702	10.80	Hydro Inventory Study_1997	
JicaPR_0594	Telen	Kalimantan Timur	1.40724	116.356	200.40	Hydro Inventory Study_1997	
JicaPR_0584	Topai	Kalimantan Timur	1.03408	114.78	40.30	Hydro Inventory Study_1997	
JicaPR_0591	Tuang	Kalimantan Timur	-0.986938	115.853	4.50	Hydro Inventory Study_1997	
hp_0976	Tuang	Kalimantan Timur			4.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0599	Tujuk	Kalimantan Timur	-1.25844	116.309	25.10	Hydro Inventory Study_1997	
JicaPR_0565	Bahau-1	Kalimantan Utara	3.16912	115.804	170.10	Hydro Inventory Study_1997	
JicaPR_0566	Bahau-2	Kalimantan Utara	3.03266	115.854	130.20	Hydro Inventory Study_1997	
hp_0485	Beranda I (Pa Ramayo)	Kalimantan Utara	3.96218	115.68511	0.20	PLN (4 - Minihydro PLN Project)	
JicaPR_0586	Boh-1	Kalimantan Utara	1.28329	115.048	154.30	Hydro Inventory Study_1997	
JicaPR_0564	Kayan-1	Kalimantan Utara	2.54783	115.449	439.80	Hydro Inventory Study_1997	
JicaPR_0541	Sembakung-1	Kalimantan Utara	4.16179	116.097	190.30	Hydro Inventory Study_1997	
JicaPR_0542	Sembakung-2	Kalimantan Utara	4.17965	116.166	38.10	Hydro Inventory Study_1997	
JicaPR_0543	Sembakung-3	Kalimantan Utara	3.98629	116.542	611.30	Hydro Inventory Study_1997	
JicaPR_0544	Sesayap-1	Kalimantan Utara	3.61224	115.848	270.90	Hydro Inventory Study_1997	
JicaPR_0553	Sesayap-10	Kalimantan Utara	3.98142	115.917	202.50	Hydro Inventory Study_1997	
JicaPR_0554	Sesayap-11	Kalimantan Utara	3.91642	115.956	643.40	Hydro Inventory Study_1997	
JicaPR_0555	Sesayap-12	Kalimantan Utara	3.7296	116.079	284.10	Hydro Inventory Study_1997	
JicaPR_0556	Sesayap-13	Kalimantan Utara	4.03956	116.156	176.20	Hydro Inventory Study_1997	
JicaPR_0557	Sesayap-14	Kalimantan Utara	3.88653	116.279	173.40	Hydro Inventory Study_1997	
JicaPR_0558	Sesayap-15	Kalimantan Utara	3.68489	116.14	322.50	Hydro Inventory Study_1997	
JicaPR_0559	Sesayap-16	Kalimantan Utara	3.07095	116.131	77.40	Hydro Inventory Study_1997	
JicaPR_0560	Sesayap-17	Kalimantan Utara	3.14668	116.191	116.90	Hydro Inventory Study_1997	
JicaPR_0561	Sesayap-18	Kalimantan Utara	3.21937	116.095	97.40	Hydro Inventory Study_1997	
JicaPR_0562	Sesayap-19	Kalimantan Utara	3.38529	116.16	321.80	Hydro Inventory Study_1997	
JicaPR_0545	Sesayap-2	Kalimantan Utara	3.72102	115.838	76.40	Hydro Inventory Study_1997	
JicaPR_0563	Sesayap-20	Kalimantan Utara	3.47687	116.357	997.80	Hydro Inventory Study_1997	
JicaPR_0546	Sesayap-3	Kalimantan Utara	3.77055	115.869	182.10	Hydro Inventory Study_1997	
JicaPR_0547	Sesayap-4	Kalimantan Utara	3.85613	115.889	240.60	Hydro Inventory Study_1997	
JicaPR_0548	Sesayap-5	Kalimantan Utara	3.85672	115.721	63.00	Hydro Inventory Study_1997	
JicaPR_0549	Sesayap-6	Kalimantan Utara	3.94447	115.795	134.90	Hydro Inventory Study_1997	
JicaPR_0550	Sesayap-7	Kalimantan Utara	4.01565	115.779	151.30	Hydro Inventory Study_1997	
JicaPR_0551	Sesayap-8	Kalimantan Utara	3.96318	115.844	290.70	Hydro Inventory Study_1997	
JicaPR_0552	Sesayap-9	Kalimantan Utara	4.08588	115.891	77.60	Hydro Inventory Study_1997	
hp_0751	C2	Kepulauan Bangka Belitung			0.20	PLN (4 - Minihydro PLN Project)	
hp_0931	Sadap III	Kepulauan Bangka Belitung			0.40	PLN (4 - Minihydro PLN Project)	
hp_0699	Abung Pekurun	Lampung			0.30	PLN (4 - Minihydro PLN Project)	
hp_0724	Banjar Masing	Lampung			0.32	PLN (4 - Minihydro PLN Project)	
JicaEX_0021	Batu Tegi	Lampung	-5.255819	104.785628	24.00	Hydro Inventory Study_1997	
hp_0014	Batutegi	Lampung	-5.25533	104.78370	28.00	Consultant	Screened out
hp_0003	Besai	Lampung	-4.94439	104.50952	92.80	Consultant	Screened out
hp_0486	Besai Kemu	Lampung	-4.85716	104.50130	7.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0020	Besai-1	Lampung	-4.979748	104.485885	90.00	Hydro Inventory Study_1997	
JicaPR_0190	Besai-2	Lampung	-4.938879	104.51221	6.80	Hydro Inventory Study_1997	
hp_0596	Besai-2	Lampung	-4.95000	104.50000	6.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0597	Besai-2	Lampung	-4.93333	104.50000	44.00	PLN (1 - Masterplan of HEPD Development List)	Screened out
JicaPR_0192	Besai-2A	Lampung	-4.913387	104.515765	21.60	Hydro Inventory Study_1997	
hp_0244	Besay	Lampung	-4.91422	104.51339	9.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0761	Cindi Laras	Lampung			0.60	PLN (4 - Minihydro PLN Project)	
JicaPR_0189	Giham	Lampung	-4.507476	104.381248	10.20	Hydro Inventory Study_1997	
fs_66	PLTM Besai Kemu	Lampung	-4.87997	104.50453	7.07	PLN_pusat_repository	
fs_67	PLTM Besay	Lampung	-4.91422	104.51339	9.20	PLN_pusat_repository	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0191	Rarem	Lampung	-4.987776	104.631281	14.30	Hydro Inventory Study_1997	
JicaPR_0194	Sekampung-2	Lampung	-5.338339	105.076574	15.30	Hydro Inventory Study_1997	
hp_0461	Semangka*	Lampung	-5.35000	104.35000	56.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0195	Semangko-1	Lampung	-5.055512	104.196689	49.90	Hydro Inventory Study_1997	
JicaPR_0196	Semangko-2	Lampung	-5.095459	104.213402	12.50	Hydro Inventory Study_1997	
JicaPR_0197	Semangko-3	Lampung	-5.108722	104.224159	55.60	Hydro Inventory Study_1997	
JicaPR_0198	Semangko-4	Lampung	-5.311877	104.327755	246.00	Hydro Inventory Study_1997	
JicaPR_0199	Semung-2	Lampung	-5.266651	104.418329	1.50	Hydro Inventory Study_1997	
hp_0550	Semung-2	Lampung	-5.26667	104.41667	1.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0200	Semung-3	Lampung	-5.288066	104.419996	21.20	Hydro Inventory Study_1997	
hp_0413	Semung-3	Lampung	-5.30000	105.41667	2.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0201	Semung-4	Lampung	-5.329098	104.41894	56.40	Hydro Inventory Study_1997	
JicaPR_0202	Semung-5	Lampung	-5.383362	104.446963	37.50	Hydro Inventory Study_1997	
JicaPR_0193	Seputih-1	Lampung	-5.091535	104.707557	5.80	Hydro Inventory Study_1997	
hp_0551	Seputih-1	Lampung	-5.10000	104.70000	5.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0652	Simpang Luas	Lampung			0.23	PLN (4 - Minihydro PLN Project)	
JicaPR_0203	Simpang Lunik	Lampung	-4.924453	103.782641	10.80	Hydro Inventory Study_1997	
hp_0341	Sukarame	Lampung	-5.03177	104.19930	8.00	PLN (3 - Minihydro IPP Project)	
hp_0961	Tambak Jaya	Lampung			0.10	PLN (4 - Minihydro PLN Project)	
hp_0963	Tapak Siring	Lampung			0.35	PLN (4 - Minihydro PLN Project)	
hp_0355	Way Pintau	Lampung	-5.53644	104.33169	3.22	PLN (3 - Minihydro IPP Project)	
hp_0356	Way Simpang Kanan	Lampung	-5.08909	103.99348	4.56	PLN (3 - Minihydro IPP Project)	
hp_0670	Ake Rain	Maluku			0.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0701	Akelamo-1	Maluku			9.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0702	Akelamo-3	Maluku			4.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1209	Apu	Maluku	-3.50372	126.889	17.00	Hydro Inventory Study_1997	
JicaPR_1227	Ela	Maluku	-3.55685	128.204	0.70	Hydro Inventory Study_1997	
hp_0788	Ela	Maluku			0.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0789	Fidi	Maluku			5.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1210	Garen	Maluku	-3.34027	126.837	10.70	Hydro Inventory Study_1997	
JicaPR_1229	Halu	Maluku	-3.70682	128.027	1.30	Hydro Inventory Study_1997	
hp_0798	Halu	Maluku			1.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1201	Ili-1	Maluku	-3.33046	126.345	9.80	Hydro Inventory Study_1997	
hp_0805	Ili-1	Maluku			9.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1202	Ili-2	Maluku	-3.27089	126.381	33.80	Hydro Inventory Study_1997	
hp_1031	Isal	Maluku			8.00	RUPTL	
hp_1005	Isal 3	Maluku			4.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1218	Isal-1	Maluku	-3.12291	129.617	23.10	Hydro Inventory Study_1997	
JicaEX_0103	Isal-2	Maluku	-3.095964	129.633884	60.00	Hydro Inventory Study_1997	
hp_0585	Isal-2	Maluku	-3.08333	129.61667	6.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_1219	Isal-3	Maluku	-3.03425	129.664	15.40	Hydro Inventory Study_1997	
hp_0810	Jajawi	Maluku			5.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1225	Jori	Maluku	-3.63568	128.239	0.70	Hydro Inventory Study_1997	
hp_0815	Jori	Maluku			0.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0833	Kasiruta	Maluku			2.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1217	Kina	Maluku	-2.91544	128.742	8.20	Hydro Inventory Study_1997	
hp_0841	Kina	Maluku			8.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1214	Kuma	Maluku	-3.49607	126.242	10.90	Hydro Inventory Study_1997	
hp_0850	Lamo-1	Maluku			4.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0851	Lamo-2	Maluku			2.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1208	Leman	Maluku	-3.1049	126.769	6.30	Hydro Inventory Study_1997	
hp_0860	Leman	Maluku			6.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1224	Liocopa	Maluku	-3.26743	128.388	5.30	Hydro Inventory Study_1997	
hp_0864	Liocopa	Maluku			5.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1226	Loehoe	Maluku	-3.65587	128.207	0.90	Hydro Inventory Study_1997	
hp_0628	Loehoe	Maluku			0.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1228	Lot	Maluku	-3.60525	128.074	1.40	Hydro Inventory Study_1997	
hp_0870	Lot	Maluku			1.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0216	Makariki	Maluku	-3.28000	129.54444	4.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1220	Mala	Maluku	-3.13269	128.799	6.70	Hydro Inventory Study_1997	
hp_0874	Mala	Maluku			6.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1212	Mala-1	Maluku	-3.53009	126.443	36.10	Hydro Inventory Study_1997	
JicaPR_1215	Mala-1	Maluku	-3.02508	128.463	28.80	Hydro Inventory Study_1997	
JicaPR_1213	Mala-2	Maluku	-3.66917	126.389	12.70	Hydro Inventory Study_1997	
JicaPR_1216	Mala-2	Maluku	-2.93029	128.471	31.20	Hydro Inventory Study_1997	
hp_0522	Mala-2	Maluku	-2.93333	128.46667	3.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_1204	Mama	Maluku	-3.18166	126.518	8.70	Hydro Inventory Study_1997	
hp_0877	Mama	Maluku			8.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1203	Mangi	Maluku	-3.24012	126.441	17.80	Hydro Inventory Study_1997	
hp_0897	Ngodama	Maluku			5.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1207	Nibe	Maluku	-3.13427	126.611	33.90	Hydro Inventory Study_1997	
JicaPR_1222	Nua	Maluku	-3.20162	129.09	10.00	Hydro Inventory Study_1997	
hp_0402	Nua	Maluku	-3.13405	129.09530	8.00	PLN (4 - Minihydro PLN Project)	Screened out
hp_1009	Nua	Maluku			1.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0905	Paca	Maluku			1.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0907	Paisu Sajgang	Maluku			2.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0912	Pastu Ra	Maluku			2.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1221	Pia	Maluku	-3.13402	128.96	10.20	Hydro Inventory Study_1997	
fs_234	PLTA Tina	Maluku	-3.72383	126.73281	12.00	PLN_wilayah	
JicaPR_1205	Ranu-1	Maluku	-3.38189	126.562	17.30	Hydro Inventory Study_1997	
JicaPR_1206	Ranu-2	Maluku	-3.34719	126.572	6.50	Hydro Inventory Study_1997	
hp_0923	Ranu-2	Maluku			6.50	PLN (2 - MHPP in HPPS)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0196	Sapalewa	Maluku	-2.92506	128.47414	7.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_0957	Tahafo	Maluku			3.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1223	Tala	Maluku	-3.30043	128.649	53.10	Hydro Inventory Study_1997	
JicaEX_0106	Tala	Maluku	-3.30043	128.649	54.00	Hydro Inventory Study_1997	
hp_0565	Tala	Maluku	-3.28333	128.63333	54.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaEX_0110	Talawi	Maluku	0.965435	127.98	7.50	Hydro Inventory Study_1997	
hp_1050	Tene	Maluku			4.00	RUPTL	
JicaPR_1211	Tina	Maluku	-3.71546	126.704	23.40	Hydro Inventory Study_1997	
JicaEX_0112	Tina	Maluku	-3.71546	126.704	12.00	Hydro Inventory Study_1997	Screened out
hp_0574	Tina	Maluku	-3.70000	126.70000	12.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0969	Tjiu-1	Maluku			3.80	PLN (2 - MHPP in HPPS)	Screened out
hp_1047	Wae Mala	Maluku			1.50	RUPTL	Screened out
hp_0353	Waemala	Maluku	-3.16478	128.79391	2.00	PLN (4 - Minihydro PLN Project)	
hp_0664	Wai Miha	Maluku			8.40	PLN (2 - MHPP in HPPS)	Screened out
hp_1044	Wai Tala	Maluku			54.00	RUPTL	
hp_0183	Wai Tina	Maluku	-3.72347	126.73233	8.00	PLN (3 - Minihydro IPP Project)	
hp_0997	Wooi Besar-2	Maluku			7.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1248	Ake Rain	Maluku Utara	-0.729117	127.802	0.90	Hydro Inventory Study_1997	
JicaPR_1239	Akelamo-1	Maluku Utara	1.29255	128.445	9.40	Hydro Inventory Study_1997	
JicaPR_1240	Akelamo-2	Maluku Utara	1.39329	128.594	11.00	Hydro Inventory Study_1997	
JicaPR_1241	Akelamo-3	Maluku Utara	1.4343	128.661	4.00	Hydro Inventory Study_1997	
JicaPR_1243	Fidi	Maluku Utara	0.355834	127.838	5.30	Hydro Inventory Study_1997	
JicaPR_1230	Jajawi	Maluku Utara	0.512704	127.746	5.80	Hydro Inventory Study_1997	
JicaPR_1245	Kasiruta	Maluku Utara	-0.458707	127.199	2.40	Hydro Inventory Study_1997	
JicaPR_1235	Lamo	Maluku Utara	1.56896	127.785	12.10	Hydro Inventory Study_1997	
JicaPR_1232	Lamo-1	Maluku Utara	1.16536	127.574	4.30	Hydro Inventory Study_1997	
JicaPR_1233	Lamo-2	Maluku Utara	1.15772	127.517	2.10	Hydro Inventory Study_1997	
hp_1080	Maluku Utara Tersebar	Maluku Utara			5.00	RUPTL	
JicaPR_1236	Ngodama	Maluku Utara	1.52992	127.767	5.50	Hydro Inventory Study_1997	
JicaPR_1238	Onat	Maluku Utara	1.09537	128.446	13.30	Hydro Inventory Study_1997	
JicaPR_1234	Paca	Maluku Utara	1.56664	127.935	1.60	Hydro Inventory Study_1997	
JicaPR_1246	Paisu Sajgang	Maluku Utara	-0.570753	127.561	2.20	Hydro Inventory Study_1997	
JicaPR_1247	Pastu Ra	Maluku Utara	-0.53033	127.373	2.30	Hydro Inventory Study_1997	
JicaPR_1242	Sangaji	Maluku Utara	0.723046	128.128	16.90	Hydro Inventory Study_1997	
JicaPR_1231	Tahafo	Maluku Utara	1.44668	127.588	3.00	Hydro Inventory Study_1997	
JicaPR_1237	Talawi	Maluku Utara	0.965435	127.98	21.80	Hydro Inventory Study_1997	
JicaPR_1244	Tjiu-1	Maluku Utara	2.27702	128.354	3.80	Hydro Inventory Study_1997	
JicaPR_1251	Wai Miha	Maluku Utara	-1.85535	124.688	8.40	Hydro Inventory Study_1997	
JicaPR_1249	Wooi Besar-1	Maluku Utara	-1.56625	127.884	17.40	Hydro Inventory Study_1997	
JicaPR_1250	Wooi Besar-2	Maluku Utara	-1.62705	127.96	7.60	Hydro Inventory Study_1997	
fs_192	PLTM Sapalewa	Maluku	-2.92506	128.47414	8.00	PLN_pusat	
fs_233	PLTM Goal	Maluku Utara	-1.21264	127.55189	1.95	PLN_wilayah	
fs_170	PLTM Dominanga	Sulawesi Utara	0.35811	123.79876	3.50	PLN_pusat	
fs_174	PLTM Pidung	Sulawesi Utara	0.51960	124.40200	2.00	PLN_pusat_repository	
fs_171	PLTM Ranowano Minahasa	Sulawesi Utara	1.36731	124.68664	2.40	PLN_pusat	
fs_175	PLTM Tincep 1	Sulawesi Utara			0.55	PLN_pusat_repository	
fs_172	PLTM Tincep 2	Sulawesi Utara	1.27794	124.74421	1.15	PLN_pusat	
fs_173	PLTM Tincep 3	Sulawesi Utara	1.27729	124.73968	2.20	PLN_pusat	
fs_176	PLTM Tincep 4	Sulawesi Utara			0.40	PLN_pusat_repository	
fs_1	PLTM Aek Godang	Sumatera Utara	2.14728	98.60847	4.40	PLN_pusat	
fs_6	PLTM Aek Rambe	Sumatera Utara	2.23391	98.46111	6.65	PLN_pusat_repository	
fs_18	PLTM Aek Silang 2	Sumatera Utara	2.31151	98.77347	10.00	PLN_pusat_repository	
fs_19	PLTM Aek Simadoras	Sumatera Utara	1.76211	99.30451	5.10	PLN_pusat_repository	
fs_2	PLTM Aek Simonggo	Sumatera Utara	2.34569	98.45181	9.00	PLN_pusat	
fs_7	PLTM Batang Toru 3	Sumatera Utara	1.92917	99.02083	10.00	PLN_pusat_repository	
fs_8	PLTM Bingai	Sumatera Utara	3.36225	98.46803	7.00	PLN_pusat_repository	
fs_9	PLTM Hutapadang	Sumatera Utara	2.77152	99.25896	10.45	PLN_pusat_repository	
fs_20	PLTM Kamangin Nagori	Sumatera Utara	2.77264	99.20506	2.00	PLN_pusat_repository	
fs_21	PLTM Karai 13	Sumatera Utara			8.30	PLN_pusat_repository	
fs_10	PLTM Kombih 3	Sumatera Utara	2.62095	98.28849	8.00	PLN_pusat_repository	
fs_12	PLTM Kombih 4	Sumatera Utara	2.60793	98.10996	10.00	PLN_pusat_repository	
fs_13	PLTM Lae Luhung	Sumatera Utara	2.83544	98.32015	10.00	PLN_pusat_repository	
fs_22	PLTM Pagaringan	Sumatera Utara	1.94605	98.77485	8.40	PLN_pusat_repository	
fs_23	PLTM Parlilitan	Sumatera Utara			10.00	PLN_pusat_repository	
fs_16	PLTM Parluasan	Sumatera Utara	2.27996	99.40539	10.00	PLN_pusat_repository	
fs_24	PLTM Poring 1	Sumatera Utara	1.97209	98.79356	9.00	PLN_pusat_repository	
fs_11	PLTM Sei Wampu 1	Sumatera Utara	3.3985	98.22775	9.00	PLN_pusat_repository	
fs_14	PLTM Silinda	Sumatera Utara	3.22031	98.735067	6.46	PLN_pusat_repository	
fs_25	PLTM Simonggo Tornaulli	Sumatera Utara	2.34661	98.48107	8.00	PLN_pusat_repository	
fs_26	PLTM Sisira	Sumatera Utara	2.25697	98.54054	9.80	PLN_pusat_repository	
fs_27	PLTM Sisira Simandame	Sumatera Utara	2.19473	98.48473	4.60	PLN_pusat_repository	
fs_15	PLTM Tanjung Lenggang	Sumatera Utara	3.54789	98.240111	10.00	PLN_pusat_repository	
fs_17	PLTMH Raisan Naga Timbul	Sumatera Utara	1.83701	98.82860	7.00	PLN_pusat_repository	
fs_4	PLTM Simare	Sumatera Utara	2.29500	99.18200	2.91	PLN_pusat	
fs_5	PLTM Tanah Pinem	Sumatera Utara	2.98500	98.15083	10.00	PLN_pusat	
fs_3	PLTMH Aek Tulas	Sumatera Utara	2.62280	98.63474	1.30	PLN_pusat	
JicaPR_1090	Babak	Nusa Tenggara Barat	-8.53365	116.338	0.40	Hydro Inventory Study_1997	
hp_0713	Babak	Nusa Tenggara Barat			0.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1192	Banggo	Nusa Tenggara Barat	-8.37922	118.262	0.20	Hydro Inventory Study_1997	
hp_0723	Banggo	Nusa Tenggara Barat			0.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0240	Batu Bedil	Nusa Tenggara Barat	-8.54668	116.22543	0.55	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0101	Beburung	Nusa Tenggara Barat	-8.385142	116.489147	22.40	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_1194	Beh-1	Nusa Tenggara Barat	-8.866	117.252	15.30	Hydro Inventory Study_1997	
JicaPR_1195	Beh-2	Nusa Tenggara Barat	-8.8701	117.173	4.10	Hydro Inventory Study_1997	
hp_0732	Beh-2	Nusa Tenggara Barat			4.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1196	Beh-3	Nusa Tenggara Barat	-8.94179	117.245	27.90	Hydro Inventory Study_1997	
hp_0489	Bintang Bano	Nusa Tenggara Barat	-8.71662	116.98578	8.80	PLN (3 - Minihydro IPP Project)	
hp_1039	Brang Beh 1	Nusa Tenggara Barat			12.00	RUPTL	Screened out
hp_1038	Brang Beh 2	Nusa Tenggara Barat			6.00	RUPTL	Screened out
hp_0248	Brang Rea 1	Nusa Tenggara Barat	-8.64696	117.03468	2.54	PLN (3 - Minihydro IPP Project)	Screened out
hp_0249	Brang Rea 2	Nusa Tenggara Barat	-8.67119	117.03853	3.84	PLN (3 - Minihydro IPP Project)	Screened out
hp_0614	Cakranegara	Nusa Tenggara Barat			0.60	PLN (3 - Minihydro IPP Project)	
hp_0271	Karang Bayan	Nusa Tenggara Barat	-8.56136	116.18828	1.30	PLN (3 - Minihydro IPP Project)	Screened out
hp_0279	Koko Babak (Unit 1)	Nusa Tenggara Barat	-8.54579	116.33216	0.30	PLN (3 - Minihydro IPP Project)	
hp_0510	Koko Babak (Unit 2)	Nusa Tenggara Barat	-8.53614	116.33647	0.60	PLN (3 - Minihydro IPP Project)	
hp_0278	Koko Babak (Unit 3)	Nusa Tenggara Barat	-8.54815	116.33348	1.40	PLN (3 - Minihydro IPP Project)	
hp_0280	Kokok Putih	Nusa Tenggara Barat	-8.31340	116.47046	3.80	PLN (3 - Minihydro IPP Project)	
hp_0046	Kokokputih	Nusa Tenggara Barat	-8.29517	116.47081	4.00	Consultant	Screened out
hp_0285	Kukusan	Nusa Tenggara Barat	-8.57615	116.55657	0.20	PLN (3 - Minihydro IPP Project)	
hp_0286	Kumbi Sedau-Lebah Sempaga	Nusa Tenggara Barat	-8.53623	116.28069	1.30	PLN (3 - Minihydro IPP Project)	
hp_0421	Mamak	Nusa Tenggara Barat	-8.69042	117.57885	0.52	PLN (4 - Minihydro PLN Project)	
hp_0441	Pengga	Nusa Tenggara Barat	-8.75509	116.18910	0.40	PLN (4 - Minihydro PLN Project)	
fs_152	PLTM Batu Bedil	Nusa Tenggara Barat			0.60	PLN_pusat_repository	
fs_148	PLTM Brang Rea 1	Nusa Tenggara Barat	-8.64696	117.03468	2.54	PLN_pusat_repository	
fs_155	PLTM Karang Bayan	Nusa Tenggara Barat	-8.56136	116.18828	1.30	PLN_pusat_repository	
fs_156	PLTM Koko babak	Nusa Tenggara Barat	-8.55067	116.33178	2.30	PLN_pusat_repository	
fs_157	PLTM Lingsar	Nusa Tenggara Barat	-8.54868	116.22063	4.00	PLN_pusat_repository	
fs_158	PLTM Pringgarata	Nusa Tenggara Barat			0.30	PLN_pusat_repository	
fs_154	PLTM Sedau	Nusa Tenggara Barat	-8.53622	116.28087	1.30	PLN_pusat_repository	
fs_150	PLTM Segara 1	Nusa Tenggara Barat	-8.41361	116.22361	2.60	PLN_pusat	
fs_151	PLTM Segara 2	Nusa Tenggara Barat	-8.40334	116.21147	4.10	PLN_pusat	
fs_153	PLTM Sesaot	Nusa Tenggara Barat	-8.54983	116.23533	1.00	PLN_pusat_repository	
hp_1069	PLTM Tersebar NTB	Nusa Tenggara Barat			15.00	RUPTL	
hp_1070	PLTM Tersebar NTB	Nusa Tenggara Barat			17.20	RUPTL	
JicaPR_1197	Rea-1	Nusa Tenggara Barat	-8.70507	117.034	2.30	Hydro Inventory Study_1997	
hp_0925	Rea-1	Nusa Tenggara Barat			2.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1198	Rea-2	Nusa Tenggara Barat	-8.79209	116.94	1.50	Hydro Inventory Study_1997	
hp_0926	Rea-2	Nusa Tenggara Barat			1.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1199	Rhee-1	Nusa Tenggara Barat	-8.53627	117.222	2.00	Hydro Inventory Study_1997	
hp_0644	Rhee-1	Nusa Tenggara Barat			2.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1200	Rhee-2	Nusa Tenggara Barat	-8.45618	117.226	1.60	Hydro Inventory Study_1997	
hp_0645	Rhee-2	Nusa Tenggara Barat			1.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0695	Santong	Nusa Tenggara Barat			1.00	PLN (4 - Minihydro PLN Project)	
hp_0229	Segara 1	Nusa Tenggara Barat	-8.41520	116.22319	1.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0228	Segara 2	Nusa Tenggara Barat	-8.40318	116.21140	6.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0106	Senjanjak	Nusa Tenggara Barat	-8.33014	116.29721	1.10	Consultant	
hp_0651	Sesaot	Nusa Tenggara Barat			1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_1193	Sumpee	Nusa Tenggara Barat	-9.01539	117.443	1.90	Hydro Inventory Study_1997	
hp_0954	Sumpee	Nusa Tenggara Barat			1.90	PLN (2 - MHPP in HPPS)	Screened out
fs_149	PLTM Brang Rea 2	Nusa Tenggara Barat	-8.32881	117.07183	3.84	PLN_pusat	
JicaPR_1188	Anail	Nusa Tenggara Timur	-8.2469	124.7	1.20	Hydro Inventory Study_1997	
hp_0708	Anail	Nusa Tenggara Timur			1.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0608	Bajawa/Ogi	Nusa Tenggara Timur			0.16	PLN (4 - Minihydro PLN Project)	
JicaPR_1119	Bema/Wera	Nusa Tenggara Timur	-8.43445	120.844	11.00	Hydro Inventory Study_1997	
JicaPR_1177	Benain-1	Nusa Tenggara Timur	-9.71755	124.462	10.20	Hydro Inventory Study_1997	
JicaPR_1179	Benain-2	Nusa Tenggara Timur	-9.56739	124.841	4.00	Hydro Inventory Study_1997	
hp_0733	Benain-2	Nusa Tenggara Timur			4.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1180	Benain-2A	Nusa Tenggara Timur	-9.55657	124.831	37.10	Hydro Inventory Study_1997	
JicaPR_1144	Besi	Nusa Tenggara Timur	-9.41877	124.116	6.90	Hydro Inventory Study_1997	
hp_0736	Besi	Nusa Tenggara Timur			6.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1136	Bobo	Nusa Tenggara Timur	-8.77617	120.628	2.80	Hydro Inventory Study_1997	
hp_0738	Bobo	Nusa Tenggara Timur			2.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1120	Buntal	Nusa Tenggara Timur	-8.4747	120.977	5.30	Hydro Inventory Study_1997	
hp_0750	Buntal	Nusa Tenggara Timur			5.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1124	Dondo-1	Nusa Tenggara Timur	-8.63309	121.882	1.20	Hydro Inventory Study_1997	
hp_0783	Dondo-1	Nusa Tenggara Timur			1.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1125	Dondo-2	Nusa Tenggara Timur	-8.67471	121.91	2.20	Hydro Inventory Study_1997	
hp_0784	Dondo-2	Nusa Tenggara Timur			2.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1126	Dondo-3	Nusa Tenggara Timur	-8.5655	121.947	3.80	Hydro Inventory Study_1997	
hp_0785	Dondo-3	Nusa Tenggara Timur			3.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0803	Harunda	Nusa Tenggara Timur			1.60	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_1189	Irauri	Nusa Tenggara Timur	-8.20395	124.9	0.70	Hydro Inventory Study_1997	
hp_0807	Irauri	Nusa Tenggara Timur			0.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1137	Jomal	Nusa Tenggara Timur	-8.75005	120.145	21.40	Hydro Inventory Study_1997	
JicaPR_1096	Kadassa-1	Nusa Tenggara Timur	-9.60254	119.823	9.50	Hydro Inventory Study_1997	
hp_0817	Kadassa-1	Nusa Tenggara Timur			9.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1097	Kadassa-2	Nusa Tenggara Timur	-9.51892	119.891	3.80	Hydro Inventory Study_1997	
hp_0818	Kadassa-2	Nusa Tenggara Timur			3.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1093	Kalada	Nusa Tenggara Timur	-9.495	119.601	3.70	Hydro Inventory Study_1997	
hp_0619	Kalada	Nusa Tenggara Timur			3.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1099	Kamatang-1	Nusa Tenggara Timur	-9.62579	120.052	0.60	Hydro Inventory Study_1997	
hp_0827	Kamatang-1	Nusa Tenggara Timur			0.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1100	Kamatang-2	Nusa Tenggara Timur	-9.60151	120.073	0.80	Hydro Inventory Study_1997	
hp_0828	Kamatang-2	Nusa Tenggara Timur			0.80	PLN (2 - MHPP in HPPS)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_1102	Kambera-1	Nusa Tenggara Timur	-9.85961	120.11	3.30	Hydro Inventory Study_1997	
hp_0829	Kambera-1	Nusa Tenggara Timur			3.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1103	Kambera-2	Nusa Tenggara Timur	-9.83515	120.193	67.40	Hydro Inventory Study_1997	
JicaEX_0107	Kambera-2	Nusa Tenggara Timur	-9.83515	120.193	17.02	Hydro Inventory Study_1997	
JicaPR_1105	Kambera-3	Nusa Tenggara Timur	-9.78125	120.245	7.40	Hydro Inventory Study_1997	
hp_0830	Kambera-3	Nusa Tenggara Timur			7.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1108	Kambera-4	Nusa Tenggara Timur	-9.76889	120.249	10.60	Hydro Inventory Study_1997	
JicaPR_1141	Kapsali	Nusa Tenggara Timur	-9.70874	123.798	5.20	Hydro Inventory Study_1997	
hp_0620	Kapsali	Nusa Tenggara Timur			5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1098	Kapunduk	Nusa Tenggara Timur	-9.53283	120.001	2.00	Hydro Inventory Study_1997	
hp_0621	Kapunduk	Nusa Tenggara Timur			2.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1091	Karendi-1	Nusa Tenggara Timur	-9.52253	119.472	21.50	Hydro Inventory Study_1997	
JicaPR_1092	Karendi-2	Nusa Tenggara Timur	-9.46581	119.448	3.30	Hydro Inventory Study_1997	
hp_0622	Karendi-2	Nusa Tenggara Timur			3.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1101	Lakalamba	Nusa Tenggara Timur	-9.55691	120.06	-	Hydro Inventory Study_1997	
JicaPR_1131	Lake	Nusa Tenggara Timur	-8.64437	120.801	4.90	Hydro Inventory Study_1997	
hp_0848	Lake	Nusa Tenggara Timur			4.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1135	Laku	Nusa Tenggara Timur	-8.71188	120.591	6.10	Hydro Inventory Study_1997	
hp_0625	Laku	Nusa Tenggara Timur			6.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0626	Lamanabi	Nusa Tenggara Timur			0.55	PLN (4 - Minihydro PLN Project)	Screened out
JicaPR_1106	Lamuk	Nusa Tenggara Timur	-9.8635	120.316	1.00	Hydro Inventory Study_1997	
hp_0853	Lamuk	Nusa Tenggara Timur			1.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0044	Lapopu	Nusa Tenggara Timur	-9.68101	119.49126	1.60	Consultant	Screened out
JicaPR_1191	Larana	Nusa Tenggara Timur	-8.30618	125.084	0.60	Hydro Inventory Study_1997	
hp_0855	Larana	Nusa Tenggara Timur			0.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1122	Lawo Lambo	Nusa Tenggara Timur	-8.6769	121.296	3.60	Hydro Inventory Study_1997	
hp_0858	Lawo Lambo	Nusa Tenggara Timur			3.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1185	Leke	Nusa Tenggara Timur	-9.8343	124.191	4.20	Hydro Inventory Study_1997	
hp_0859	Leke	Nusa Tenggara Timur			4.20	PLN (2 - MHPP in HPPS)	Screened out
hp_1015	Lokomboro	Nusa Tenggara Timur			0.80	PLN (4 - Minihydro PLN Project)	
hp_0038	Lokomboro 1	Nusa Tenggara Timur	-9.61831	119.29675	1.00	Consultant	
hp_0120	Lokomboro 6 & 7	Nusa Tenggara Timur	-9.61917	119.29439	0.40	PLN (4 - Minihydro PLN Project)	Screened out
hp_0121	Lokomboro Cascading (#4 & #5)	Nusa Tenggara Timur	-9.61917	119.29439	0.40	PLN (4 - Minihydro PLN Project)	
hp_0122	Lokomboro Extention (#2 & #3)	Nusa Tenggara Timur	-9.61917	119.29439	1.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1190	Manasako	Nusa Tenggara Timur	-8.24208	125.002	2.80	Hydro Inventory Study_1997	
hp_0878	Manasako	Nusa Tenggara Timur			2.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1178	Mau Besi	Nusa Tenggara Timur	-9.53515	124.755	2.40	Hydro Inventory Study_1997	
hp_0888	Mau Besi	Nusa Tenggara Timur			2.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1110	Melolo-1	Nusa Tenggara Timur	-10.0081	120.465	1.90	Hydro Inventory Study_1997	
hp_0632	Melolo-1	Nusa Tenggara Timur			1.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1111	Melolo-2	Nusa Tenggara Timur	-9.96294	120.505	2.60	Hydro Inventory Study_1997	
hp_0633	Melolo-2	Nusa Tenggara Timur			2.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0889	Mena (Kaubele)	Nusa Tenggara Timur			1.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1181	Menu-1	Nusa Tenggara Timur	-9.84369	124.648	1.20	Hydro Inventory Study_1997	
hp_0634	Menu-1	Nusa Tenggara Timur			1.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1182	Menu-2	Nusa Tenggara Timur	-9.82387	124.73	2.70	Hydro Inventory Study_1997	
hp_0635	Menu-2	Nusa Tenggara Timur			2.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1133	Meseh-1	Nusa Tenggara Timur	-8.65108	120.368	10.00	Hydro Inventory Study_1997	
hp_0891	Meseh-1	Nusa Tenggara Timur			1.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1134	Meseh-2	Nusa Tenggara Timur	-8.69532	120.39	9.60	Hydro Inventory Study_1997	
hp_0892	Meseh-2	Nusa Tenggara Timur			9.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1142	Metan	Nusa Tenggara Timur	-9.64835	123.732	26.80	Hydro Inventory Study_1997	
JicaPR_1186	Mina	Nusa Tenggara Timur	-10.0103	124.159	20.70	Hydro Inventory Study_1997	
JicaPR_1187	Mina Alt	Nusa Tenggara Timur	-10.0211	124.15	37.40	Hydro Inventory Study_1997	
JicaPR_1132	Moke	Nusa Tenggara Timur	-8.74113	120.844	24.60	Hydro Inventory Study_1997	
JicaPR_1183	Muke	Nusa Tenggara Timur	-9.97643	124.411	0.50	Hydro Inventory Study_1997	
hp_0894	Muke	Nusa Tenggara Timur			0.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0211	Ndungga	Nusa Tenggara Timur	-8.76931	121.67846	2.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1138	Noni	Nusa Tenggara Timur	-9.80533	123.83	7.60	Hydro Inventory Study_1997	
hp_0898	Noni	Nusa Tenggara Timur			7.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1114	Nowa	Nusa Tenggara Timur	-8.55021	119.995	1.10	Hydro Inventory Study_1997	
hp_0899	Nowa	Nusa Tenggara Timur			1.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1094	Palame-1	Nusa Tenggara Timur	-9.55974	119.796	2.40	Hydro Inventory Study_1997	
hp_0908	Palame-1	Nusa Tenggara Timur			2.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1095	Palame-2	Nusa Tenggara Timur	-9.50468	119.778	1.80	Hydro Inventory Study_1997	
hp_0909	Palame-2	Nusa Tenggara Timur			1.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1112	Parainglala	Nusa Tenggara Timur	-9.66756	119.513	15.20	Hydro Inventory Study_1997	
fs_235	PLTM Denduka	Nusa Tenggara Timur			0.16	PLN_wilayah	
fs_242	PLTM Harunda	Nusa Tenggara Timur	-9.57253	119.86131	1.45	PLN_wilayah	
fs_240	PLTM Lamanabi	Nusa Tenggara Timur			0.06	PLN_wilayah	
fs_243	PLTM Lapopu-Wanakaka	Nusa Tenggara Timur	-9.67539	119.49619	1.60	PLN_wilayah	
fs_244	PLTM Lokomboro 6 & 7	Nusa Tenggara Timur	-9.61982	119.29326	0.40	PLN_wilayah	
fs_241	PLTM Nggongi	Nusa Tenggara Timur	-10.20202	120.25441	0.03	PLN_wilayah	
fs_238	PLTM Sita	Nusa Tenggara Timur	-8.75264	120.56903	1.00	PLN_wilayah	
fs_237	PLTM Soru	Nusa Tenggara Timur	-9.53997	119.81989	0.09	PLN_wilayah	
hp_1067	PLTM Tersebar NTT	Nusa Tenggara Timur			9.15	RUPTL	
hp_1068	PLTM Tersebar NTT	Nusa Tenggara Timur			3.35	RUPTL	
fs_245	PLTM Umbuwangu 2	Nusa Tenggara Timur	-9.59980	119.15549	0.20	PLN_wilayah	
fs_236	PLTM Wae Lega	Nusa Tenggara Timur	-8.54269	120.38189	1.75	PLN_wilayah	
fs_239	PLTM Waeroa	Nusa Tenggara Timur	-8.86494	120.99824	0.40	PLN_wilayah	
fs_246	PLTM Wanokaka 2	Nusa Tenggara Timur	-9.68141	119.48650	0.72	PLN_wilayah	
JicaPR_1123	Rea	Nusa Tenggara Timur	-8.64966	121.696	2.50	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0924	Rea	Nusa Tenggara Timur			2.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1129	Ria	Nusa Tenggara Timur	-8.75075	121.702	4.70	Hydro Inventory Study_1997	
hp_0928	Ria	Nusa Tenggara Timur			4.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1130	Ria Mboeli	Nusa Tenggara Timur	-8.75812	121.865	1.70	Hydro Inventory Study_1997	
hp_0929	Ria Mboeli	Nusa Tenggara Timur			1.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1107	Rita	Nusa Tenggara Timur	-9.83968	120.218	8.20	Hydro Inventory Study_1997	
hp_0930	Rita	Nusa Tenggara Timur			8.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1121	Sissa	Nusa Tenggara Timur	-8.6099	121.225	6.30	Hydro Inventory Study_1997	
hp_0947	Sissa	Nusa Tenggara Timur			6.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0339	Sita	Nusa Tenggara Timur	-8.75264	120.56903	1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0111	Sitoto	Nusa Tenggara Timur	-9.47348	123.958	15.24	Hydro Inventory Study_1997	
JicaPR_1143	Sttoto	Nusa Tenggara Timur	-9.47348	123.958	29.60	Hydro Inventory Study_1997	
JicaPR_1139	Taramanu-1	Nusa Tenggara Timur	-9.76814	123.814	9.80	Hydro Inventory Study_1997	
hp_0964	Taramanu-1	Nusa Tenggara Timur			9.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1140	Taramanu-2	Nusa Tenggara Timur	-9.7378	123.75	7.30	Hydro Inventory Study_1997	
hp_0965	Taramanu-2	Nusa Tenggara Timur			7.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1184	Tuke	Nusa Tenggara Timur	-9.92787	124.554	1.40	Hydro Inventory Study_1997	
hp_0662	Tuke	Nusa Tenggara Timur			1.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0350	Umbuwangu 2	Nusa Tenggara Timur	-9.59980	119.15549	0.20	PLN (4 - Minihydro PLN Project)	Screened out
JicaPR_1118	Vang Reo	Nusa Tenggara Timur	-8.35963	120.479	78.00	Hydro Inventory Study_1997	
hp_1046	Wae Rancang I	Nusa Tenggara Timur			10.00	RUPTL	
hp_1045	Wae Rancang II	Nusa Tenggara Timur			6.50	RUPTL	
JicaPR_1117	Wai Naong	Nusa Tenggara Timur	-8.50598	120.539	15.50	Hydro Inventory Study_1997	
JicaEX_0108	Wai Racang	Nusa Tenggara Timur	-8.51533	120.417	11.07	Hydro Inventory Study_1997	
JicaPR_1116	Wai Ranjang	Nusa Tenggara Timur	-8.51533	120.417	9.30	Hydro Inventory Study_1997	
hp_0984	Wai Ranjang	Nusa Tenggara Timur			9.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0579	Wai Ranjang	Nusa Tenggara Timur	-8.58333	120.46667	15.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_1115	Wai Ru	Nusa Tenggara Timur	-8.50656	120.367	8.30	Hydro Inventory Study_1997	
hp_0985	Wai Ru	Nusa Tenggara Timur			8.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0986	Waigaret	Nusa Tenggara Timur			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_1104	Waikudu	Nusa Tenggara Timur	-9.78111	120.115	1.80	Hydro Inventory Study_1997	
hp_0665	Waikudu	Nusa Tenggara Timur			1.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1127	Wajo-1	Nusa Tenggara Timur	-8.6716	122.086	1.50	Hydro Inventory Study_1997	
hp_0987	Wajo-1	Nusa Tenggara Timur			1.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1128	Wajo-2	Nusa Tenggara Timur	-8.72894	122.02	2.00	Hydro Inventory Study_1997	
hp_0988	Wajo-2	Nusa Tenggara Timur			2.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0580	Wanakaka	Nusa Tenggara Timur	-9.67561	119.49556	1.60	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_1109	Watumbaka	Nusa Tenggara Timur	-9.82015	120.39	1.10	Hydro Inventory Study_1997	
hp_0667	Watumbaka	Nusa Tenggara Timur			1.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1113	Watupanggantu	Nusa Tenggara Timur	-9.61406	119.318	7.10	Hydro Inventory Study_1997	
hp_0990	Watupanggantu	Nusa Tenggara Timur			7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0921	Akimuga-1	Papua	-4.34687	137.506	71.30	Hydro Inventory Study_1997	
JicaPR_0922	Akimuga-2	Papua	-4.41438	137.565	61.30	Hydro Inventory Study_1997	
hp_0455	Amai	Papua	-3.43850	140.38794	1.40	PLN (4 - Minihydro PLN Project)	
hp_0704	Amaru	Papua			7.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0895	Andreac	Papua	-4.54243	139.494	21.70	Hydro Inventory Study_1997	
hp_1084	Baliem	Papua			50.00	RUPTL	
hp_0111	Baliem 2	Papua	-4.27284	139.06448	2.00	Consultant	Screened out
JicaPR_0884	Baliem-1	Papua	-4.19687	139.022	100.00	Hydro Inventory Study_1997	
JicaPR_0885	Baliem-2	Papua	-4.24034	139.063	175.40	Hydro Inventory Study_1997	
JicaPR_0886	Baliem-3	Papua	-4.30659	139.053	95.60	Hydro Inventory Study_1997	
JicaPR_0887	Baliem-4	Papua	-4.37217	139.103	107.30	Hydro Inventory Study_1997	
JicaPR_0888	Baliem-5	Papua	-4.40821	139.176	195.20	Hydro Inventory Study_1997	
JicaPR_0889	Baliem-6	Papua	-4.46622	139.239	91.00	Hydro Inventory Study_1997	
JicaPR_0890	Baliem-7	Papua	-4.50997	139.296	100.70	Hydro Inventory Study_1997	
JicaPR_0891	Baliem-8	Papua	-4.5654	139.323	141.90	Hydro Inventory Study_1997	
JicaPR_1038	Bemong	Papua	-3.84386	137.363	41.20	Hydro Inventory Study_1997	
hp_1040	Biak	Papua			2.60	RUPTL	
JicaPR_0909	Blumen-1	Papua	-4.3572	137.827	77.80	Hydro Inventory Study_1997	
JicaPR_0910	Blumen-2	Papua	-4.53444	137.961	24.20	Hydro Inventory Study_1997	
JicaPR_0896	Brazza-1	Papua	-4.55404	139.744	46.30	Hydro Inventory Study_1997	
JicaPR_0897	Brazza-2	Papua	-4.60661	139.726	91.10	Hydro Inventory Study_1997	
JicaPR_0898	Brazza-3	Papua	-4.66913	139.708	74.80	Hydro Inventory Study_1997	
JicaPR_0892	Catalina-1	Papua	-4.53635	139.085	57.90	Hydro Inventory Study_1997	
JicaPR_0893	Catalina-2	Papua	-4.58143	139.147	76.70	Hydro Inventory Study_1997	
JicaPR_0894	Catalina-3	Papua	-4.64491	139.197	62.20	Hydro Inventory Study_1997	
JicaPR_0916	Cemara-1	Papua	-4.31293	137.677	94.90	Hydro Inventory Study_1997	
JicaPR_0917	Cemara-2	Papua	-4.38634	137.701	127.00	Hydro Inventory Study_1997	
JicaPR_1040	Dalelica-1	Papua	-3.95681	137.67	52.00	Hydro Inventory Study_1997	
JicaPR_1041	Dalelica-2	Papua	-3.8885	137.653	98.40	Hydro Inventory Study_1997	
JicaPR_1042	Dalelica-3	Papua	-3.80177	137.563	74.20	Hydro Inventory Study_1997	
JicaPR_1043	Dalelica-4	Papua	-3.73924	137.527	126.80	Hydro Inventory Study_1997	
JicaPR_0911	Darmand Villa-1	Papua	-4.39562	137.996	55.80	Hydro Inventory Study_1997	
JicaPR_0912	Darmand Villa-2	Papua	-4.39544	138.212	49.40	Hydro Inventory Study_1997	
JicaPR_0913	Darmand Villa-3	Papua	-4.34275	138.329	41.60	Hydro Inventory Study_1997	
JicaPR_0914	Darmand Villa-4	Papua	-4.45692	138.248	23.30	Hydro Inventory Study_1997	
JicaPR_0915	Darmand Villa-5	Papua	-4.54443	138.247	51.10	Hydro Inventory Study_1997	
JicaPR_1035	Dawabu	Papua	-3.43434	136.546	38.50	Hydro Inventory Study_1997	
JicaPR_1036	Delo-1	Papua	-3.72366	137.155	94.50	Hydro Inventory Study_1997	
JicaPR_1037	Delo-2	Papua	-3.68055	137.275	152.00	Hydro Inventory Study_1997	
JicaPR_1023	Derewo-1	Papua	-3.91265	137.102	56.40	Hydro Inventory Study_1997	
JicaPR_1024	Derewo-2	Papua	-3.85958	137.079	35.90	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_1025	Derewo-3	Papua	-3.80508	136.956	37.20	Hydro Inventory Study_1997	
JicaPR_1026	Derewo-4	Papua	-3.85601	136.884	128.60	Hydro Inventory Study_1997	
JicaPR_1027	Derewo-5	Papua	-3.60387	136.302	278.40	Hydro Inventory Study_1997	
JicaPR_1028	Derewo-6	Papua	-3.5155	136.178	175.00	Hydro Inventory Study_1997	
JicaPR_1029	Derewo-7	Papua	-3.47082	136.109	153.30	Hydro Inventory Study_1997	
JicaPR_1030	Derewo-8	Papua	-3.32925	136.188	36.20	Hydro Inventory Study_1997	
hp_0781	Digoel	Papua			3.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0876	Digul Timur-1	Papua	-5.16804	140.655	128.90	Hydro Inventory Study_1997	
JicaPR_0877	Digul Timur-2	Papua	-5.21525	140.588	179.50	Hydro Inventory Study_1997	
JicaPR_0878	Digul Timur-3	Papua	-5.29629	140.497	81.10	Hydro Inventory Study_1997	
JicaPR_0901	Eilanden-1	Papua	-4.83313	140.071	56.60	Hydro Inventory Study_1997	
JicaPR_0902	Eilanden-2	Papua	-4.91516	140.144	40.10	Hydro Inventory Study_1997	
JicaPR_0903	Eilanden-3	Papua	-4.87827	140.292	115.40	Hydro Inventory Study_1997	
JicaPR_0934	Endere-1	Papua	-4.12204	136.025	149.70	Hydro Inventory Study_1997	
JicaPR_0935	Endere-2	Papua	-4.1473	135.976	89.60	Hydro Inventory Study_1997	
hp_0446	Genyem II	Papua	-2.63409	140.01628	1.00	PLN (4 - Minihydro PLN Project)	
hp_0795	Grime I	Papua			1.00	PLN (4 - Minihydro PLN Project)	
hp_0616	Grime II	Papua			1.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1066	Idenburg	Papua	-3.66181	140.072	2 000.10	Hydro Inventory Study_1997	
JicaPR_0927	Iweka	Papua	-4.19411	136.86	33.30	Hydro Inventory Study_1997	
JicaPR_1073	Jaos	Papua	-2.84579	140.634	3.70	Hydro Inventory Study_1997	
hp_0812	Jaos	Papua			3.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0929	Jawee-1	Papua	-4.05767	136.319	84.20	Hydro Inventory Study_1997	
JicaPR_0931	Jawee-2	Papua	-4.1335	136.259	97.10	Hydro Inventory Study_1997	
JicaPR_0932	Jawee-3	Papua	-4.15623	136.197	151.10	Hydro Inventory Study_1997	
JicaPR_0933	Jawee-4	Papua	-4.16849	136.136	157.10	Hydro Inventory Study_1997	
JicaPR_1051	Kadie	Papua	-3.6168	138.775	22.00	Hydro Inventory Study_1997	
hp_0264	Kalibumi	Papua	-3.47698	135.46637	2.60	PLN (4 - Minihydro PLN Project)	
hp_1029	Kalibumi II	Papua			5.00	RUPTL	
hp_1028	Kalibumi III Cascade	Papua			7.50	RUPTL	
JicaPR_0879	Kao-1	Papua	-5.17327	140.897	60.40	Hydro Inventory Study_1997	
JicaPR_0880	Kao-2	Papua	-5.19783	140.857	58.50	Hydro Inventory Study_1997	
JicaPR_0881	Kao-3	Papua	-5.21172	140.782	49.10	Hydro Inventory Study_1997	
JicaPR_0882	Kao-4	Papua	-5.4035	140.678	40.10	Hydro Inventory Study_1997	
JicaPR_1069	Kokori	Papua	-2.34619	137.476	25.30	Hydro Inventory Study_1997	
JicaPR_1039	Korokinaran	Papua	-3.80668	137.457	84.90	Hydro Inventory Study_1997	
JicaPR_1070	Lesu	Papua	-2.26839	137.32	30.30	Hydro Inventory Study_1997	
JicaPR_0906	Lorentz-1	Papua	-4.43344	138.775	69.40	Hydro Inventory Study_1997	
JicaPR_0907	Lorentz-2	Papua	-4.47533	138.773	96.90	Hydro Inventory Study_1997	
JicaPR_0908	Lorentz-3	Papua	-4.60904	138.791	17.00	Hydro Inventory Study_1997	
JicaPR_1067	Mamberamo-1	Papua	-2.44672	138.207	6 446.30	Hydro Inventory Study_1997	
JicaPR_1068	Mamberamo-2	Papua	-2.16566	137.892	955.10	Hydro Inventory Study_1997	
JicaPR_0920	Mamoa	Papua	-4.3597	137.385	43.40	Hydro Inventory Study_1997	
JicaPR_0936	Mapia-1	Papua	-4.09438	135.839	33.30	Hydro Inventory Study_1997	
JicaPR_0937	Mapia-2	Papua	-4.19504	135.888	135.30	Hydro Inventory Study_1997	
hp_0630	Maredrer	Papua			9.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0395	Mariarotu-1	Papua	-1.80731	136.02772	1.30	PLN (4 - Minihydro PLN Project)	Screened out
hp_0396	Mariarotu-1	Papua	-1.80764	136.02208	1.30	PLN (4 - Minihydro PLN Project)	
hp_0397	Mariarotu-2	Papua	-1.82222	136.43167	1.30	PLN (4 - Minihydro PLN Project)	
hp_0631	Mega	Papua			9.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1018	Meno	Papua	-3.84861	135.435	17.80	Hydro Inventory Study_1997	
JicaPR_0924	Mimika	Papua	-4.15706	136.606	20.80	Hydro Inventory Study_1997	
hp_0893	Momi/Ransiki	Papua			9.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1034	Nadubuai	Papua	-2.40207	136.952	27.10	Hydro Inventory Study_1997	
JicaPR_0905	Noordosst	Papua	-4.51197	138.671	31.40	Hydro Inventory Study_1997	
JicaPR_0904	Noordwest	Papua	-4.44587	138.478	51.70	Hydro Inventory Study_1997	
hp_1076	Orya 2	Papua			10.00	RUPTL	
hp_1075	Orya/Genyem	Papua			20.00	RUPTL	
JicaPR_0923	Otomona	Papua	-4.24879	136.985	39.50	Hydro Inventory Study_1997	
JicaPR_1078	P. Biak	Papua	-0.994064	135.988	7.30	Hydro Inventory Study_1997	
hp_0902	P. Biak	Papua			7.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1076	P. Japen-1	Papua	-1.822	136.342	7.10	Hydro Inventory Study_1997	
hp_0903	P. Japen-1	Papua			7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1077	P. Japen-2	Papua	-1.81329	136.123	4.20	Hydro Inventory Study_1997	
hp_0904	P. Japen-2	Papua			4.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0928	Paniai/Uta	Papua	-3.97369	136.348	61.50	Hydro Inventory Study_1997	
hp_0696	Prafi	Papua			8.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0921	Ransiki-1	Papua			1.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0922	Ransiki-3	Papua			8.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1047	Rauffaer-1	Papua	-3.67491	137.488	218.50	Hydro Inventory Study_1997	
JicaPR_1048	Rauffaer-2	Papua	-3.58794	137.354	165.90	Hydro Inventory Study_1997	
JicaPR_1049	Rauffaer-3	Papua	-3.50639	137.284	186.10	Hydro Inventory Study_1997	
JicaPR_1033	Rombak	Papua	-2.48697	136.697	48.60	Hydro Inventory Study_1997	
JicaPR_1072	Sentani	Papua	-2.7447	140.624	8.40	Hydro Inventory Study_1997	
hp_0941	Sentani	Papua			8.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1075	Sermo	Papua	-2.64529	140.021	6.10	Hydro Inventory Study_1997	
hp_0943	Sermo	Papua			6.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1031	Siewa-1	Papua	-3.2583	136.385	60.10	Hydro Inventory Study_1997	
JicaPR_1032	Siewa-2	Papua	-3.1811	136.351	45.00	Hydro Inventory Study_1997	
hp_0368	Sinagma 1	Papua	-4.11207	138.92650	0.12	PLN (4 - Minihydro PLN Project)	
hp_0136	Sinagma 2	Papua	-4.11068	138.92783	0.14	PLN (4 - Minihydro PLN Project)	
hp_0137	Sinagma 3	Papua	-4.11068	138.92783	0.14	PLN (4 - Minihydro PLN Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_1022	Siriwo	Papua	-3.42937	135.924	74.30	Hydro Inventory Study_1997	
JicaPR_1060	Sobger-1	Papua	-4.32528	139.784	17.00	Hydro Inventory Study_1997	
JicaPR_1061	Sobger-2	Papua	-4.33315	139.835	37.80	Hydro Inventory Study_1997	
JicaPR_1062	Sobger-3	Papua	-4.26606	139.908	94.20	Hydro Inventory Study_1997	
JicaPR_1063	Sobger-4	Papua	-4.21044	139.958	84.90	Hydro Inventory Study_1997	
JicaPR_1064	Sobger-5	Papua	-4.30996	140.15	86.90	Hydro Inventory Study_1997	
JicaPR_1065	Sobger-6	Papua	-4.51244	140.624	411.00	Hydro Inventory Study_1997	
JicaPR_0871	Sop-1	Papua	-4.76026	140.559	124.50	Hydro Inventory Study_1997	
JicaPR_0872	Sop-2	Papua	-4.8012	140.635	117.50	Hydro Inventory Study_1997	
JicaPR_0873	Sop-3	Papua	-4.85654	140.681	105.20	Hydro Inventory Study_1997	
JicaPR_0874	Sop-4	Papua	-5.01333	140.727	129.70	Hydro Inventory Study_1997	
JicaPR_0875	Sop-5	Papua	-5.09103	140.702	122.70	Hydro Inventory Study_1997	
hp_0950	Sorong	Papua			0.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0899	Steen Boom-1	Papua	-4.66206	140.012	104.00	Hydro Inventory Study_1997	
JicaPR_0900	Steen Boom-2	Papua	-4.72953	139.948	100.80	Hydro Inventory Study_1997	
JicaPR_1017	Sura	Papua	-3.75542	135.571	20.60	Hydro Inventory Study_1997	
JicaPR_1019	Suro	Papua	-3.73692	135.379	52.60	Hydro Inventory Study_1997	
JicaPR_1074	Tami	Papua	-2.70255	140.814	32.30	Hydro Inventory Study_1997	
JicaPR_0930	Tigi/Jawee	Papua	-4.07482	136.263	83.00	Hydro Inventory Study_1997	
JicaPR_0941	Titinima-1	Papua	-3.98915	135.546	40.30	Hydro Inventory Study_1997	
JicaPR_0942	Titinima-2	Papua	-3.97318	135.451	42.50	Hydro Inventory Study_1997	
JicaPR_0943	Titinima-3	Papua	-3.98104	135.386	56.80	Hydro Inventory Study_1997	
JicaPR_1050	Toli	Papua	-3.56082	138.408	17.80	Hydro Inventory Study_1997	
JicaPR_0918	Tsing-1	Papua	-4.194	137.236	64.50	Hydro Inventory Study_1997	
JicaPR_0919	Tsing-2	Papua	-4.40453	137.201	30.50	Hydro Inventory Study_1997	
JicaPR_0925	Tuaka	Papua	-4.20066	136.725	48.10	Hydro Inventory Study_1997	
JicaPR_1020	Ulawa	Papua	-3.74776	135.776	34.90	Hydro Inventory Study_1997	
JicaPR_0938	Urumuka	Papua	-4.34018	136.082	28.10	Hydro Inventory Study_1997	
JicaPR_1052	Vandewal-1	Papua	-3.64632	139.018	39.50	Hydro Inventory Study_1997	
JicaPR_1053	Vandewal-2	Papua	-3.63889	139.119	48.40	Hydro Inventory Study_1997	
JicaPR_1054	Vandewal-3	Papua	-3.78845	139.261	16.80	Hydro Inventory Study_1997	
JicaPR_1055	Vandewal-4	Papua	-3.68845	139.395	104.80	Hydro Inventory Study_1997	
JicaPR_1056	Vandewal-5	Papua	-3.76172	139.572	113.40	Hydro Inventory Study_1997	
JicaPR_1057	Vandewal-6	Papua	-4.01356	139.566	16.30	Hydro Inventory Study_1997	
JicaPR_1058	Vandewal-7	Papua	-3.9651	139.605	34.60	Hydro Inventory Study_1997	
JicaPR_1059	Vandewal-8	Papua	-3.72991	139.69	221.70	Hydro Inventory Study_1997	
hp_0073	Walesi	Papua	-4.13681	138.90744	2.90	Consultant	Screened out
hp_0688	Walesi #1	Papua			0.50	PLN (4 - Minihydro PLN Project)	
hp_0689	Walesi #2	Papua			0.50	PLN (4 - Minihydro PLN Project)	
hp_0690	Walesi #3	Papua			0.32	PLN (4 - Minihydro PLN Project)	
hp_0691	Walesi #4	Papua			0.32	PLN (4 - Minihydro PLN Project)	
hp_0692	Walesi #5	Papua			0.50	PLN (4 - Minihydro PLN Project)	
hp_0411	Walesi 6 - 7	Papua	-4.09722	138.90222	1.20	PLN (4 - Minihydro PLN Project)	
hp_0687	Walesi Blok II	Papua			6.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0883	Wamena	Papua	-4.10602	138.861	3.50	Hydro Inventory Study_1997	
hp_0666	Wamena	Papua			3.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_1021	Warasai	Papua	-3.58745	135.968	240.70	Hydro Inventory Study_1997	
JicaPR_0926	Wataikwa	Papua	-4.18376	136.799	25.80	Hydro Inventory Study_1997	
hp_0991	Werba #1	Papua			1.00	PLN (4 - Minihydro PLN Project)	
hp_0992	Werba #2	Papua			1.00	PLN (4 - Minihydro PLN Project)	
JicaPR_1071	Wiru	Papua	-2.51086	139.621	32.80	Hydro Inventory Study_1997	
JicaPR_1016	Woguni	Papua	-3.05526	134.476	28.50	Hydro Inventory Study_1997	
JicaPR_1044	Yamo-1	Papua	-3.67957	138.073	19.70	Hydro Inventory Study_1997	
JicaPR_1045	Yamo-2	Papua	-3.65609	138.008	29.20	Hydro Inventory Study_1997	
JicaPR_1046	Yamo-3	Papua	-3.67248	137.682	92.10	Hydro Inventory Study_1997	
JicaPR_0974	Aifat-1	Papua Barat	-0.780945	132.884	14.60	Hydro Inventory Study_1997	
JicaPR_0975	Aifat-2	Papua Barat	-0.889394	132.678	161.00	Hydro Inventory Study_1997	
JicaPR_0977	Aifat-3	Papua Barat	-0.959918	132.555	176.90	Hydro Inventory Study_1997	
JicaPR_0978	Aifat-4	Papua Barat	-1.26388	132.587	162.20	Hydro Inventory Study_1997	
JicaPR_0979	Aifat-5	Papua Barat	-1.33596	132.564	34.00	Hydro Inventory Study_1997	
JicaPR_0969	Aiman-1	Papua Barat	-1.03826	133.161	19.00	Hydro Inventory Study_1997	
JicaPR_0970	Aiman-2	Papua Barat	-1.01756	133.023	44.90	Hydro Inventory Study_1997	
JicaPR_0971	Aiman-3	Papua Barat	-1.20979	132.799	195.60	Hydro Inventory Study_1997	
JicaPR_0972	Aiman-4	Papua Barat	-1.36007	132.832	112.30	Hydro Inventory Study_1997	
JicaPR_0973	Aiman-5	Papua Barat	-1.38475	132.811	35.30	Hydro Inventory Study_1997	
JicaPR_0980	Amaru	Papua Barat	-1.32222	132.396	7.90	Hydro Inventory Study_1997	
JicaPR_0995	Anita	Papua Barat	-0.881379	133.36	15.60	Hydro Inventory Study_1997	
JicaPR_1009	Gigi/Gita	Papua Barat	-1.38004	133.923	11.90	Hydro Inventory Study_1997	
JicaPR_1010	Gita/Ransiki	Papua Barat	-1.36543	134.008	95.40	Hydro Inventory Study_1997	
JicaPR_1014	Gita/Ransiki-1	Papua Barat	-1.401	133.992	57.60	Hydro Inventory Study_1997	
JicaPR_1015	Gita/Ransiki-2	Papua Barat	-1.37054	133.995	16.50	Hydro Inventory Study_1997	
JicaPR_0976	Jawian	Papua Barat	-0.845988	132.572	64.00	Hydro Inventory Study_1997	
JicaPR_1005	Jofsisera	Papua Barat	-1.02488	133.644	17.40	Hydro Inventory Study_1997	
JicaPR_0947	Kamakawalar	Papua Barat	-3.80404	134.211	103.00	Hydro Inventory Study_1997	
JicaPR_0996	Kasi-1	Papua Barat	-0.85583	133.334	34.70	Hydro Inventory Study_1997	
JicaPR_0997	Kasi-2	Papua Barat	-0.815043	133.411	33.30	Hydro Inventory Study_1997	
JicaPR_0982	Kladuk-1	Papua Barat	-1.0086	131.891	133.40	Hydro Inventory Study_1997	
JicaPR_0983	Kladuk-2	Papua Barat	-1.25664	131.769	236.00	Hydro Inventory Study_1997	
hp_0225	Kombemur	Papua Barat	-2.94278	132.39667	6.60	PLN (4 - Minihydro PLN Project)	
JicaPR_0986	Koor-1	Papua Barat	-0.547675	132.572	35.10	Hydro Inventory Study_1997	
JicaPR_0987	Koor-2	Papua Barat	-0.578388	132.517	14.70	Hydro Inventory Study_1997	
JicaPR_0988	Koor-3	Papua Barat	-0.427243	132.329	113.10	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0950	Kuri	Papua Barat	-2.74372	134.112	90.30	Hydro Inventory Study_1997	
JicaPR_0944	Lengguru-1	Papua Barat	-3.40286	134.15	23.80	Hydro Inventory Study_1997	
JicaPR_0945	Lengguru-2	Papua Barat	-3.70296	134.078	44.50	Hydro Inventory Study_1997	
JicaPR_0946	Loamora/Kamakawalar	Papua Barat	-3.69421	134.229	81.80	Hydro Inventory Study_1997	
JicaPR_0949	Maredrer	Papua Barat	-2.94423	132.36	9.00	Hydro Inventory Study_1997	
JicaPR_0993	Mearjer-1	Papua Barat	-0.986839	133.47	17.80	Hydro Inventory Study_1997	
JicaPR_0994	Mearjer-2	Papua Barat	-0.898132	133.411	23.30	Hydro Inventory Study_1997	
JicaPR_0984	Mega	Papua Barat	-0.674452	132.083	9.50	Hydro Inventory Study_1997	
JicaPR_0964	Mios-1	Papua Barat	-1.42749	133.12	22.00	Hydro Inventory Study_1997	
JicaPR_0965	Mios-2	Papua Barat	-1.50018	133.151	15.20	Hydro Inventory Study_1997	
JicaPR_1013	Momi/Ransiki	Papua Barat	-1.45258	134.058	9.80	Hydro Inventory Study_1997	
JicaPR_0989	Moon	Papua Barat	-0.534448	132.8	13.70	Hydro Inventory Study_1997	
JicaPR_0951	Muturi-1	Papua Barat	-1.55135	133.855	46.70	Hydro Inventory Study_1997	
JicaPR_0952	Muturi-2	Papua Barat	-1.95363	133.786	51.90	Hydro Inventory Study_1997	
JicaPR_1079	P. Misool	Papua Barat	-1.84609	129.915	11.80	Hydro Inventory Study_1997	
JicaPR_1007	Prafi	Papua Barat	-1.00681	133.897	8.80	Hydro Inventory Study_1997	
hp_0917	Prafi	Papua Barat			2.50	PLN (4 - Minihydro PLN Project)	Screened out
hp_1060	Prafi 2	Papua Barat			1.00	RUPTL	
hp_1057	Ransiki	Papua Barat			6.00	RUPTL	
JicaPR_1008	Ransiki-1	Papua Barat	-1.31522	134.038	10.00	Hydro Inventory Study_1997	
JicaPR_1011	Ransiki-2	Papua Barat	-1.38248	134.066	19.70	Hydro Inventory Study_1997	
JicaPR_1012	Ransiki-3	Papua Barat	-1.43076	134.089	8.50	Hydro Inventory Study_1997	
JicaPR_0958	Rawarra-1	Papua Barat	-1.2054	133.322	29.20	Hydro Inventory Study_1997	
JicaPR_0959	Rawarra-2	Papua Barat	-1.3049	133.381	31.30	Hydro Inventory Study_1997	
JicaPR_0960	Rawarra-3	Papua Barat	-1.24904	133.245	64.60	Hydro Inventory Study_1997	
JicaPR_0961	Rawarra-4	Papua Barat	-1.30923	133.081	105.90	Hydro Inventory Study_1997	
JicaPR_0962	Rawarra-5	Papua Barat	-1.44719	132.94	134.10	Hydro Inventory Study_1997	
JicaPR_0963	Rawarra-6	Papua Barat	-1.49737	132.918	17.40	Hydro Inventory Study_1997	
JicaPR_0981	Sadine	Papua Barat	-0.888594	132.182	15.20	Hydro Inventory Study_1997	
JicaPR_0948	Sakua	Papua Barat	-3.05805	133.951	12.80	Hydro Inventory Study_1997	
JicaPR_0985	Sorong	Papua Barat	-0.853366	131.264	0.50	Hydro Inventory Study_1997	
JicaPR_0953	Tembuni-1	Papua Barat	-1.39513	133.729	40.50	Hydro Inventory Study_1997	
JicaPR_0954	Tembuni-2	Papua Barat	-1.47592	133.696	33.20	Hydro Inventory Study_1997	
JicaPR_0955	Tembuni-3	Papua Barat	-1.51563	133.666	41.50	Hydro Inventory Study_1997	
JicaPR_0956	Tembuni-4	Papua Barat	-1.6686	133.594	26.00	Hydro Inventory Study_1997	
JicaPR_0957	Tembuni-5	Papua Barat	-1.81841	133.358	40.40	Hydro Inventory Study_1997	
JicaPR_0966	Tunoforo-1	Papua Barat	-1.33095	133.556	19.70	Hydro Inventory Study_1997	
JicaPR_0967	Tunoforo-2	Papua Barat	-1.42231	133.557	33.80	Hydro Inventory Study_1997	
JicaPR_0968	Tunoforo-3	Papua Barat	-1.49868	133.515	25.10	Hydro Inventory Study_1997	
JicaPR_0939	Urema-1	Papua Barat	-3.60819	134.705	18.00	Hydro Inventory Study_1997	
JicaPR_0940	Urema-2	Papua Barat	-3.73546	134.893	23.90	Hydro Inventory Study_1997	
hp_0693	Waigo	Papua Barat			1.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0998	Waramai-1	Papua Barat	-0.991188	133.527	11.50	Hydro Inventory Study_1997	
JicaPR_0999	Waramai-2	Papua Barat	-0.91885	133.56	23.60	Hydro Inventory Study_1997	
JicaPR_1000	Waramai-3	Papua Barat	-0.86416	133.597	14.20	Hydro Inventory Study_1997	
hp_0459	Warsamson	Papua Barat	-0.80000	131.38333	49.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_1001	Waryori-1	Papua Barat	-1.19892	133.733	62.70	Hydro Inventory Study_1997	
JicaPR_1002	Waryori-2	Papua Barat	-1.18792	133.772	20.50	Hydro Inventory Study_1997	
JicaPR_1003	Waryori-3	Papua Barat	-1.10714	133.762	25.70	Hydro Inventory Study_1997	
JicaPR_1004	Waryori-4	Papua Barat	-1.01355	133.719	96.50	Hydro Inventory Study_1997	
JicaPR_1006	Waryori-5	Papua Barat	-0.898207	133.653	130.10	Hydro Inventory Study_1997	
JicaPR_0992	Wekareng	Papua Barat	-0.637214	133.172	13.90	Hydro Inventory Study_1997	
JicaPR_0991	Wepei	Papua Barat	-0.601681	133.128	11.90	Hydro Inventory Study_1997	
JicaPR_0990	Wesauni	Papua Barat	-0.556395	133.028	55.80	Hydro Inventory Study_1997	
JicaPR_0104	Biobio	Riau	-0.115366	100.884093	24.10	Hydro Inventory Study_1997	
JicaPR_0123	Gangsal	Riau	-0.792301	102.456412	8.20	Hydro Inventory Study_1997	
hp_0495	Gangsal	Riau	-0.80000	102.45000	8.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0100	Kampar Kanan-2	Riau	0.384691	100.381666	38.00	Hydro Inventory Study_1997	
JicaPR_0101	Kapurnangadang	Riau	0.298311	100.577992	29.70	Hydro Inventory Study_1997	
JicaEX_0012	Kotapanjang	Riau	0.28964	100.877086	114.00	Hydro Inventory Study_1997	
hp_0025	Kotapanjang	Riau	0.29000	100.88166	114.00	Consultant	Screened out
JicaPR_0121	Kuantan-2	Riau	-0.621197	101.346715	284.00	Hydro Inventory Study_1997	
hp_0387	Kuantan-2	Riau	-0.63333	101.33333	272.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0097	Rokan Kiri-1	Riau	0.558671	100.312199	189.00	Hydro Inventory Study_1997	
JicaPR_0098	Rokan Kiri-2	Riau	0.673434	100.434951	113.00	Hydro Inventory Study_1997	
JicaPR_0105	Sibayang-1	Riau	-0.300485	101.007049	28.60	Hydro Inventory Study_1997	
JicaPR_0106	Sibayang-2	Riau	-0.19013	101.069432	101.50	Hydro Inventory Study_1997	
JicaPR_0107	Sungingi	Riau	-0.423316	101.288786	39.40	Hydro Inventory Study_1997	
fs_200	PLTM Bambalu	Sulawesi Selatan			0.30	PLN_wilayah	
fs_187	PLTM Bantaeng 1	Sulawesi Selatan	-5.38703	120.01219	4.20	PLN_pusat_repository	
fs_193	PLTM Batukede	Sulawesi Selatan	-3.19112	119.53215	8.85	PLN_wilayah	
fs_194	PLTM Benteng Malewang	Sulawesi Selatan	-5.40883	120.03546	5.20	PLN_wilayah	
fs_208	PLTM Bontomantene	Sulawesi Selatan	-5.38083	120.10330	2.22	PLN_wilayah	
fs_197	PLTM Bontotene	Sulawesi Selatan			1.00	PLN_wilayah	
fs_207	PLTM Bungin 2	Sulawesi Selatan	-3.51406	119.90036	10.00	PLN_wilayah	
fs_182	PLTM Bungin 3	Sulawesi Selatan	-3.51947	120.00167	5.00	PLN_pusat_repository	
fs_201	PLTM Dataru	Sulawesi Selatan	-5.44856	119.79539	9.50	PLN_wilayah	
fs_179	PLTM Dusun Palantieng	Sulawesi Selatan	-4.85000	120.31667	4.00	PLN_pusat	
fs_202	PLTM Kadundung	Sulawesi Selatan	-3.38590	120.16330	3.20	PLN_wilayah	
fs_180	PLTM Kahaya	Sulawesi Selatan	-5.32333	120.00391	3.00	PLN_pusat	
fs_209	PLTM Kindang	Sulawesi Selatan	-5.40883	120.03546	3.50	PLN_wilayah	
fs_205	PLTM Kindang 2	Sulawesi Selatan	-5.35028	120.06389	3.00	PLN_wilayah	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
fs_189	PLTM Kondongan	Sulawesi Selatan	-3.02975	119.73861	3.45	PLN_pusat_repository	
fs_195	PLTM Ma'dong	Sulawesi Selatan	-2.95261	119.80867	10.00	PLN_wilayah	
fs_198	PLTM Maiting Hulu 2	Sulawesi Selatan	-2.86501	119.84459	8.00	PLN_wilayah	
fs_185	PLTM Mallawa	Sulawesi Selatan	-4.82222	119.88222	5.00	PLN_pusat_repository	
fs_188	PLTM Malua	Sulawesi Selatan	-3.29806	119.94761	4.60	PLN_pusat_repository	
fs_184	PLTM Pasui 2	Sulawesi Selatan	-3.43547	119.89486	6.40	PLN_pusat_repository	
fs_196	PLTM Patikala	Sulawesi Selatan	-2.45269	120.40989	6.00	PLN_wilayah	
fs_203	PLTM Paun	Sulawesi Selatan	-3.20373	119.54412	9.20	PLN_wilayah	
fs_190	PLTM Pongbatik	Sulawesi Selatan	-2.98881	119.69261	3.00	PLN_pusat_repository	
fs_206	PLTM Rongkong 3	Sulawesi Selatan	-2.56628	119.98804	7.60	PLN_wilayah	
fs_183	PLTM Saluanoa	Sulawesi Selatan	-2.33869	120.79167	2.00	PLN_pusat_repository	
fs_199	PLTM Sapaya	Sulawesi Selatan	-5.33818	119.70352	5.20	PLN_wilayah	
fs_191	PLTM Siteba 2	Sulawesi Selatan			9.75	PLN_pusat_repository	
fs_186	PLTM Tombolo Pao	Sulawesi Selatan			2.00	PLN_pusat_repository	
fs_204	PLTM Tomoni	Sulawesi Selatan	-2.47583	120.70611	10.00	PLN_wilayah	
fs_181	PLTMH Eremerasa	Sulawesi Selatan	-5.47019	120.01551	1.30	PLN_pusat	
fs_63	PLTM Babatan	Sumatera Selatan	-4.13028	103.6225	5.00	PLN_pusat_repository	
fs_61	PLTM Karyanyata	Sumatera Selatan	-4.07	103.66	4.00	PLN_pusat_repository	
fs_64	PLTM Komering	Sumatera Selatan	-3.23114	104.47228	1.40	PLN_pusat_repository	
fs_60	PLTM Lahat	Sumatera Selatan	-3.86829	103.36097	10.00	PLN_pusat	
fs_65	PLTM Niagara	Sumatera Selatan	-4.79497	103.90367	1.70	PLN_pusat_repository	
fs_62	PLTM Semendo	Sumatera Selatan	-4.10718	103.62896	9.50	PLN_pusat_repository	
hp_0437	Balla	Sulawesi Barat	-3.01700	119.31692	0.70	PLN (4 - Minihydro PLN Project)	
hp_0448	Bonehau	Sulawesi Barat	-2.69072	119.20837	4.00	PLN (4 - Minihydro PLN Project)	
hp_0745	Budong-budong	Sulawesi Barat			2.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0827	Budung-1	Sulawesi Barat	-1.84379	119.75	27.70	Hydro Inventory Study_1997	
JicaPR_0828	Budung-2	Sulawesi Barat	-1.95523	119.688	31.50	Hydro Inventory Study_1997	
JicaPR_0829	Budung-3	Sulawesi Barat	-2.01121	119.616	14.40	Hydro Inventory Study_1997	
JicaPR_0830	Budung-4	Sulawesi Barat	-1.93751	119.618	14.90	Hydro Inventory Study_1997	
JicaPR_0824	Calumpang	Sulawesi Barat	-2.45523	119.459	356.30	Hydro Inventory Study_1997	
hp_0602	Kalukku	Sulawesi Barat			1.40	PLN (4 - Minihydro PLN Project)	
JicaPR_0822	Kaluku	Sulawesi Barat	-2.621	119.15	35.60	Hydro Inventory Study_1997	
hp_1026	Karama Baseload (Unsolicted)	Sulawesi Barat			100.00	RUPTL	
hp_1025	Karama Peaking (Unsolicted)	Sulawesi Barat			350.00	RUPTL	
JicaPR_0825	Karama-2	Sulawesi Barat	-2.40754	119.382	791.60	Hydro Inventory Study_1997	
JicaPR_0826	Kerataun	Sulawesi Barat	-2.55543	119.544	54.50	Hydro Inventory Study_1997	
JicaPR_0840	Lariang-10	Sulawesi Barat	-1.5123	119.634	7.00	Hydro Inventory Study_1997	
JicaPR_0837	Lariang-7	Sulawesi Barat	-1.41527	119.649	639.30	Hydro Inventory Study_1997	
JicaPR_0821	Malunda	Sulawesi Barat	-2.96581	118.898	36.90	Hydro Inventory Study_1997	
JicaPR_0810	Mamasa-1	Sulawesi Barat	-3.0979	119.304	183.60	Hydro Inventory Study_1997	
JicaPR_0803	Mamasa-2	Sulawesi Barat	-3.11396	119.309	19.80	Hydro Inventory Study_1997	
JicaPR_0816	Mandar-1	Sulawesi Barat	-3.13924	118.961	17.80	Hydro Inventory Study_1997	
JicaPR_0817	Mandar-2	Sulawesi Barat	-3.23099	118.997	19.10	Hydro Inventory Study_1997	
JicaPR_0818	Mandar-3	Sulawesi Barat	-3.37622	119.018	17.20	Hydro Inventory Study_1997	
JicaPR_0820	Manyamba	Sulawesi Barat	-3.15061	118.865	13.90	Hydro Inventory Study_1997	
JicaPR_0812	Mapili-1	Sulawesi Barat	-3.04606	119.076	72.60	Hydro Inventory Study_1997	
JicaPR_0813	Mapili-2	Sulawesi Barat	-3.14412	119.08	90.60	Hydro Inventory Study_1997	
JicaPR_0814	Mapili-3	Sulawesi Barat	-3.29238	119.119	55.10	Hydro Inventory Study_1997	
JicaPR_0815	Masuni	Sulawesi Barat	-3.19018	119.15	413.30	Hydro Inventory Study_1997	
hp_0525	Masuni	Sulawesi Barat	-3.20000	119.13333	4.20	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0819	Matana-2	Sulawesi Barat	-3.34547	118.99	6.90	Hydro Inventory Study_1997	
JicaPR_0811	Rentelema	Sulawesi Barat	-2.92989	119.216	6.70	Hydro Inventory Study_1997	
hp_0709	Andolaki-2	Sulawesi Selatan			7.91	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0780	Awo	Sulawesi Selatan	-3.70426	120.17	2.10	Hydro Inventory Study_1997	
hp_0711	Awo	Sulawesi Selatan			2.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0779	Bajo	Sulawesi Selatan	-3.36809	120.189	1.80	Hydro Inventory Study_1997	
hp_0714	Bajo	Sulawesi Selatan			1.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0026	Bakaru	Sulawesi Selatan	-3.47981	119.65173	126.00	Consultant	Screened out
JicaEX_0088	Bakaru (1st Stage)	Sulawesi Selatan	-3.45417	119.623	126.00	Hydro Inventory Study_1997	
JicaEX_0089	Bakaru (2nd Stage)	Sulawesi Selatan	-3.463085	119.63707	126.00	Hydro Inventory Study_1997	
hp_0149	Bakaru (2nd)	Sulawesi Selatan	-3.45000	119.60000	126.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0100	Balambano	Sulawesi Selatan	-2.64482	121.22009	13.00	Consultant	
hp_0235	Baliase	Sulawesi Selatan	-2.42081	120.37490	9.00	PLN (3 - Minihydro IPP Project)	
hp_0414	Bantaeng-1	Sulawesi Selatan	-5.38719	120.01194	4.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0086	Batu	Sulawesi Selatan	-3.427605	119.711494	271.10	Hydro Inventory Study_1997	
hp_0484	Batu	Sulawesi Selatan	-3.43333	119.70000	271.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0786	Batuputi	Sulawesi Selatan	-4.78268	119.954	11.70	Hydro Inventory Study_1997	
hp_0242	Belajen	Sulawesi Selatan	-3.31333	119.82778	8.30	PLN (3 - Minihydro IPP Project)	
JicaEX_0084	Bili-Bili	Sulawesi Selatan	-5.279	119.585	11.20	Hydro Inventory Study_1997	
hp_0002	Bili-bili	Sulawesi Selatan	-5.27960	119.58533	2.00	Consultant	Screened out
JicaPR_0808	Bonto Batu	Sulawesi Selatan	-3.4687	119.758	235.70	Hydro Inventory Study_1997	
hp_0458	Bonto Batu	Sulawesi Selatan	-3.28333	119.70000	1.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0744	Bontotene (Takapala)	Sulawesi Selatan			1.70	PLN (3 - Minihydro IPP Project)	
hp_0408	Bungin	Sulawesi Selatan	-3.52861	119.94228	3.00	PLN (3 - Minihydro IPP Project)	
hp_0251	Bungin III	Sulawesi Selatan	-3.51947	120.00169	5.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0788	Cancadi	Sulawesi Selatan	-4.5624	119.869	12.40	Hydro Inventory Study_1997	
hp_0258	Dataru	Sulawesi Selatan	-5.44784	119.79549	6.60	PLN (3 - Minihydro IPP Project)	Screened out
hp_0493	Eremerasa	Sulawesi Selatan	-5.47013	120.01551	1.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0808	Iwoimenda	Sulawesi Selatan			8.65	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0798	Jeneberang	Sulawesi Selatan	-5.28073	119.752	21.00	Hydro Inventory Study_1997	
JicaPR_0799	Janetakka	Sulawesi Selatan	-5.34931	119.665	6.10	Hydro Inventory Study_1997	
hp_0813	Janetakka	Sulawesi Selatan			6.10	PLN (2 - MHPP in HPPS)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0618	Kahaya	Sulawesi Selatan			4.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0770	Kalaena-1	Sulawesi Selatan	-2.268813	120.64979	39.50	Hydro Inventory Study_1997	
JicaPR_0771	Kalaena-2	Sulawesi Selatan	-2.339911	120.720916	41.59	Hydro Inventory Study_1997	
JicaPR_0772	Kalaena-3	Sulawesi Selatan	-2.41954	120.772131	53.54	Hydro Inventory Study_1997	
JicaPR_0790	Kalempang-1	Sulawesi Selatan	-3.53241	119.944	15.30	Hydro Inventory Study_1997	
JicaPR_0791	Kalempang-2	Sulawesi Selatan	-3.68342	119.93	21.80	Hydro Inventory Study_1997	
JicaPR_0792	Kalempang-3	Sulawesi Selatan	-3.74337	120.067	7.10	Hydro Inventory Study_1997	
hp_0819	Kalempang-3	Sulawesi Selatan			7.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0050	Karaloe Datara	Sulawesi Selatan	-5.47689	119.79514	9.00	Consultant	Screened out
JicaPR_0823	Karama-1	Sulawesi Selatan	-2.3258	119.668	824.70	Hydro Inventory Study_1997	
hp_0507	Karama-1	Sulawesi Selatan	-2.33333	119.66667	8.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0116	Karebe	Sulawesi Selatan	-2.66844	121.18536	14.00	Consultant	
JicaPR_0796	Kelarat-1	Sulawesi Selatan	-5.54991	119.801	25.20	Hydro Inventory Study_1997	
JicaPR_0797	Kelarat-2	Sulawesi Selatan	-5.6051	119.748	19.40	Hydro Inventory Study_1997	
hp_0842	Kondongan	Sulawesi Selatan			3.45	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0789	Langkana	Sulawesi Selatan	-4.47713	119.872	6.60	Hydro Inventory Study_1997	
hp_0854	Langkana	Sulawesi Selatan			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0083	Larona	Sulawesi Selatan	-2.771889	121.329445	165.00	Hydro Inventory Study_1997	
hp_0043	Larona	Sulawesi Selatan	-2.67100	121.26028	165.00	Consultant	Screened out
hp_0857	Lasolo-2	Sulawesi Selatan			3.42	PLN (2 - MHPP in HPPS)	Screened out
hp_0872	Madong	Sulawesi Selatan			1.00	PLN (3 - Minihydro IPP Project)	
JicaEX_0085	Malea	Sulawesi Selatan	-3.176493	119.771231	182.00	Hydro Inventory Study_1997	
hp_0403	Malea	Sulawesi Selatan	-3.16667	119.76667	182.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_1008	Malea (Excess Power)	Sulawesi Selatan			6.70	PLN (3 - Minihydro IPP Project)	
hp_1081	Malea (FTP 2)	Sulawesi Selatan			90.00	RUPTL	
hp_0523	Mallawa	Sulawesi Selatan	-4.82222	119.88222	5.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0300	Malua	Sulawesi Selatan	-3.29806	119.94761	4.60	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0807	Mandate	Sulawesi Selatan	-3.43526	119.801	203.80	Hydro Inventory Study_1997	
hp_0879	Mappung	Sulawesi Selatan			0.29	PLN (3 - Minihydro IPP Project)	
JicaPR_0800	Maros	Sulawesi Selatan	-5.16229	119.759	26.90	Hydro Inventory Study_1997	
JicaPR_0801	Masupu-1	Sulawesi Selatan	-3.09842	119.629	40.50	Hydro Inventory Study_1997	
JicaPR_0802	Masupu-2	Sulawesi Selatan	-3.27303	119.694	145.00	Hydro Inventory Study_1997	
JicaPR_0806	Mata Alo-1	Sulawesi Selatan	-3.43625	119.942	9.00	Hydro Inventory Study_1997	
hp_0885	Mata Alo-1	Sulawesi Selatan			9.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0809	Mataalo-3	Sulawesi Selatan	-3.54509	119.787	71.30	Hydro Inventory Study_1997	
hp_0886	Matana-2	Sulawesi Selatan			6.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0782	Minraleng-1	Sulawesi Selatan	-4.87933	119.93	31.90	Hydro Inventory Study_1997	
JicaPR_0783	Minraleng-2	Sulawesi Selatan	-4.82012	119.979	42.60	Hydro Inventory Study_1997	
JicaPR_0785	Mong	Sulawesi Selatan	-4.47515	120.016	264.00	Hydro Inventory Study_1997	
hp_0531	Mong	Sulawesi Selatan	-4.48333	120.00000	255.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0805	Paleleng-2	Sulawesi Selatan	-3.48474	119.661	112.10	Hydro Inventory Study_1997	
JicaPR_0777	Paramang-1	Sulawesi Selatan	-3.19711	120.063	12.60	Hydro Inventory Study_1997	
JicaPR_0778	Paramang-2	Sulawesi Selatan	-3.26855	120.205	31.50	Hydro Inventory Study_1997	
hp_0640	Pasui	Sulawesi Selatan			1.90	PLN (3 - Minihydro IPP Project)	
hp_0315	Pasui-2	Sulawesi Selatan	-3.43547	119.89486	6.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0773	Patikala-1	Sulawesi Selatan	-2.342753	120.410798	20.56	Hydro Inventory Study_1997	
JicaPR_0774	Patikala-2	Sulawesi Selatan	-2.430916	120.348211	19.91	Hydro Inventory Study_1997	
hp_1066	PLTM Tersebar Sulsel	Sulawesi Selatan			94.00	RUPTL	
JicaEX_0087	Poko	Sulawesi Selatan	-3.435396	119.593376	233.00	Hydro Inventory Study_1997	
hp_0316	Poko	Sulawesi Selatan	-3.43333	119.58333	233.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0642	Pongbatik	Sulawesi Selatan			3.48	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0768	Pongkeru-2	Sulawesi Selatan	-2.945006	121.245467	46.86	Hydro Inventory Study_1997	
JicaPR_0769	Pongkeru-3	Sulawesi Selatan	-2.799217	121.187409	235.11	Hydro Inventory Study_1997	
hp_0449	Ranteballa	Sulawesi Selatan	-3.35944	120.18314	2.40	PLN (3 - Minihydro IPP Project)	
hp_0927	Rentelemo	Sulawesi Selatan			6.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0436	Rongkong	Sulawesi Selatan	-2.61598	120.09483	8.10	PLN (3 - Minihydro IPP Project)	
JicaPR_0775	Rongkong-1	Sulawesi Selatan	-2.544673	120.137684	18.21	Hydro Inventory Study_1997	
JicaPR_0776	Rongkong-2	Sulawesi Selatan	-2.585911	120.023887	22.30	Hydro Inventory Study_1997	
hp_0399	Saluanoa	Sulawesi Selatan	-2.34145	120.79771	2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0674	Sawitto #1	Sulawesi Selatan			0.54	PLN (4 - Minihydro PLN Project)	
hp_0675	Sawitto #2	Sulawesi Selatan			0.54	PLN (4 - Minihydro PLN Project)	
hp_0676	Sawitto #3	Sulawesi Selatan			0.54	PLN (4 - Minihydro PLN Project)	
hp_0335	Simbuang	Sulawesi Selatan	-2.86436	120.03967	3.00	PLN (3 - Minihydro IPP Project)	
hp_0141	Siteba	Sulawesi Selatan	-2.77988	120.10267	7.50	PLN (3 - Minihydro IPP Project)	
JicaPR_0781	Siwa	Sulawesi Selatan	-3.64996	120.277	1.40	Hydro Inventory Study_1997	
hp_0948	Siwa	Sulawesi Selatan			1.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0804	Soreang	Sulawesi Selatan	-3.31169	119.455	833.00	Hydro Inventory Study_1997	
hp_0118	Tangka/Manippi	Sulawesi Selatan	-5.19976	120.02352	1.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0793	Tangkak-1	Sulawesi Selatan	-5.19107	120.048	8.90	Hydro Inventory Study_1997	
hp_0962	Tangkak-1	Sulawesi Selatan			8.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0794	Tangkak-2	Sulawesi Selatan	-5.1294	120.071	24.00	Hydro Inventory Study_1997	
JicaPR_0795	Tangkak-3	Sulawesi Selatan	-5.07425	120.088	34.40	Hydro Inventory Study_1997	
hp_0970	Toma-1	Sulawesi Selatan			2.81	PLN (2 - MHPP in HPPS)	Screened out
hp_0971	Toma-2	Sulawesi Selatan			2.52	PLN (2 - MHPP in HPPS)	Screened out
hp_0972	Toma-3	Sulawesi Selatan			2.66	PLN (2 - MHPP in HPPS)	Screened out
hp_0973	Toma-4	Sulawesi Selatan			5.45	PLN (2 - MHPP in HPPS)	Screened out
hp_0349	Tombolo Pao	Sulawesi Selatan	-5.18861	119.94000	2.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0787	Urapat	Sulawesi Selatan	-4.6057	119.85	23.90	Hydro Inventory Study_1997	
hp_0352	Ussu Malili	Sulawesi Selatan	-2.55278	121.10556	3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0784	Walimpong	Sulawesi Selatan	-4.50931	120	46.70	Hydro Inventory Study_1997	
hp_0994	Winning	Sulawesi Selatan			1.60	PLN (4 - Minihydro PLN Project)	
hp_0669	Alani	Sulawesi Tengah			5.60	PLN (3 - Minihydro IPP Project)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0732	Balingara	Sulawesi Tengah	-1.107043	121.908914	53.69	Hydro Inventory Study_1997	
hp_0609	Bambalo (PLN)	Sulawesi Tengah			2.64	PLN (4 - Minihydro PLN Project)	
hp_0236	Bambalo 2	Sulawesi Tengah	-1.43186	120.93211	1.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_0721	Bambalo II	Sulawesi Tengah			3.00	PLN (3 - Minihydro IPP Project)	
hp_0610	Banasu	Sulawesi Tengah			9.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0730	Bangketa-1	Sulawesi Tengah	-1.122851	122.153117	16.55	Hydro Inventory Study_1997	
JicaPR_0731	Bangketa-2	Sulawesi Tengah	-1.019219	122.117981	41.53	Hydro Inventory Study_1997	
hp_0241	Batu Nobota	Sulawesi Tengah	0.99625	120.89122	5.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0736	Batu	Sulawesi Tengah	-1.1969	122.511	19.30	Hydro Inventory Study_1997	
hp_0385	Bengkoli	Sulawesi Tengah	0.67889	120.19972	2.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0737	Biak (I, II, III)	Sulawesi Tengah			4.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0849	Binontoan	Sulawesi Tengah	1.186173	121.048462	29.28	Hydro Inventory Study_1997	
JicaPR_0727	Bongka-1	Sulawesi Tengah	-1.263371	121.734988	148.34	Hydro Inventory Study_1997	
JicaPR_0728	Bongka-2	Sulawesi Tengah	-1.208919	121.580385	193.03	Hydro Inventory Study_1997	
hp_0390	Bongkasoa	Sulawesi Tengah	-1.12944	121.47218	1.40	PLN (3 - Minihydro IPP Project)	Screened out
hp_0456	Buleleng	Sulawesi Tengah	-3.00233	122.18944	1.20	PLN (4 - Minihydro PLN Project)	
JicaPR_0850	Buol-1	Sulawesi Tengah	1.02076	121.224447	11.29	Hydro Inventory Study_1997	
JicaPR_0851	Buol-2	Sulawesi Tengah	0.948612	121.16989	26.60	Hydro Inventory Study_1997	
hp_0257	Dako	Sulawesi Tengah	1.08347	120.88933	1.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0747	Dopi	Sulawesi Tengah	-2.864618	122.052386	5.54	Hydro Inventory Study_1997	
hp_0787	Dopi	Sulawesi Tengah			5.54	PLN (2 - MHPP in HPPS)	Screened out
hp_0391	Halulai	Sulawesi Tengah	-1.43615	120.42816	1.20	PLN (4 - Minihydro PLN Project)	
hp_0052	Hanga-hanga	Sulawesi Tengah	-0.94527	122.76867	2.00	Consultant	
hp_0801	Hanga-hanga I	Sulawesi Tengah			1.60	PLN (4 - Minihydro PLN Project)	
hp_0802	Hanga-hanga II	Sulawesi Tengah			2.50	PLN (3 - Minihydro IPP Project)	
hp_0617	Hek	Sulawesi Tengah			2.50	PLN (3 - Minihydro IPP Project)	
hp_0826	Kalumpang	Sulawesi Tengah			1.25	PLN (3 - Minihydro IPP Project)	
JicaPR_0744	Karaua	Sulawesi Tengah	-2.328537	121.632754	25.65	Hydro Inventory Study_1997	
hp_0623	Kolondom	Sulawesi Tengah			1.60	PLN (4 - Minihydro PLN Project)	
hp_0281	Kolori	Sulawesi Tengah	-1.83753	120.27243	0.40	PLN (4 - Minihydro PLN Project)	
hp_0843	Korokabalo	Sulawesi Tengah			2.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0733	Labu-1	Sulawesi Tengah	-0.866222	122.526	3.70	Hydro Inventory Study_1997	Screened out
JicaPR_0734	Labu-2	Sulawesi Tengah	-0.805353	122.493	2.80	Hydro Inventory Study_1997	
hp_0697	Lambangan	Sulawesi Tengah			3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0722	Lambunu	Sulawesi Tengah	0.547397	120.935831	1.32	Hydro Inventory Study_1997	
hp_0849	Lambunu	Sulawesi Tengah			1.32	PLN (2 - MHPP in HPPS)	Screened out
hp_0515	Lariang - 8*	Sulawesi Tengah	-1.91667	120.10000	12.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0831	Lariang-1	Sulawesi Tengah	-1.79415	120.313	321.70	Hydro Inventory Study_1997	
hp_0856	Lariang-10	Sulawesi Tengah			7.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0841	Lariang-11	Sulawesi Tengah	-1.29848	119.698	12.30	Hydro Inventory Study_1997	
JicaPR_0832	Lariang-2	Sulawesi Tengah	-1.88251	120.195	254.90	Hydro Inventory Study_1997	
JicaPR_0833	Lariang-3	Sulawesi Tengah	-2.01246	120.2	112.90	Hydro Inventory Study_1997	
JicaPR_0834	Lariang-4	Sulawesi Tengah	-1.95005	120.155	424.30	Hydro Inventory Study_1997	
JicaPR_0835	Lariang-5	Sulawesi Tengah	-1.65935	120.023	472.80	Hydro Inventory Study_1997	
JicaPR_0836	Lariang-6	Sulawesi Tengah	-1.65083	119.869	217.20	Hydro Inventory Study_1997	
hp_0516	Lariang-6	Sulawesi Tengah	-1.66667	119.86667	29.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0838	Lariang-8	Sulawesi Tengah	-1.91086	120.102	12.90	Hydro Inventory Study_1997	
JicaPR_0839	Lariang-9	Sulawesi Tengah	-1.78414	120.037	12.40	Hydro Inventory Study_1997	
JicaPR_0745	Larongsangi	Sulawesi Tengah	-2.712467	121.952817	20.90	Hydro Inventory Study_1997	
hp_0865	Lobu	Sulawesi Tengah			5.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0735	Malik	Sulawesi Tengah	-0.655367	123.261	3.00	Hydro Inventory Study_1997	
JicaPR_0846	Maraja-1	Sulawesi Tengah	0.878224	120.877755	4.02	Hydro Inventory Study_1997	
hp_0880	Maraja-1	Sulawesi Tengah			4.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0847	Maraja-2	Sulawesi Tengah	0.832471	120.863676	4.29	Hydro Inventory Study_1997	
hp_0881	Maraja-2	Sulawesi Tengah			4.29	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0848	Maraja-3	Sulawesi Tengah	0.719212	120.579808	3.61	Hydro Inventory Study_1997	
hp_0882	Maraja-3	Sulawesi Tengah			3.61	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0739	Morowali	Sulawesi Tengah	-1.67615	121.431052	9.63	Hydro Inventory Study_1997	
hp_0638	Morowali	Sulawesi Tengah			9.63	PLN (2 - MHPP in HPPS)	Screened out
hp_0311	Paddumpu	Sulawesi Tengah	0.68823	120.24215	5.00	PLN (3 - Minihydro IPP Project)	
hp_0101	Palasa	Sulawesi Tengah	0.52042	120.41665	4.50	Consultant	Screened out
JicaPR_0844	Palu-2	Sulawesi Tengah	-1.33034	119.961	21.30	Hydro Inventory Study_1997	
JicaPR_0845	Palu-2A	Sulawesi Tengah	-1.27966	119.947	3.40	Hydro Inventory Study_1997	
hp_0639	Palu-2A	Sulawesi Tengah			3.40	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0090	Palu-3	Sulawesi Tengah	-1.285259	120.110732	74.80	Hydro Inventory Study_1997	
JicaPR_0726	Pandiri	Sulawesi Tengah	-1.51959	120.766	24.50	Hydro Inventory Study_1997	
JicaPR_0842	Pasangayu-1	Sulawesi Tengah	-1.08941	119.668	18.60	Hydro Inventory Study_1997	
JicaPR_0843	Pasangayu-2	Sulawesi Tengah	-1.28184	119.61	18.60	Hydro Inventory Study_1997	
hp_1064	PLTM Tersebar Sulteng	Sulawesi Tengah			35.20	RUPTL	
hp_0317	Ponju	Sulawesi Tengah	0.59611	120.10167	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0392	Pono	Sulawesi Tengah	-1.53919	120.02951	6.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1061	Poru Kabalo	Sulawesi Tengah			2.50	RUPTL	Screened out
hp_0017	Poso 2	Sulawesi Tengah	-1.64562	120.65569	195.00	Consultant	Screened out
JicaPR_0724	Poso-1	Sulawesi Tengah	-1.67002	120.654	200.50	Hydro Inventory Study_1997	
hp_0589	Poso-1	Sulawesi Tengah	-1.68333	120.65000	24.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0725	Poso-2	Sulawesi Tengah	-1.61372	120.698	136.50	Hydro Inventory Study_1997	
hp_0463	Poso-2	Sulawesi Tengah	-1.61667	120.68333	132.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0723	Ratodena	Sulawesi Tengah	-1.75315	120.645	28.60	Hydro Inventory Study_1997	
hp_0462	Sakita (Mampueno)	Sulawesi Tengah	-2.57600	121.96687	2.00	PLN (3 - Minihydro IPP Project)	
hp_0322	Sampaga	Sulawesi Tengah	0.66306	120.08194	1.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0649	Sansarino	Sulawesi Tengah			0.80	PLN (4 - Minihydro PLN Project)	
hp_0650	Sawidago II	Sulawesi Tengah			0.91	PLN (4 - Minihydro PLN Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0367	Sawidago-1 #1	Sulawesi Tengah	-1.74432	120.67429	0.38	PLN (4 - Minihydro PLN Project)	
hp_0394	Sawidago-3	Sulawesi Tengah	-1.75145	120.69358	1.60	PLN (4 - Minihydro PLN Project)	
JicaPR_0746	Siumbatu	Sulawesi Tengah	-2.780721	121.982684	9.05	Hydro Inventory Study_1997	
hp_0653	Siumbatu	Sulawesi Tengah			9.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0737	Solato-1	Sulawesi Tengah	-1.576029	121.596195	26.94	Hydro Inventory Study_1997	
JicaPR_0738	Solato-2	Sulawesi Tengah	-1.695472	121.654175	31.20	Hydro Inventory Study_1997	
JicaPR_0740	Sumara	Sulawesi Tengah	-1.701452	121.308408	8.22	Hydro Inventory Study_1997	
hp_0952	Sumara	Sulawesi Tengah			8.22	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0729	Taima	Sulawesi Tengah	-0.820643	122.378	2.10	Hydro Inventory Study_1997	
JicaPR_0741	Tambalako-1	Sulawesi Tengah	-2.275923	121.137717	18.12	Hydro Inventory Study_1997	
JicaPR_0742	Tambalako-2	Sulawesi Tengah	-2.248907	121.221633	25.06	Hydro Inventory Study_1997	
JicaPR_0743	Tambalako-3	Sulawesi Tengah	-2.277345	121.341133	38.70	Hydro Inventory Study_1997	
hp_0078	Tinombo	Sulawesi Tengah	0.44033	120.24615	1.70	Consultant	Screened out
hp_0393	Tomasa	Sulawesi Tengah	-1.67539	120.74675	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0661	Tomini II	Sulawesi Tengah			2.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0721	Tuladengi	Sulawesi Tengah	0.513963	121.094219	18.42	Hydro Inventory Study_1997	
hp_0603	Wawopada	Sulawesi Tengah			6.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0398	Yaentu	Sulawesi Tengah	-1.84075	120.86486	1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0758	Andolaki-1	Sulawesi Tenggara	-3.510456	121.264063	14.60	Hydro Inventory Study_1997	
JicaPR_0759	Andolaki-2	Sulawesi Tenggara	-3.517162	121.269351	7.91	Hydro Inventory Study_1997	
JicaPR_0760	Andolaki-3	Sulawesi Tenggara	-3.573385	121.31464	15.17	Hydro Inventory Study_1997	
JicaPR_0764	Iwoimenda	Sulawesi Tenggara	-3.751833	121.25435	8.65	Hydro Inventory Study_1997	
hp_1085	Konawe	Sulawesi Tenggara			50.00	RUPTL	
hp_0512	Konaweha*	Sulawesi Tenggara	-3.83333	121.91667	24.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0761	Konaweha-1	Sulawesi Tenggara	-3.434928	121.249969	22.17	Hydro Inventory Study_1997	
JicaPR_0762	Konaweha-2	Sulawesi Tenggara	-3.639417	121.513046	188.95	Hydro Inventory Study_1997	
JicaEX_0082	Konaweha-3	Sulawesi Tenggara	-3.766545	121.828797	23.87	Hydro Inventory Study_1997	
hp_0283	Konaweha-3	Sulawesi Tenggara	-3.73333	121.83333	24.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0409	Konaweha-4*	Sulawesi Tenggara	-3.70000	121.75000	26.00	PLN (1 - Masterplan of HEPP Development List)	
JicaPR_0748	Lalindu-1	Sulawesi Tenggara	-3.011079	121.954221	200.09	Hydro Inventory Study_1997	
JicaPR_0749	Lalindu-2	Sulawesi Tenggara	-3.146164	122.072296	85.90	Hydro Inventory Study_1997	
hp_0222	Lapai I	Sulawesi Tenggara	-3.37264	121.05708	4.00	PLN (4 - Minihydro PLN Project)	
hp_0221	Lapai II	Sulawesi Tenggara	-3.33652	121.04297	4.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0750	Lasolo-1	Sulawesi Tenggara	-3.15754	121.678252	58.62	Hydro Inventory Study_1997	
JicaPR_0751	Lasolo-2	Sulawesi Tenggara	-3.42487	121.705289	3.42	Hydro Inventory Study_1997	
JicaPR_0752	Lasolo-3	Sulawesi Tenggara	-3.323909	121.726618	11.27	Hydro Inventory Study_1997	
JicaEX_0081	Lasolo-4	Sulawesi Tenggara	-3.42629	122.011122	100.00	Hydro Inventory Study_1997	
hp_0407	Lasolo-4	Sulawesi Tenggara	-3.43333	121.98333	1.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0042	Lasusua 1	Sulawesi Tenggara	-3.54589	120.96619	3.10	Consultant	
hp_0041	Lasusua 2	Sulawesi Tenggara	-3.53086	120.94267	4.00	Consultant	
hp_0447	Mikuasi (PLN)	Sulawesi Tenggara	-3.24549	121.09686	0.50	PLN (4 - Minihydro PLN Project)	
JicaPR_0767	Pongkeru-1	Sulawesi Tenggara	-3.12768	121.305292	100.47	Hydro Inventory Study_1997	
hp_0096	Ranteangin 1	Sulawesi Tenggara	-3.63282	121.13919	2.00	Consultant	
hp_0095	Ranteangin 2	Sulawesi Tenggara	-3.63243	121.11635	2.00	Consultant	
hp_0094	Ranteangin 3	Sulawesi Tenggara	-3.62656	121.10613	1.30	Consultant	
hp_0093	Ranteangin 4	Sulawesi Tenggara	-3.61722	121.09856	3.00	Consultant	
hp_0092	Ranteangin 5	Sulawesi Tenggara	-3.63532	121.07142	4.50	Consultant	
hp_0091	Ranteangin 6	Sulawesi Tenggara	-3.63631	121.07090	6.30	Consultant	
hp_0090	Ranteangin 7	Sulawesi Tenggara	-3.64216	121.05341	2.10	Consultant	
hp_0089	Ranteangin 8	Sulawesi Tenggara	-3.61628	121.09670	1.60	Consultant	
hp_0401	Riorita	Sulawesi Tenggara	-3.12278	121.13278	1.00	PLN (4 - Minihydro PLN Project)	
hp_0438	Rongi	Sulawesi Tenggara	-5.52979	122.73903	0.80	PLN (4 - Minihydro PLN Project)	
hp_0434	Sabilambo	Sulawesi Tenggara	-4.05728	121.70453	2.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0763	Tamboli	Sulawesi Tenggara			21.35	Hydro Inventory Study_1997	
JicaEX_0105	Tamboli	Sulawesi Tenggara	-3.88006	121.353	25.82	Hydro Inventory Study_1997	
hp_0410	Tamboli	Sulawesi Tenggara	-3.88333	121.36667	25.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0605	Toaha	Sulawesi Tenggara			1.00	PLN (4 - Minihydro PLN Project)	
JicaPR_0753	Toma-1	Sulawesi Tenggara	-3.470371	121.544545	2.81	Hydro Inventory Study_1997	
JicaPR_0754	Toma-2	Sulawesi Tenggara	-3.55711	121.544558	2.52	Hydro Inventory Study_1997	
JicaPR_0755	Toma-3	Sulawesi Tenggara	-3.476059	121.622785	2.66	Hydro Inventory Study_1997	
JicaPR_0756	Toma-4	Sulawesi Tenggara	-3.589815	121.661485	5.45	Hydro Inventory Study_1997	
JicaPR_0757	Toma-5	Sulawesi Tenggara	-3.655225	121.602881	33.87	Hydro Inventory Study_1997	
hp_1041	Watunohu	Sulawesi Tenggara			15.00	RUPTL	
JicaPR_0765	Watunohu-1	Sulawesi Tenggara	-3.396286	121.095037	58.57	Hydro Inventory Study_1997	
hp_0406	Watunohu-1	Sulawesi Tenggara	-3.40000	121.08333	57.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0766	Watunohu-2	Sulawesi Tenggara	-3.373451	121.079133	17.60	Hydro Inventory Study_1997	
hp_0072	Wining	Sulawesi Tenggara	-5.40235	122.90155	1.60	Consultant	
JicaPR_0852	Anagilen	Sulawesi Barat	0.872754	123.181	5.20	Hydro Inventory Study_1997	
hp_0707	Anagilen	Sulawesi Barat			5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0859	Ayung	Sulawesi Barat	0.791306	123.915	8.60	Hydro Inventory Study_1997	
hp_0712	Ayung	Sulawesi Barat			8.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0853	Balaannaitam	Sulawesi Barat	0.850895	123.344	6.60	Hydro Inventory Study_1997	
hp_0715	Balaannaitam	Sulawesi Barat			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0856	Bayau-1	Sulawesi Barat	0.703591	123.581	4.90	Hydro Inventory Study_1997	
hp_0729	Bayau-1	Sulawesi Barat			4.90	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0113	Bone-2	Sulawesi Barat	0.501115	123.308143	26.60	Hydro Inventory Study_1997	
JicaPR_0711	Bulawa	Sulawesi Barat	0.48443	123.566	7.60	Hydro Inventory Study_1997	
hp_0748	Bulawa	Sulawesi Barat			7.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0749	Bulongo	Sulawesi Barat			8.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0054	Dominanga	Sulawesi Barat	0.34227	123.80791	1.30	Consultant	Screened out
hp_0259	Dominanga (IPP)	Sulawesi Barat	0.35811	123.79876	3.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0362	Duminanga	Sulawesi Barat	0.36103	123.83462	0.50	PLN (4 - Minihydro PLN Project)	Screened out

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_1035	Duminanga	Sulawesi Barat			3.50	RUPTL	Screened out
JicaPR_0860	Dumoga-1	Sulawesi Barat	0.581782	123.852	11.80	Hydro Inventory Study_1997	
JicaPR_0861	Dumoga-2	Sulawesi Barat	0.832007	124.103	35.00	Hydro Inventory Study_1997	
JicaPR_0858	Gamputa	Sulawesi Barat	0.789125	123.542	9.70	Hydro Inventory Study_1997	
hp_0790	Gamputa	Sulawesi Barat			9.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0854	llanga-1	Sulawesi Barat	0.683094	123.745	5.90	Hydro Inventory Study_1997	
hp_0804	llanga-1	Sulawesi Barat			5.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0855	llanga-2	Sulawesi Barat	0.741612	123.707	18.00	Hydro Inventory Study_1997	
hp_0840	Kilotiga	Sulawesi Barat			0.60	PLN (3 - Minihydro IPP Project)	
JicaPR_0870	Kuwil	Sulawesi Barat	1.4511	124.921	9.70	Hydro Inventory Study_1997	
hp_0624	Kuwil	Sulawesi Barat			9.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0846	Labu-1	Sulawesi Barat			3.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0847	Labu-2	Sulawesi Barat			2.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0297	Lelipang	Sulawesi Barat	3.48652	125.53915	0.60	PLN (4 - Minihydro PLN Project)	
hp_0422	Lobong	Sulawesi Barat	0.77274	124.24624	1.60	PLN (4 - Minihydro PLN Project)	
hp_0876	Malik	Sulawesi Barat			3.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0419	Mobuya	Sulawesi Barat	0.83607	124.42872	3.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0863	Mongondow	Sulawesi Barat	0.818936	124.138	20.20	Hydro Inventory Study_1997	
JicaPR_0864	Mooat	Sulawesi Barat	0.77851	124.455	0.50	Hydro Inventory Study_1997	
hp_0637	Mooat	Sulawesi Barat			0.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0906	Paguyaman-1	Sulawesi Barat			4.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0386	Pidung	Sulawesi Barat	0.51960	124.40200	2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1010	Poigar	Sulawesi Barat			2.40	PLN (4 - Minihydro PLN Project)	
hp_0097	Poigar 1	Sulawesi Barat	0.81560	124.43231	2.40	Consultant	Screened out
hp_1062	Poigar 2	Sulawesi Barat			30.00	RUPTL	Screened out
JicaPR_0865	Poigar-1	Sulawesi Barat	0.810621	124.444	6.60	Hydro Inventory Study_1997	
hp_1011	Poigar-1	Sulawesi Barat			6.60	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0091	Poigar-2	Sulawesi Barat	0.858475	124.411351	25.38	Hydro Inventory Study_1997	
JicaEX_0092	Poigar-3	Sulawesi Barat	0.878193	124.387272	13.54	Hydro Inventory Study_1997	
hp_0588	Poigar-3*	Sulawesi Barat	0.86667	124.38333	14.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0866	Poigar-4	Sulawesi Barat	0.969832	124.308	7.40	Hydro Inventory Study_1997	
hp_1012	Poigar-4	Sulawesi Barat			7.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0916	Pontak	Sulawesi Barat			0.60	PLN (4 - Minihydro PLN Project)	
hp_0920	Randangan-2	Sulawesi Barat			5.58	PLN (2 - MHPP in HPPS)	Screened out
hp_0321	Ranowangko	Sulawesi Barat	1.36731	124.68664	2.20	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0867	Ranoyapo-1	Sulawesi Barat	1.02499	124.532	12.50	Hydro Inventory Study_1997	
JicaPR_0868	Ranoyapo-2	Sulawesi Barat	1.13352	124.584	29.00	Hydro Inventory Study_1997	
JicaPR_0857	Sangkur/Bayau	Sulawesi Barat	0.830293	123.639	21.90	Hydro Inventory Study_1997	
JicaPR_0869	Sawangan	Sulawesi Barat	1.35016	124.947	9.20	Hydro Inventory Study_1997	
JicaEX_0109	Sawangan	Sulawesi Barat	1.35016	124.947	16.00	Hydro Inventory Study_1997	Screened out
hp_0366	Sawangan	Sulawesi Barat	1.25000	124.91667	16.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_1013	Sawangan	Sulawesi Barat			9.20	PLN (2 - MHPP in HPPS)	Screened out
hp_1055	Sawangan	Sulawesi Barat			12.00	RUPTL	Screened out
hp_0958	Taima	Sulawesi Barat			2.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0080	Tanggari 1	Sulawesi Barat	1.34856	124.92355	17.20	Consultant	Screened out
hp_0079	Tanggari 2	Sulawesi Barat	1.36436	124.93879	19.00	Consultant	Screened out
JicaEX_0094	Tanggari-1	Sulawesi Barat	1.32245	124.925	16.60	Hydro Inventory Study_1997	
JicaEX_0093	Tanggari-2	Sulawesi Barat	1.33664	124.934	19.00	Hydro Inventory Study_1997	
hp_0656	Tincep 1 (IPP)	Sulawesi Barat			0.40	PLN (3 - Minihydro IPP Project)	
hp_0657	Tincep 2 (IPP)	Sulawesi Barat			1.10	PLN (3 - Minihydro IPP Project)	Screened out
hp_0658	Tincep 3 (IPP)	Sulawesi Barat			2.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0659	Tincep 4 (IPP)	Sulawesi Barat			0.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0862	Toadon	Sulawesi Barat	0.815091	124.205	1.50	Hydro Inventory Study_1997	
hp_0660	Toadon	Sulawesi Barat			1.50	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0095	Tonsealama	Sulawesi Barat	1.29867	124.925	14.38	Hydro Inventory Study_1997	
hp_0077	Tonsealama	Sulawesi Barat	1.32968	124.92383	14.38	Consultant	Screened out
hp_0979	Ulung Peliang	Sulawesi Barat			1.00	PLN (4 - Minihydro PLN Project)	
hp_0999	Wulur Maatus	Sulawesi Barat			2.40	PLN (4 - Minihydro PLN Project)	
JicaPR_0243	Air Batang-2	Sumatera Barat	-1.859033	101.096312	18.40	Hydro Inventory Study_1997	
JicaPR_0245	Air Batung-2	Sumatera Barat	-1.947066	101.15407	21.00	Hydro Inventory Study_1997	
JicaPR_0248	Air Haji-1	Sumatera Barat	-1.764778	100.987915	13.60	Hydro Inventory Study_1997	
JicaPR_0250	Air Haji-2	Sumatera Barat	-1.894142	100.958961	27.30	Hydro Inventory Study_1997	
JicaPR_0263	Air Tuik	Sumatera Barat	-1.424755	100.691771	25.30	Hydro Inventory Study_1997	
hp_1037	Alahan Panjang	Sumatera Barat			3.00	RUPTL	
JicaPR_0268	Anai-1	Sumatera Barat	-0.552165	100.346071	19.50	Hydro Inventory Study_1997	
hp_0477	Anai-1	Sumatera Barat	-0.56667	100.33333	19.10	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0269	Anai-2	Sumatera Barat	-0.603428	100.344445	18.30	Hydro Inventory Study_1997	
JicaPR_0095	Asik	Sumatera Barat	0.673189	100.012962	4.30	Hydro Inventory Study_1997	
hp_0479	Asik	Sumatera Barat	0.66667	100.00000	4.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0280	Bangis	Sumatera Barat	0.422615	99.588307	7.50	Hydro Inventory Study_1997	
hp_0482	Bangis	Sumatera Barat	0.41667	99.58333	7.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0132	Bangka-1	Sumatera Barat	-1.434432	101.181692	34.70	Hydro Inventory Study_1997	
JicaPR_0282	Batahan-2	Sumatera Barat	0.506789	99.53765	13.40	Hydro Inventory Study_1997	
JicaPR_0283	Batahan-3	Sumatera Barat	0.454373	99.530927	21.30	Hydro Inventory Study_1997	
JicaEX_0014	Batang Agam	Sumatera Barat	-0.254186	100.525436	10.50	Hydro Inventory Study_1997	
hp_0018	Batang Agam	Sumatera Barat	-0.27271	100.55439	7.00	Consultant	Screened out
hp_0203	Batang Anai 1	Sumatera Barat	-0.51278	100.34094	3.20	PLN (3 - Minihydro IPP Project)	
JicaPR_0133	Batang Hari/Bangka	Sumatera Barat	-1.328663	101.187318	34.10	Hydro Inventory Study_1997	
JicaPR_0129	Batang Hari-1	Sumatera Barat	-1.213346	100.901531	27.10	Hydro Inventory Study_1997	
JicaPR_0130	Batang Hari-2	Sumatera Barat	-1.272002	100.963814	67.90	Hydro Inventory Study_1997	
JicaPR_0131	Batang Hari-3	Sumatera Barat	-1.344561	101.057368	63.90	Hydro Inventory Study_1997	
JicaPR_0134	Batang Hari-4	Sumatera Barat	-1.25941	101.263716	222.60	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0483	Batang Hari-4	Sumatera Barat	-1.26667	101.25000	216.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0136	Batang Hari-5A	Sumatera Barat	-1.175541	101.35202	82.70	Hydro Inventory Study_1997	
JicaPR_0137	Batang Hari-6A	Sumatera Barat	-1.068409	101.411039	70.50	Hydro Inventory Study_1997	
JicaPR_0138	Batang Hari-7A	Sumatera Barat	-0.949511	101.569322	45.40	Hydro Inventory Study_1997	
hp_0237	Batang Patimah	Sumatera Barat	0.01828	100.07847	2.80	PLN (3 - Minihydro IPP Project)	Screened out
hp_1065	Batang Samo	Sumatera Barat			7.00	RUPTL	
hp_1059	Batang Sangir	Sumatera Barat			10.00	RUPTL	
hp_0198	Batang Sumpur	Sumatera Barat	0.19730	100.12931	7.58	PLN (3 - Minihydro IPP Project)	
hp_0112	Batubusuk (Indarung)	Sumatera Barat	-0.90659	100.45683	4.74	Consultant	
hp_0133	Bayang	Sumatera Barat	-1.18815	100.59458	4.50	PLN (3 - Minihydro IPP Project)	
JicaEX_0025	Bayang-1	Sumatera Barat	-1.093055	100.663536	13.18	Hydro Inventory Study_1997	
JicaEX_0026	Bayang-2	Sumatera Barat	-1.135634	100.685286	30.90	Hydro Inventory Study_1997	
JicaPR_0264	Bayang-3	Sumatera Barat	-1.15811	100.622685	34.70	Hydro Inventory Study_1997	
hp_0180	Bukit Cubadak	Sumatera Barat	-0.31409	100.75948	9.22	PLN (3 - Minihydro IPP Project)	Screened out
hp_0250	Bukit Sileh	Sumatera Barat	-0.96028	100.71328	0.64	PLN (3 - Minihydro IPP Project)	Screened out
hp_0158	Gumanti I	Sumatera Barat	-1.11078	100.88431	4.00	PLN (3 - Minihydro IPP Project)	
hp_0363	Gumanti III	Sumatera Barat	-1.12417	100.90836	6.45	PLN (3 - Minihydro IPP Project)	
JicaPR_0124	Gumanti-1	Sumatera Barat	-1.102501	100.898534	16.20	Hydro Inventory Study_1997	
hp_0584	Gumanti-1	Sumatera Barat	-1.11667	100.88333	15.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0125	Gumanti-2	Sumatera Barat	-1.176606	101.016944	79.60	Hydro Inventory Study_1997	
JicaPR_0126	Gumanti-3	Sumatera Barat	-1.229907	101.144521	41.00	Hydro Inventory Study_1997	
hp_1034	Gumanti-3	Sumatera Barat			6.45	RUPTL	Screened out
hp_0157	Guntung	Sumatera Barat	-0.14864	100.24425	4.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1033	Gunung Tujuh	Sumatera Barat			8.00	RUPTL	Screened out
JicaPR_0249	Haji/Langik	Sumatera Barat	-1.857586	101.003833	15.80	Hydro Inventory Study_1997	
hp_1032	Hydro power	Sumatera Barat			10.00	RUPTL	
hp_0154	Induring	Sumatera Barat	-1.39522	100.61672	1.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_1027	Kambahan	Sumatera Barat			3.00	RUPTL	
JicaPR_0255	Kambang-1	Sumatera Barat	-1.474313	100.852029	39.10	Hydro Inventory Study_1997	
JicaPR_0256	Kambang-2	Sumatera Barat	-1.567884	100.776165	17.00	Hydro Inventory Study_1997	
JicaPR_0099	Kampar Kanan-1	Sumatera Barat	0.330589	100.326357	72.30	Hydro Inventory Study_1997	
JicaPR_0274	Kenaikan-1	Sumatera Barat	0.409126	99.733752	15.50	Hydro Inventory Study_1997	
JicaPR_0275	Kenaikan-2	Sumatera Barat	0.336719	99.719737	8.90	Hydro Inventory Study_1997	
hp_0508	Kenaikan-2	Sumatera Barat	0.33333	99.71667	8.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0226	Kerambil	Sumatera Barat	-1.15667	100.60403	1.40	PLN (3 - Minihydro IPP Project)	
JicaPR_0120	Kuantan-1	Sumatera Barat	-0.63107	100.997739	8.40	Hydro Inventory Study_1997	
hp_0513	Kuantan-1	Sumatera Barat	-0.63333	100.98333	8.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0257	Lanjajan-1	Sumatera Barat	-1.57128	100.859489	29.50	Hydro Inventory Study_1997	
JicaPR_0258	Lanjajan-2	Sumatera Barat	-1.634028	100.825966	11.30	Hydro Inventory Study_1997	
hp_0220	Laruang Gosan	Sumatera Barat	-0.08031	100.41156	4.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0114	Lawas	Sumatera Barat	-0.777643	100.801482	9.00	Hydro Inventory Study_1997	
hp_0388	Lawas	Sumatera Barat	-0.78333	100.80000	9.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0113	Lawas/Suo	Sumatera Barat	-0.840274	100.783748	3.60	Hydro Inventory Study_1997	
hp_0517	Lawas/Suo	Sumatera Barat	-0.85000	100.78333	3.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0861	Lempur	Sumatera Barat			0.87	PLN (4 - Minihydro PLN Project)	
hp_0466	Lintau I	Sumatera Barat	-0.39833	100.76694	9.00	PLN (3 - Minihydro IPP Project)	
hp_0037	Lower Bayangnyalo	Sumatera Barat	-1.14753	100.63040	7.26	Consultant	
hp_0677	Lubuk Gadang	Sumatera Barat			7.50	PLN (3 - Minihydro IPP Project)	
hp_0119	Lubuk Sao II	Sumatera Barat	-0.31089	100.11811	2.60	PLN (3 - Minihydro IPP Project)	
JicaPR_0092	Lubuk-2	Sumatera Barat	0.803261	99.860929	10.70	Hydro Inventory Study_1997	
hp_0384	Lubuk-4	Sumatera Barat	0.85000	99.96667	8.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0109	Lubukgadang	Sumatera Barat	-1.57916	101.31499	7.50	Consultant	
JicaPR_0102	Mahat-1	Sumatera Barat	0.090774	100.548465	24.70	Hydro Inventory Study_1997	
JicaPR_0103	Mahat-2	Sumatera Barat	0.213379	100.813144	52.40	Hydro Inventory Study_1997	
hp_1020	Mangani	Sumatera Barat			1.17	RUPTL	Screened out
hp_0629	Mangani	Sumatera Barat			1.17	PLN (3 - Minihydro IPP Project)	
hp_0117	Maninjau	Sumatera Barat	-0.31089	100.11811	68.00	Consultant	Screened out
JicaEX_0027	Maninjau-1	Sumatera Barat	-0.300127	100.150208	68.00	Hydro Inventory Study_1997	
JicaPR_0270	Maninjau-2	Sumatera Barat	-0.324551	100.104835	31.50	Hydro Inventory Study_1997	
JicaPR_0271	Masang-1	Sumatera Barat	-0.187959	100.259448	27.20	Hydro Inventory Study_1997	
JicaPR_0272	Masang-2	Sumatera Barat	-0.139126	100.226243	40.40	Hydro Inventory Study_1997	
hp_0465	Masang-2	Sumatera Barat	-0.15000	100.21667	52.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0273	Masang-3	Sumatera Barat	-0.10098	100.136658	198.90	Hydro Inventory Study_1997	
JicaEX_0104	Masang-3	Sumatera Barat	-0.10098	100.137	88.56	Hydro Inventory Study_1997	
hp_0213	Muara Sako	Sumatera Barat	-2.10658	101.23392	3.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0305	Muaro	Sumatera Barat	-1.07686	100.77672	0.24	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0254	Palangai Kacik	Sumatera Barat	-1.756469	100.927163	40.00	Hydro Inventory Study_1997	
JicaPR_0251	Palangai-1	Sumatera Barat	-1.607232	100.925453	40.50	Hydro Inventory Study_1997	
JicaPR_0252	Palangai-2	Sumatera Barat	-1.661103	100.941192	28.70	Hydro Inventory Study_1997	
JicaPR_0253	Palangai-3	Sumatera Barat	-1.737299	100.864911	61.00	Hydro Inventory Study_1997	
JicaPR_0276	Pasaman-1	Sumatera Barat	0.363144	99.870282	16.70	Hydro Inventory Study_1997	
JicaPR_0277	Pasaman-2	Sumatera Barat	0.315559	99.849295	123.20	Hydro Inventory Study_1997	
JicaPR_0278	Pasaman-3	Sumatera Barat	0.214739	99.850599	36.40	Hydro Inventory Study_1997	
hp_0389	Pasinggrahan	Sumatera Barat	-0.94761	100.71764	0.48	PLN (3 - Minihydro IPP Project)	
hp_1073	Patimah	Sumatera Barat			2.80	RUPTL	Screened out
JicaPR_0246	Penadah	Sumatera Barat	-2.033778	101.156472	52.70	Hydro Inventory Study_1997	
hp_0440	Pinang Awan (Muara Labuh)	Sumatera Barat	-1.57414	101.11754	0.40	PLN (4 - Minihydro PLN Project)	
hp_0202	Pinti Kayu	Sumatera Barat	-1.11801	100.89828	1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0116	Pulangki-1	Sumatera Barat	-0.904295	100.894423	32.30	Hydro Inventory Study_1997	
JicaPR_0117	Pulangki-2	Sumatera Barat	-0.806533	100.906914	41.30	Hydro Inventory Study_1997	
hp_0365	Rabi Jonggor	Sumatera Barat	0.39411	99.72131	4.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0435	Salido Kecil	Sumatera Barat	-1.29327	100.64088	0.66	PLN (3 - Minihydro IPP Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
JicaPR_0135	Sangir	Sumatera Barat	-1.661284	101.361346	42.70	Hydro Inventory Study_1997	
hp_1056	Sangir 1	Sumatera Barat			10.00	RUPTL	
hp_0935	Sangir Hulu	Sumatera Barat			1.00	PLN (3 - Minihydro IPP Project)	
hp_0194	Siamang Bunyi	Sumatera Barat	-0.14372	100.46067	1.70	PLN (3 - Minihydro IPP Project)	Screened out
hp_0193	Sianok Duku	Sumatera Barat	-0.19144	100.26181	6.60	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0118	Sibakur	Sumatera Barat	-0.828184	101.102045	10.10	Hydro Inventory Study_1997	
hp_0192	Sikarbau (IPP)	Sumatera Barat	0.38014	99.56392	2.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0127	Sikiah-1	Sumatera Barat	-1.179237	101.155898	59.60	Hydro Inventory Study_1997	
JicaPR_0128	Sikiah-2	Sumatera Barat	-1.209533	101.193062	27.20	Hydro Inventory Study_1997	
JicaPR_0108	Sinamar-1	Sumatera Barat	-0.316825	100.759303	37.30	Hydro Inventory Study_1997	
hp_0561	Sinamar-1	Sumatera Barat	-0.33333	100.75000	36.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0109	Sinamar-2	Sumatera Barat	-0.413456	100.753701	26.10	Hydro Inventory Study_1997	
hp_0562	Sinamar-2	Sumatera Barat	-0.41667	100.75000	25.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaEX_0013	Singkarak	Sumatera Barat	-0.622662	100.50102	175.00	Hydro Inventory Study_1997	
hp_0011	Singkarak	Sumatera Barat	-0.50953	100.34111	175.00	Consultant	Screened out
JicaPR_0110	Singkarak-2	Sumatera Barat	-0.551749	100.634788	3.10	Hydro Inventory Study_1997	
hp_0563	Singkarak-2	Sumatera Barat	-0.56667	100.63333	3.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0111	Singkarak-3	Sumatera Barat	-0.646502	100.781409	40.00	Hydro Inventory Study_1997	
JicaPR_0259	Sirantih-1	Sumatera Barat	-1.387297	100.793045	18.40	Hydro Inventory Study_1997	
JicaPR_0260	Sirantih-2	Sumatera Barat	-1.467827	100.73716	20.30	Hydro Inventory Study_1997	
JicaPR_0119	Sukam	Sumatera Barat	-0.729735	101.008862	28.40	Hydro Inventory Study_1997	
JicaPR_0096	Sumpur	Sumatera Barat	0.563178	100.088177	57.00	Hydro Inventory Study_1997	
JicaPR_0112	Sumpur	Sumatera Barat	-0.57892	100.917067	15.80	Hydro Inventory Study_1997	
JicaPR_0122	Sumpur	Sumatera Barat	-0.513937	100.476087	12.10	Hydro Inventory Study_1997	
hp_0083	Sumpur	Sumatera Barat	0.21494	100.12001	8.00	Consultant	Screened out
hp_1052	Sungai Aur	Sumatera Barat			2.30	RUPTL	
hp_1051	Sungai Garam Hydro	Sumatera Barat			10.00	RUPTL	
hp_0955	Sungai Penuh	Sumatera Barat			0.70	PLN (4 - Minihydro PLN Project)	
JicaPR_0115	Suo	Sumatera Barat	-0.788826	100.849758	3.80	Hydro Inventory Study_1997	
hp_0564	Suo	Sumatera Barat	-0.80000	100.83333	3.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0279	Talu	Sumatera Barat	0.206889	99.988326	18.20	Hydro Inventory Study_1997	
JicaPR_0247	Tapang	Sumatera Barat	-2.117482	101.188672	8.70	Hydro Inventory Study_1997	
hp_0344	Tapang	Sumatera Barat	-2.13333	101.18333	8.70	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0261	Taratak Tumpatih-1	Sumatera Barat	-1.238035	100.746355	30.30	Hydro Inventory Study_1997	
JicaPR_0262	Taratak Tumpatih-2	Sumatera Barat	-1.309883	100.705822	48.80	Hydro Inventory Study_1997	
hp_0189	Tarusan	Sumatera Barat	-1.05322	100.52369	3.20	PLN (3 - Minihydro IPP Project)	
JicaPR_0265	Tarusan-1	Sumatera Barat	-1.04993	100.530487	16.60	Hydro Inventory Study_1997	
JicaPR_0266	Tarusan-2	Sumatera Barat	-1.066701	100.51192	13.20	Hydro Inventory Study_1997	
JicaPR_0267	Tarusan-3	Sumatera Barat	-1.138027	100.497194	25.30	Hydro Inventory Study_1997	
hp_0604	Tuik	Sumatera Barat			6.30	PLN (3 - Minihydro IPP Project)	Screened out
hp_0053	Air Meo	Sumatera Selatan	-4.03323	103.75020	2.70	Consultant	
hp_0234	Babatan	Sumatera Selatan	-4.12914	103.62317	4.92	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0183	Bal	Sumatera Selatan	-3.134917	102.627329	22.60	Hydro Inventory Study_1997	
hp_0071	Belimbing Muaralangkap	Sumatera Selatan	-3.75102	102.72712	1.52	Consultant	
JicaPR_0176	Endikat-1	Sumatera Selatan	-4.139209	103.358559	39.30	Hydro Inventory Study_1997	
JicaPR_0177	Endikat-2	Sumatera Selatan	-4.087051	103.375556	22.30	Hydro Inventory Study_1997	
hp_0492	Endikat-2	Sumatera Selatan	-4.10000	103.36667	22.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0173	Enim-1	Sumatera Selatan	-4.218399	103.555204	17.40	Hydro Inventory Study_1997	
JicaPR_0174	Enim-2	Sumatera Selatan	-4.107694	103.637018	84.70	Hydro Inventory Study_1997	
JicaPR_0175	Enim-3	Sumatera Selatan	-4.066305	103.737407	100.00	Hydro Inventory Study_1997	
hp_0272	Karyanyata	Sumatera Selatan	-4.07194	103.66478	4.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0124	Komering	Sumatera Selatan	-4.23101	104.47244	1.40	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0167	Komering-1	Sumatera Selatan	-4.538749	104.063026	34.80	Hydro Inventory Study_1997	
JicaPR_0168	Komering-2	Sumatera Selatan	-4.519159	104.159117	14.40	Hydro Inventory Study_1997	
hp_0844	Kota Agung	Sumatera Selatan			0.60	PLN (4 - Minihydro PLN Project)	
JicaPR_0186	Kulus	Sumatera Selatan	-2.822143	102.271862	54.40	Hydro Inventory Study_1997	
JicaPR_0185	Kutu	Sumatera Selatan	-2.973298	102.321537	75.70	Hydro Inventory Study_1997	
JicaPR_0170	Laham	Sumatera Selatan	-4.182416	103.808012	16.40	Hydro Inventory Study_1997	
hp_0289	Lahat	Sumatera Selatan	-4.14022	103.36339	9.99	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0178	Lematang-1	Sumatera Selatan	-4.136857	103.274135	22.50	Hydro Inventory Study_1997	
JicaPR_0179	Lematang-2	Sumatera Selatan	-4.069483	103.327268	11.20	Hydro Inventory Study_1997	
JicaPR_0180	Lematang-3	Sumatera Selatan	-3.995248	103.357	24.50	Hydro Inventory Study_1997	
JicaEX_0018	Lematang-4	Sumatera Selatan	-3.908466	103.507935	12.15	Hydro Inventory Study_1997	
JicaPR_0181	Lematang-5	Sumatera Selatan	-3.849369	103.526954	28.60	Hydro Inventory Study_1997	
JicaPR_0209	Luas-1	Sumatera Selatan	-4.470973	103.456103	125.50	Hydro Inventory Study_1997	
JicaPR_0182	Musi-2	Sumatera Selatan	-3.712605	102.968088	50.20	Hydro Inventory Study_1997	
JicaPR_0188	Musi-3A	Sumatera Selatan	-3.691866	102.978375	58.10	Hydro Inventory Study_1997	
hp_0142	Niagara	Sumatera Selatan	-4.80689	103.91392	1.70	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0171	Ogan-1	Sumatera Selatan	-4.17463	103.752151	19.80	Hydro Inventory Study_1997	
JicaPR_0172	Ogan-2	Sumatera Selatan	-4.079308	103.794682	39.60	Hydro Inventory Study_1997	
JicaEX_0017	Ranau	Sumatera Selatan	-4.773941	103.880644	60.00	Hydro Inventory Study_1997	
JicaPR_0184	Rupit	Sumatera Selatan	-2.974919	102.654291	11.00	Hydro Inventory Study_1997	
JicaPR_0164	Saka-1	Sumatera Selatan	-4.386368	103.792618	15.40	Hydro Inventory Study_1997	
JicaPR_0165	Saka-2	Sumatera Selatan	-4.426235	103.836006	13.40	Hydro Inventory Study_1997	
hp_0327	Selabung	Sumatera Selatan	-4.63883	103.87483	4.50	PLN (3 - Minihydro IPP Project)	
JicaPR_0162	Selabung-2	Sumatera Selatan	-4.677236	103.828641	105.30	Hydro Inventory Study_1997	
JicaPR_0163	Selabung-3	Sumatera Selatan	-4.601906	103.911757	20.70	Hydro Inventory Study_1997	
JicaPR_0166	Selabung-4	Sumatera Selatan	-4.557276	104.039122	24.20	Hydro Inventory Study_1997	
hp_0946	Sidourip	Sumatera Selatan			0.10	PLN (4 - Minihydro PLN Project)	
JicaPR_0169	Telama	Sumatera Selatan	-4.66154	104.117515	14.60	Hydro Inventory Study_1997	
hp_0346	Telanaï Banding Agung	Sumatera Selatan	-4.77929	103.88836	6.00	PLN (3 - Minihydro IPP Project)	
hp_0663	Ulu Danau	Sumatera Selatan			0.22	PLN (3 - Minihydro IPP Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0470	Aek Godang	Sumatera Utara	2.14728	98.60847	4.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0673	Aek Raisan #1	Sumatera Utara			0.75	PLN (4 - Minihydro PLN Project)	
hp_0672	Aek Raisan #2	Sumatera Utara			0.75	PLN (4 - Minihydro PLN Project)	
hp_0471	Aek Rambe	Sumatera Utara	2.23391	98.46111	5.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0700	Aek Sibundong	Sumatera Utara			0.75	PLN (4 - Minihydro PLN Project)	
hp_0671	Aek Silang	Sumatera Utara			0.75	PLN (4 - Minihydro PLN Project)	
hp_0472	Aek Silang 2	Sumatera Utara	2.31151	98.77347	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0230	Aek Simadoras	Sumatera Utara	1.76211	99.30451	5.10	PLN (3 - Minihydro IPP Project)	Screened out
hp_0594	Aek Simonggo	Sumatera Utara	2.34569	98.45181	9.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0357	Aek Sisira Simandame	Sumatera Utara	2.19473	98.48473	4.60	PLN (3 - Minihydro IPP Project)	Screened out
hp_0473	Aek Tomuan-1	Sumatera Utara	2.70678	99.14825	8.00	PLN (3 - Minihydro IPP Project)	
hp_0376	Aek Tulas	Sumatera Utara	2.62280	98.63196	2.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0478	Anggoci	Sumatera Utara	2.28158	98.41850	9.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0034	Asahan 1	Sumatera Utara	2.49554	99.23466	18.00	Consultant	Screened out
hp_0595	Asahan 3	Sumatera Utara	2.56667	99.35000	174.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0454	Asahan 4-5	Sumatera Utara	2.58333	99.41667	6.00	PLN (1 - Masterplan of HEPP Development List)	
JicaEX_0008	Asahan-1	Sumatera Utara	2.48319	99.21234	180.00	Hydro Inventory Study_1997	
JicaEX_0009	Asahan-3	Sumatera Utara	2.558343	99.335881	400.00	Hydro Inventory Study_1997	
JicaPR_0075	Asahan-4	Sumatera Utara	2.591054	99.421979	100.70	Hydro Inventory Study_1997	
hp_0036	Bahbolon	Sumatera Utara	3.15133	99.18278	2.52	Consultant	
JicaPR_0063	Bahorok-1	Sumatera Utara	3.562153	97.975901	9.40	Hydro Inventory Study_1997	
hp_0480	Bahorok-1	Sumatera Utara	3.55000	97.96667	9.40	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0064	Bahorok-2	Sumatera Utara	3.564257	98.079583	32.30	Hydro Inventory Study_1997	
JicaPR_0089	Barumun-1	Sumatera Utara	1.040102	99.576431	8.50	Hydro Inventory Study_1997	
hp_0383	Barumun-1	Sumatera Utara	1.03333	99.56667	8.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0090	Barumun-2	Sumatera Utara	1.080935	99.573729	3.20	Hydro Inventory Study_1997	
hp_0382	Barumun-2	Sumatera Utara	1.06667	99.56667	3.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0281	Batahan-1	Sumatera Utara	0.560568	99.618894	13.50	Hydro Inventory Study_1997	
hp_0611	Batang Gadis	Sumatera Utara			0.90	PLN (4 - Minihydro PLN Project)	
hp_0358	Batang Toru	Sumatera Utara	1.95566	99.00597	7.50	PLN (3 - Minihydro IPP Project)	
hp_1054	Batang Toru (Tapstel)	Sumatera Utara			510.00	RUPTL	
hp_0359	Batang Toru 3	Sumatera Utara	1.93411	99.01803	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0360	Batang Toru 4	Sumatera Utara	1.91770	99.02562	1.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0065	Berkail-1	Sumatera Utara	3.470544	98.078289	17.60	Hydro Inventory Study_1997	
JicaPR_0066	Berkail-2	Sumatera Utara	3.485784	98.125432	7.30	Hydro Inventory Study_1997	
hp_0243	Berkail-2	Sumatera Utara	3.48333	98.11667	7.30	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0067	Berkail-3	Sumatera Utara	3.447583	98.165597	19.40	Hydro Inventory Study_1997	
JicaPR_0079	Bila-1	Sumatera Utara	1.937886	99.505453	5.80	Hydro Inventory Study_1997	
hp_0487	Bila-1	Sumatera Utara	1.93333	99.50000	5.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0080	Bila-2	Sumatera Utara	1.929631	99.565726	43.10	Hydro Inventory Study_1997	
hp_0488	Bila-2	Sumatera Utara	1.91667	99.55000	42.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0081	Bila-3	Sumatera Utara	1.952241	99.62991	44.00	Hydro Inventory Study_1997	
hp_0245	Bingai	Sumatera Utara	3.36225	98.46803	7.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0743	Boho	Sumatera Utara			0.20	PLN (4 - Minihydro PLN Project)	
hp_0069	Buaya Silinda	Sumatera Utara	3.24448	98.75925	3.60	Consultant	
JicaPR_0062	Buluh	Sumatera Utara	3.630588	98.117572	10.80	Hydro Inventory Study_1997	
JicaPR_0313	Butugarigis	Sumatera Utara	2.075175	98.511425	17.60	Hydro Inventory Study_1997	
JicaPR_0355	Cinendang-1	Sumatera Utara	2.437398	98.170783	262.60	Hydro Inventory Study_1997	
JicaPR_0356	Cinendang-2A	Sumatera Utara	2.476887	98.107968	66.30	Hydro Inventory Study_1997	
JicaPR_0287	Gadis-1	Sumatera Utara	0.763922	99.614732	68.80	Hydro Inventory Study_1997	
JicaPR_0288	Gadis-2	Sumatera Utara	1.018568	99.359454	181.30	Hydro Inventory Study_1997	
JicaPR_0289	Gadis-3	Sumatera Utara	1.055194	99.262296	106.20	Hydro Inventory Study_1997	
JicaPR_0293	Gadis-4	Sumatera Utara	1.106738	99.058677	5.20	Hydro Inventory Study_1997	
hp_0494	Gadis-4	Sumatera Utara	1.10000	99.05000	5.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0336	Gunung-1	Sumatera Utara	3.066865	98.193507	8.20	Hydro Inventory Study_1997	
hp_0498	Gunung-1	Sumatera Utara	3.06667	98.18333	8.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0337	Gunung-2	Sumatera Utara	3.025809	98.157017	23.00	Hydro Inventory Study_1997	
hp_0453	Hasang*	Sumatera Utara	2.28333	99.43333	4.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0261	Huta Padang	Sumatera Utara	2.77152	99.25899	1.00	PLN (3 - Minihydro IPP Project)	
hp_0128	Hutaraja	Sumatera Utara	2.31320	98.76973	5.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0084	Ilung	Sumatera Utara	1.511865	99.532588	12.50	Hydro Inventory Study_1997	
hp_1016	INALUM	Sumatera Utara			45.00	RUPTL	
hp_0266	Kamangin Nagori	Sumatera Utara	2.77264	99.20488	2.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0086	Kanan	Sumatera Utara	1.799425	99.741227	11.40	Hydro Inventory Study_1997	
hp_0506	Karai 1	Sumatera Utara	3.20305	98.84545	1.00	PLN (3 - Minihydro IPP Project)	
hp_0269	Karai 12	Sumatera Utara	3.09391	98.78176	6.00	PLN (3 - Minihydro IPP Project)	
hp_0127	Karai 13	Sumatera Utara	3.04610	98.78160	8.30	PLN (3 - Minihydro IPP Project)	Screened out
hp_0270	Karai 7	Sumatera Utara	3.10457	98.80920	6.70	PLN (3 - Minihydro IPP Project)	
JicaPR_0070	Ketekukan	Sumatera Utara	3.33548	98.304417	5.80	Hydro Inventory Study_1997	
hp_0276	Ketekukan	Sumatera Utara	3.33333	98.30000	5.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0424	Kombih 1	Sumatera Utara	2.59823	98.32260	1.50	PLN (4 - Minihydro PLN Project)	
hp_0423	Kombih 2	Sumatera Utara	2.61858	98.29147	1.50	PLN (4 - Minihydro PLN Project)	
hp_0282	Kombih-5	Sumatera Utara	2.64144	98.12497	9.99	PLN (3 - Minihydro IPP Project)	
JicaPR_0076	Kualu-1	Sumatera Utara	2.299293	99.480709	15.40	Hydro Inventory Study_1997	
JicaPR_0077	Kualu-2	Sumatera Utara	2.522963	99.540885	21.80	Hydro Inventory Study_1997	
JicaPR_0341	Kumbih-1	Sumatera Utara	2.64225	98.241268	14.20	Hydro Inventory Study_1997	
JicaPR_0342	Kumbih-2	Sumatera Utara	2.637016	98.117539	38.60	Hydro Inventory Study_1997	
JicaPR_0343	Kumbih-3	Sumatera Utara	2.617121	98.111387	42.80	Hydro Inventory Study_1997	
hp_0377	Kumbih-3	Sumatera Utara	2.61667	98.10000	41.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0287	Lae Kombih 3	Sumatera Utara	2.62069	98.28847	8.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0288	Lae Luhung	Sumatera Utara	2.83500	98.32018	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0514	Lae Ordi	Sumatera Utara	2.56472	98.28806	1.00	PLN (3 - Minihydro IPP Project)	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0378	Lae Ordi 2	Sumatera Utara	2.56667	98.16667	1.00	PLN (3 - Minihydro IPP Project)	
hp_0290	Lake Toba	Sumatera Utara	2.76667	98.68333	4.00	PLN (1 - Masterplan of HEPP Development List)	
hp_0291	Lau Gunung	Sumatera Utara	3.03789	98.17014	1.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0091	Lubuk-1	Sumatera Utara	0.805394	99.833525	6.00	Hydro Inventory Study_1997	
hp_0519	Lubuk-1	Sumatera Utara	0.80000	99.83333	6.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0093	Lubuk-4	Sumatera Utara	0.857147	99.967891	8.10	Hydro Inventory Study_1997	
JicaPR_0094	Lubuk-5	Sumatera Utara	0.852644	100.067161	22.10	Hydro Inventory Study_1997	
hp_0301	Mandoge	Sumatera Utara	2.73743	99.15868	1.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0088	Manggu	Sumatera Utara	1.280691	99.586409	8.90	Hydro Inventory Study_1997	
hp_0302	Manggu	Sumatera Utara	1.26667	99.58333	8.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0895	Munte	Sumatera Utara			0.80	PLN (4 - Minihydro PLN Project)	
JicaPR_0284	Natal	Sumatera Utara	0.688952	99.341652	24.10	Hydro Inventory Study_1997	
JicaPR_0078	Natas	Sumatera Utara	2.255743	99.612838	9.80	Hydro Inventory Study_1997	
hp_0308	Natas	Sumatera Utara	2.25000	99.60000	9.80	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0344	Ordi-1	Sumatera Utara	2.543166	98.281272	41.90	Hydro Inventory Study_1997	
JicaPR_0345	Ordi-2	Sumatera Utara	2.559681	98.224383	27.40	Hydro Inventory Study_1997	
JicaPR_0346	Ordi-3	Sumatera Utara	2.571114	98.163403	19.10	Hydro Inventory Study_1997	
hp_0533	Ordi-3	Sumatera Utara	2.56667	98.15000	18.40	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0347	Ordi-4	Sumatera Utara	2.554708	98.140165	48.80	Hydro Inventory Study_1997	
JicaPR_0348	Ordi-5	Sumatera Utara	2.525537	98.110079	27.20	Hydro Inventory Study_1997	
hp_0379	Ordi-5	Sumatera Utara	2.51667	98.10000	26.80	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0312	Pakkat	Sumatera Utara	2.12222	98.48611	1.00	PLN (3 - Minihydro IPP Project)	
hp_1019	Pandan	Sumatera Utara			7.60	RUPTL	
JicaPR_0082	Pane-1	Sumatera Utara	1.714576	99.546856	22.80	Hydro Inventory Study_1997	
JicaPR_0083	Pane-2	Sumatera Utara	1.605552	99.556838	11.70	Hydro Inventory Study_1997	
JicaPR_0085	Pane-3	Sumatera Utara	1.53224	99.605815	40.50	Hydro Inventory Study_1997	
hp_0313	Pargaringan	Sumatera Utara	1.94605	98.77420	8.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0291	Parlampungan-1	Sumatera Utara	0.855149	99.327146	44.50	Hydro Inventory Study_1997	
JicaPR_0292	Parlampungan-2	Sumatera Utara	0.902664	99.226664	36.10	Hydro Inventory Study_1997	
hp_0443	Parlilitan	Sumatera Utara	2.32929	98.42341	7.50	PLN (3 - Minihydro IPP Project)	Screened out
hp_0380	Parluasan	Sumatera Utara	2.28333	99.38889	4.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0314	Parmonangan	Sumatera Utara	2.11684	98.73953	9.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0307	Pinang	Sumatera Utara	2.075637	98.707753	21.80	Hydro Inventory Study_1997	
hp_1063	PLTM Tersebar Sumut	Sumatera Utara			96.00	RUPTL	
JicaPR_0310	Poring	Sumatera Utara	2.024569	98.821488	7.00	Hydro Inventory Study_1997	
hp_0537	Poring	Sumatera Utara	2.01667	98.81667	7.00	PLN (2 - MHPP in HPPS)	Screened out
hp_0318	Poring 1	Sumatera Utara	1.97144	98.79294	9.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0319	Poring 2	Sumatera Utara	1.96859	98.77331	9.00	PLN (3 - Minihydro IPP Project)	
JicaPR_0296	Puli-1	Sumatera Utara	1.749618	99.241469	33.70	Hydro Inventory Study_1997	
JicaPR_0297	Puli-2	Sumatera Utara	1.76145	99.209544	31.50	Hydro Inventory Study_1997	
JicaPR_0298	Puli-3	Sumatera Utara	1.758958	99.14911	6.20	Hydro Inventory Study_1997	
hp_0538	Puli-3	Sumatera Utara	1.75000	99.13333	6.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0285	Pungkul-1	Sumatera Utara	0.577725	99.749436	3.20	Hydro Inventory Study_1997	
hp_0539	Pungkul-1	Sumatera Utara	0.56667	99.73333	3.20	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0286	Pungkul-2	Sumatera Utara	0.63498	99.762679	4.20	Hydro Inventory Study_1997	
hp_0540	Pungkul-2	Sumatera Utara	0.63333	99.75000	4.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0541	Rahu 1	Sumatera Utara	2.41983	98.44577	8.20	PLN (3 - Minihydro IPP Project)	
hp_0542	Rahu 2	Sumatera Utara	2.37083	98.43611	6.40	PLN (3 - Minihydro IPP Project)	
hp_0320	Raisan Hutadokol	Sumatera Utara	1.85556	98.81094	7.00	PLN (3 - Minihydro IPP Project)	
hp_0543	Raisan Nagatimbul	Sumatera Utara	1.83611	98.83056	7.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0302	Raisan-1	Sumatera Utara	1.844769	98.835285	26.70	Hydro Inventory Study_1997	
hp_0544	Raisan-1	Sumatera Utara	1.83333	98.83333	26.20	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0303	Raisan-2	Sumatera Utara	1.874632	98.73768	40.50	Hydro Inventory Study_1997	
JicaPR_0350	Rambe	Sumatera Utara	2.244232	98.445121	22.10	Hydro Inventory Study_1997	
hp_0022	Renun	Sumatera Utara	2.78681	98.54087	82.00	Consultant	
JicaEX_0032	Renun-1	Sumatera Utara	2.61882	98.49317	82.00	Hydro Inventory Study_1997	
JicaPR_0331	Renun-2	Sumatera Utara	2.648574	98.467076	15.40	Hydro Inventory Study_1997	
JicaPR_0332	Renun-3	Sumatera Utara	2.682509	98.443799	20.20	Hydro Inventory Study_1997	
JicaPR_0333	Renun-4	Sumatera Utara	2.736241	98.390897	21.30	Hydro Inventory Study_1997	
JicaPR_0334	Renun-5	Sumatera Utara	2.888559	98.200242	7.10	Hydro Inventory Study_1997	
hp_0546	Renun-5	Sumatera Utara	2.88333	98.20000	7.10	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0335	Renun-6	Sumatera Utara	2.989114	98.155421	23.00	Hydro Inventory Study_1997	
JicaPR_0290	Salai-1	Sumatera Utara	1.25784	99.094921	20.40	Hydro Inventory Study_1997	
JicaPR_0338	Sebelin-1	Sumatera Utara	2.888283	98.049411	8.00	Hydro Inventory Study_1997	
hp_0324	Sebelin-1	Sumatera Utara	2.88333	98.03333	8.00	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0339	Sebelin-2	Sumatera Utara	2.909641	97.958465	28.50	Hydro Inventory Study_1997	
hp_0326	Sei Wampu	Sumatera Utara	3.39850	98.22775	9.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0058	Serangan-1	Sumatera Utara	3.710195	97.881023	27.20	Hydro Inventory Study_1997	
JicaPR_0059	Serangan-2	Sumatera Utara	3.650502	97.934244	21.70	Hydro Inventory Study_1997	
JicaPR_0060	Serangan-3	Sumatera Utara	3.70859	97.962078	16.60	Hydro Inventory Study_1997	
JicaPR_0061	Serangan-4	Sumatera Utara	3.720236	98.003746	52.20	Hydro Inventory Study_1997	
JicaPR_0304	Sibundong-1	Sumatera Utara	2.14441	98.764635	10.20	Hydro Inventory Study_1997	
JicaPR_0305	Sibundong-2	Sumatera Utara	2.131917	98.743823	9.90	Hydro Inventory Study_1997	
hp_0591	Sibundong-2	Sumatera Utara	2.11667	98.73333	9.90	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0306	Sibundong-3	Sumatera Utara	2.103348	98.733711	15.20	Hydro Inventory Study_1997	
JicaPR_0308	Sibundong-4	Sumatera Utara	2.07612	98.734891	32.20	Hydro Inventory Study_1997	
hp_0460	Sibundong-4	Sumatera Utara	2.06667	98.73333	31.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0309	Sibundong-5	Sumatera Utara	2.029826	98.759811	87.60	Hydro Inventory Study_1997	
JicaPR_0311	Sibundong-6	Sumatera Utara	1.956378	98.745598	10.40	Hydro Inventory Study_1997	
hp_0330	Sidikalang 1	Sumatera Utara	2.74861	98.37556	8.60	PLN (3 - Minihydro IPP Project)	
hp_0331	Sidikalang 2	Sumatera Utara	2.78303	98.33890	7.40	PLN (3 - Minihydro IPP Project)	
JicaPR_0294	Sigeon/Toba	Sumatera Utara	2.062621	99.01839	9.00	Hydro Inventory Study_1997	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
hp_0555	Sigeaon/Toba	Sumatera Utara	2.05000	99.01667	9.00	PLN (2 - MHPP in HPPS)	Screened out
JicaEX_0011	Siguragura	Sumatera Utara	2.503972	99.261901	286.00	Hydro Inventory Study_1997	
JicaPR_0087	Sihapos	Sumatera Utara	1.324255	99.582637	13.70	Hydro Inventory Study_1997	
JicaPR_0354	Sikundur	Sumatera Utara	2.428769	98.230696	26.60	Hydro Inventory Study_1997	
JicaPR_0074	Silang	Sumatera Utara	2.302388	98.775632	28.00	Hydro Inventory Study_1997	
hp_0015	Silau 2	Sumatera Utara	2.71243	99.12593	8.00	Consultant	Screened out
JicaPR_0072	Silau-1	Sumatera Utara	2.745781	99.178691	28.00	Hydro Inventory Study_1997	
JicaPR_0073	Silau-2	Sumatera Utara	2.767598	99.261109	19.80	Hydro Inventory Study_1997	
hp_0333	Silau-2	Sumatera Utara	2.71250	99.12568	7.50	PLN (3 - Minihydro IPP Project)	
hp_0558	Silinda	Sumatera Utara	3.22024	98.73680	6.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaPR_0351	Simanggo-1	Sumatera Utara	2.333204	98.441588	45.50	Hydro Inventory Study_1997	
JicaPR_0352	Simanggo-2	Sumatera Utara	2.290106	98.423134	60.30	Hydro Inventory Study_1997	
hp_0559	Simanggo-2	Sumatera Utara	2.28333	98.41667	9.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0353	Simanggo-3	Sumatera Utara	2.324131	98.32874	109.50	Hydro Inventory Study_1997	
hp_0334	Simbelin-1	Sumatera Utara	2.89372	98.04086	6.00	PLN (3 - Minihydro IPP Project)	
hp_0087	Simonggo Nambadia	Sumatera Utara	2.31009	98.42433	9.90	Consultant	
hp_0086	Simonggo Parduan	Sumatera Utara	2.27497	98.41161	1.00	Consultant	
hp_0336	Simonggo Tornaui	Sumatera Utara	2.34642	98.48118	8.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_1053	Simonggo-2	Sumatera Utara			90.00	RUPTL	
hp_0010	Sipansihaporas	Sumatera Utara	1.73621	98.84427	5.00	Consultant	
JicaEX_0029	Sipansihaporas-1	Sumatera Utara	1.743779	98.871512	33.00	Hydro Inventory Study_1997	
JicaEX_0030	Sipansihaporas-2	Sumatera Utara	1.73299	98.840454	17.00	Hydro Inventory Study_1997	
JicaPR_0312	Sirahar	Sumatera Utara	2.138256	98.499922	36.50	Hydro Inventory Study_1997	
JicaPR_0349	Siria	Sumatera Utara	2.251187	98.550212	16.80	Hydro Inventory Study_1997	
hp_0337	Siria	Sumatera Utara	2.25000	98.55000	16.50	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_0338	Sisira	Sumatera Utara	2.25697	98.54054	8.20	PLN (3 - Minihydro IPP Project)	Screened out
hp_0085	Sisira Pusuik	Sumatera Utara	2.23980	98.53452	6.22	Consultant	
hp_0567	Tanah Pinem	Sumatera Utara	2.98889	98.14583	1.00	PLN (3 - Minihydro IPP Project)	Screened out
JicaEX_0010	Tangga	Sumatera Utara	2.53446	99.298339	317.00	Hydro Inventory Study_1997	
hp_0081	Tangga	Sumatera Utara	2.56111	99.30961	317.00	Consultant	Screened out
hp_0343	Tanjung Lenggang	Sumatera Utara	3.54789	98.24011	1.00	PLN (3 - Minihydro IPP Project)	Screened out
hp_0345	Tara Bintang	Sumatera Utara	2.29114	98.36431	1.00	PLN (3 - Minihydro IPP Project)	
hp_0966	Tarutung	Sumatera Utara			0.12	PLN (4 - Minihydro PLN Project)	
JicaPR_0068	Tebah-1	Sumatera Utara	3.300161	98.096484	6.50	Hydro Inventory Study_1997	
hp_0569	Tebah-1	Sumatera Utara	3.30000	98.08333	6.50	PLN (2 - MHPP in HPPS)	Screened out
JicaPR_0069	Tebah-2	Sumatera Utara	3.307512	98.177884	23.40	Hydro Inventory Study_1997	
hp_0974	Tonduhan	Sumatera Utara			0.40	PLN (4 - Minihydro PLN Project)	
JicaEX_0028	Toru-1	Sumatera Utara	1.958647	99.005776	125.00	Hydro Inventory Study_1997	
JicaPR_0295	Toru-2	Sumatera Utara	1.917642	99.027642	34.20	Hydro Inventory Study_1997	
hp_0381	Toru-2	Sumatera Utara	1.91667	99.01667	33.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0299	Toru-3	Sumatera Utara	1.57528	99.165346	236.50	Hydro Inventory Study_1997	
hp_0575	Toru-3	Sumatera Utara	1.56667	99.15000	227.60	PLN (1 - Masterplan of HEPP Development List)	Screened out
JicaPR_0300	Toru-4	Sumatera Utara	1.536601	99.145991	18.70	Hydro Inventory Study_1997	
JicaPR_0301	Toru-5	Sumatera Utara	1.500861	99.116315	16.50	Hydro Inventory Study_1997	
JicaEX_0007	Wampu	Sumatera Utara	3.170607	98.23056	84.00	Hydro Inventory Study_1997	
hp_0103	Wampu	Sumatera Utara	3.25401	98.21286	45.00	Consultant	Screened out
hp_0600	Wampu	Sumatera Utara	3.16667	98.21667	84.00	PLN (1 - Masterplan of HEPP Development List)	Screened out
hp_1042	Wampu (FTP2)	Sumatera Utara			45.00	RUPTL	
JicaPR_0071	Wampu-5	Sumatera Utara	3.393457	98.235998	4.70	Hydro Inventory Study_1997	
hp_0601	Wampu-5	Sumatera Utara	3.38333	98.23333	4.70	PLN (2 - MHPP in HPPS)	Screened out
fs_81	PLTM Caringin	Jawa Barat	-6.89583	106.40222	4.29	PLN_pusat_repository	
fs_75	PLTM Cianten 1	Jawa Barat	-6.69029	106.64320	2.00	PLN_pusat_repository	
fs_92	PLTM Cianten 2	Jawa Barat	-6.67970	106.63695	5.00	PLN_pusat_repository	
fs_76	PLTM Cianten 3	Jawa Barat	-6.66645	106.63165	5.80	PLN_pusat_repository	
fs_77	PLTM Ciarinem	Jawa Barat	-7.46144	107.72686	3.00	PLN_pusat_repository	
fs_93	PLTM Ciasem	Jawa Barat	-6.64211	107.6525	3.00	PLN_pusat_repository	
fs_94	PLTM Cibalapulang 3	Jawa Barat	-7.20047	106.99286	9.00	PLN_pusat_repository	
fs_95	PLTM Cibatarua Panyairan	Jawa Barat	-7.38894	107.68830	8.23	PLN_pusat_repository	
fs_78	PLTM Cibuni	Jawa Barat	-7.20125	107.24722	3.20	PLN_pusat_repository	
fs_86	PLTM Cibuni Mandiri	Jawa Barat	-7.20156	107.26286	2.00	PLN_pusat_repository	
fs_96	PLTM Cicatih	Jawa Barat	-6.95155	106.75570	6.40	PLN_pusat_repository	
fs_69	PLTM Ciharang	Jawa Barat	-6.65200	107.51592	1.80	PLN_pusat	
fs_80	PLTM Cikaengan	Jawa Barat	-7.51262	107.92928	3.00	PLN_pusat_repository	
fs_79	PLTM Cikaengan 2	Jawa Barat	-7.57318	107.92641	7.18	PLN_pusat_repository	
fs_87	PLTM Cikandang	Jawa Barat	-7.45261	107.67525	6.00	PLN_pusat_repository	
fs_70	PLTM Cikawung Atas	Jawa Barat	-7.32708	107.54530	5.58	PLN_pusat	
fs_82	PLTM Cikawung Bawah	Jawa Barat	-7.33067	107.52225	2.50	PLN_pusat_repository	
fs_97	PLTM Cikopo 2	Jawa Barat	-7.36611	107.66694	5.58	PLN_pusat_repository	
fs_98	PLTM Cilaki	Jawa Barat	-7.30806	107.51944	5.40	PLN_pusat_repository	
fs_71	PLTM Cilayu Kulon	Jawa Barat	-7.38650	107.56592	5.20	PLN_pusat	
fs_72	PLTM Cileat	Jawa Barat	-6.78345	107.74950	5.18	PLN_pusat	
fs_88	PLTM Cironpang	Jawa Barat	-7.45049	107.60980	8.00	PLN_pusat_repository	
fs_99	PLTM Jatisari	Jawa Barat	-7.54363	107.85192	5.00	PLN_pusat_repository	
fs_100	PLTM Kalapa Nunggal	Jawa Barat	-7.32833	107.19444	3.00	PLN_pusat_repository	
fs_89	PLTM Kanzy 5	Jawa Barat	-7.48060	107.61122	5.00	PLN_pusat_repository	
fs_83	PLTM Kerta Mukti	Jawa Barat	-6.99069	106.75684	6.30	PLN_pusat_repository	
fs_101	PLTM Pesantren 1	Jawa Barat	-7.17131	107.17125	1.80	PLN_pusat_repository	
fs_73	PLTM Pusaka 1	Jawa Barat	-7.20417	107.22778	8.80	PLN_pusat	
fs_84	PLTM Pusaka 3	Jawa Barat	-7.23944	107.17972	3.00	PLN_pusat_repository	
fs_74	PLTM Sukamaju	Jawa Barat	-6.99361	106.74414	7.50	PLN_pusat	
fs_85	PLTM Toblong	Jawa Barat	-7.5845	107.92542	6.00	PLN_pusat_repository	
fs_90	PLTMH Kombongan	Jawa Barat	-7.42981	107.68206	1.90	PLN_pusat_repository	

ID	Project Name	Province	Latitude (WGS84)	Longitude (WGS84)	Installed Capacity (MW)	Source	Screening
fs_91	PLTM Sindang Cai	Jawa Barat	-6.60565	107.68132	0.85	PLN_pusat_repository	
fs_232	PLTM Aralle	Sulawesi Barat	-2.98812	119.06834	8.70	PLN_wilayah	
fs_231	PLTM Pamoseang	Sulawesi Barat	-2.99861	119.10339	6.00	PLN_wilayah	
fs_46	PLTM Batang Tuik	Sumatera Barat	-0.57125	100.69147	6.30	PLN_pusat	
fs_47	PLTM Bukit Cubadak	Sumatera Barat	-0.33264	100.76581	9.22	PLN_pusat	
fs_48	PLTM Bukit Sileh	Sumatera Barat	-0.96064	100.71342	0.70	PLN_pusat	
fs_56	PLTM Guntung	Sumatera Barat	-0.14858	100.24422	4.00	PLN_pusat_repository	
fs_59	PLTM Induring	Sumatera Barat	-1.39522	100.6195	1.20	PLN_pusat_repository	
fs_49	PLTM Laruang Gosan	Sumatera Barat	-0.08031	100.41156	4.09	PLN_pusat	
fs_50	PLTM Muara Sako	Sumatera Barat	-1.89342	101.23392	3.00	PLN_pusat	
fs_51	PLTM Muaro	Sumatera Barat	-1.07686	100.77672	0.24	PLN_pusat	
fs_57	PLTM Pinti Kayu	Sumatera Barat	1.11801	100.89828	10.00	PLN_pusat_repository	
fs_54	PLTM Siamang Bunyi	Sumatera Barat	-0.14372	100.46067	1.78	PLN_pusat	
fs_55	PLTM Sianok Duku	Sumatera Barat	-0.19144	100.26181	6.60	PLN_pusat	
fs_58	PLTM Sikarbau	Sumatera Barat	0.37819	99.56381	2.00	PLN_pusat_repository	
fs_52	PLTM Batang Patimah	Sumatera Barat	0.01809	100.07835	2.80	PLN_pusat	
fs_53	PLTM Rabi Jonggor	Sumatera Barat	0.39411	99.72131	4.51	PLN_pusat	
JicaPR_1160	Baunai***		-8.62927	126.109	1.30	Hydro Inventory Study_1997	
JicaPR_1170	Be Lulic-1***		-9.0487	125.466	21.60	Hydro Inventory Study_1997	
JicaPR_1171	Be Lulic-2***		-9.11933	125.478	6.80	Hydro Inventory Study_1997	
JicaPR_1156	Bebo***		-8.6651	125.935	1.90	Hydro Inventory Study_1997	
JicaPR_1161	Bui Huli-1***		-8.66185	126.382	9.20	Hydro Inventory Study_1997	
JicaPR_1162	Bui Huli-2***		-8.66212	126.415	1.90	Hydro Inventory Study_1997	
JicaPR_1167	Burahun***		-8.85573	125.96	14.50	Hydro Inventory Study_1997	
JicaPR_1164	Cala Glai***		-8.67054	126.687	2.40	Hydro Inventory Study_1997	
JicaPR_1175	Caraulun***		-8.99526	125.617	8.50	Hydro Inventory Study_1997	
JicaPR_1172	Coli Huno-1***		-8.89333	125.586	5.40	Hydro Inventory Study_1997	
JicaPR_1173	Coli Huno-2***		-8.91117	125.602	4.90	Hydro Inventory Study_1997	
JicaPR_1174	Coli Huno-3***		-8.94292	125.606	5.40	Hydro Inventory Study_1997	
JicaPR_1158	Comoro-1***		-8.66931	125.431	1.20	Hydro Inventory Study_1997	
JicaPR_1159	Comoro-2***		-8.65924	125.468	1.30	Hydro Inventory Study_1997	
JicaPR_1165	Cuha-1***		-8.76551	126.387	2.70	Hydro Inventory Study_1997	
JicaPR_1166	Cuha-2***		-8.80247	126.368	4.40	Hydro Inventory Study_1997	
JicaPR_1151	Daisoli***		-8.75396	125.602	3.70	Hydro Inventory Study_1997	
JicaPR_1169	Dilor***		-8.89386	126.083	1.30	Hydro Inventory Study_1997	
JicaPR_1148	Garai-1***		-8.83488	125.402	6.40	Hydro Inventory Study_1997	
JicaPR_1149	Garai-2***		-8.86008	125.369	7.50	Hydro Inventory Study_1997	
JicaPR_1147	Gleno-2***		-8.72258	125.324	6.10	Hydro Inventory Study_1997	
JicaEX_0102	Ira Lalaro***		-8.472102	127.223781	27.00	Hydro Inventory Study_1997	
JicaPR_1152	Lacló-1***		-8.72739	125.677	39.00	Hydro Inventory Study_1997	
JicaPR_1153	Lacló-2***		-8.73945	125.74	31.40	Hydro Inventory Study_1997	
JicaPR_1154	Lacló-3***		-8.65582	125.799	12.60	Hydro Inventory Study_1997	
JicaPR_1155	Lacló-4***		-8.59669	125.838	11.90	Hydro Inventory Study_1997	
JicaPR_1146	Lalowa***		-8.71809	125.382	10.70	Hydro Inventory Study_1997	
JicaPR_1157	Lihobani***		-8.60433	125.752	2.20	Hydro Inventory Study_1997	
JicaPR_1150	Magapu***		-8.91756	125.35	9.10	Hydro Inventory Study_1997	
JicaPR_1145	Mena (Kaubele)***		-9.32605	124.386	1.00	Hydro Inventory Study_1997	
JicaPR_1168	Sahen***		-8.95869	125.943	5.60	Hydro Inventory Study_1997	
JicaPR_1163	Seical***		-8.65389	126.451	4.70	Hydro Inventory Study_1997	
JicaPR_1176	Sui***		-8.94478	125.707	4.90	Hydro Inventory Study_1997	
hp_0727	Baunai***				1.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0730	Be Lulic-2***				6.80	PLN (2 - MHPP in HPPS)	Screened out
hp_0731	Bebo***				1.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0746	Bui Huli-1***				9.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0747	Bui Huli-2***				1.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0752	Cala Glai***				2.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0753	Caraulun***				8.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0768	Coli Huno-1***				5.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0769	Coli Huno-2***				4.90	PLN (2 - MHPP in HPPS)	Screened out
hp_0770	Coli Huno-3***				5.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0771	Comoro-1***				1.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0772	Comoro-2***				1.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0773	Cuha-1***				2.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0774	Cuha-2***				4.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0778	Daisoli***				3.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0782	Dilor***				1.30	PLN (2 - MHPP in HPPS)	Screened out
hp_0791	Garai-1***				6.40	PLN (2 - MHPP in HPPS)	Screened out
hp_0792	Garai-2***				7.50	PLN (2 - MHPP in HPPS)	Screened out
hp_0794	Gleno-2***				6.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0863	Lihobani***				2.20	PLN (2 - MHPP in HPPS)	Screened out
hp_0873	Magapu***				9.10	PLN (2 - MHPP in HPPS)	Screened out
hp_0932	Sahen***				5.60	PLN (2 - MHPP in HPPS)	Screened out
hp_0936	Seical***				4.70	PLN (2 - MHPP in HPPS)	Screened out
hp_0951	Sui***				4.90	PLN (2 - MHPP in HPPS)	Screened out

*** Former Indonesian territory (East Timor)

ANNEX II – GIS DATABASE USER’S MANUAL

1 INTRODUCTION

1.1 CONTEXT

The Geographic Information System (GIS) Database for Small Hydropower Planning was developed by the Consultant for small hydropower mapping and improved geospatial electrification planning in Indonesia based on PLN specific necessities and is currently hosted in PLN's server.

The main purpose of building up this central database on Small Hydropower (nationwide level) is to facilitate and improve the planning process of Small Hydropower in both grid and isolated systems in Indonesia.

The central GIS database for national information on Small Hydropower Planning (SHP Database) was developed in PostgreSQL which is an open source object-relational database management system (ORDBMS). This ORDBMS has a PostGIS extension which allows GIS objects to be stored in the database.

The visualization and management tools of this GIS Database are supported by a user-friendly open source Geographic Information System – QGIS. To provide customized options for easier and intuitive usage of the existing data in this database, a package of QGIS Plugins (version QGIS Essen 2.14) was developed.

WGS84 (World Geodetic System 84) is the adopted coordinate system by the GIS database for national information on Small Hydropower Planning, therefore all saved and visualized data are in this coordinate system.

1.2 INSTALLATION REQUIREMENTS

QGIS doesn't have a formal system requirement *per se*. However we recommend the following installation requirements for proper use and installation of the software:

- Processor: Intel I3 2 cores @2GHz (or superior)
- RAM: 4 GB (or superior)
- Hard Disk: 320 GB or superior (2GB minimum of free space)
- Operation System: Windows 7 or Windows 8
- Access to PLN server

2 INSTALLATION

The SHP Database installation process is simple and intuitive. For installing this application just follow the indications shown in this tutorial.

This software is available for Windows 7 and Windows 8 and it is similar in the two operating systems mentioned before. Nevertheless each of them has its particularities, so in this manual it will be shown how to install this application step-by-step in these two operating systems.

To start the installation process, double click on the installation file: **SHPDatabase.exe**. After you execute this file a new window will came up (Figure 2.1), where you should click **Next** to continue.

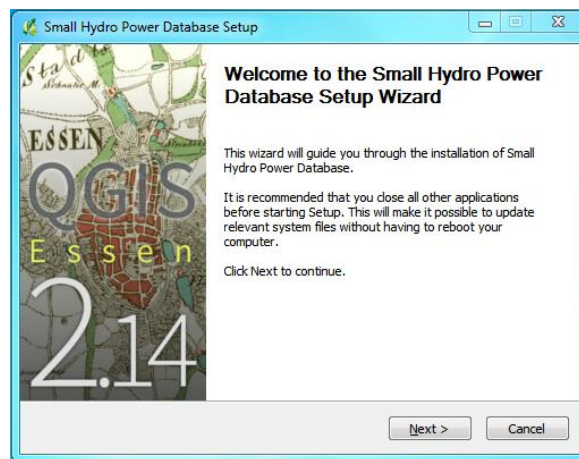


Figure 2.1 – Welcome to the Small Hydropower Database Setup.

Now you can read and agree to the terms and conditions of this software (Figure 2.2) and then press **I Agree**. During the installation you can cancel or go back to the previous menu at any point of the installation process.

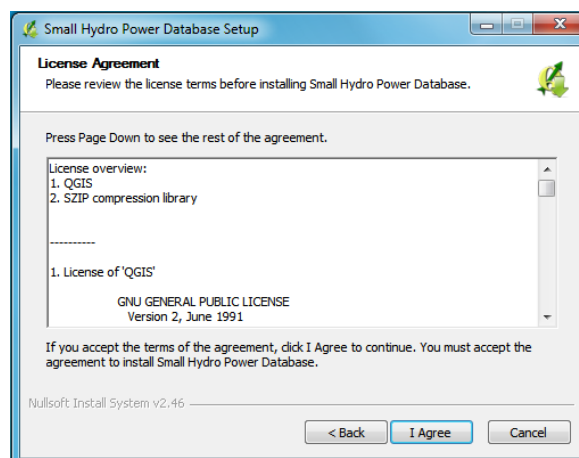


Figure 2.2 – License Agreement.

This software will be installed by default in the folder C:\Program Files (x86)\SHPDatabase, however you can change it if you want (Figure 2.3), just be aware of the installation requirements (hard disk space).

In case your operating system is **Windows 8** the folder where the software is installed is not optional – it has to be installed in C:\SHP.

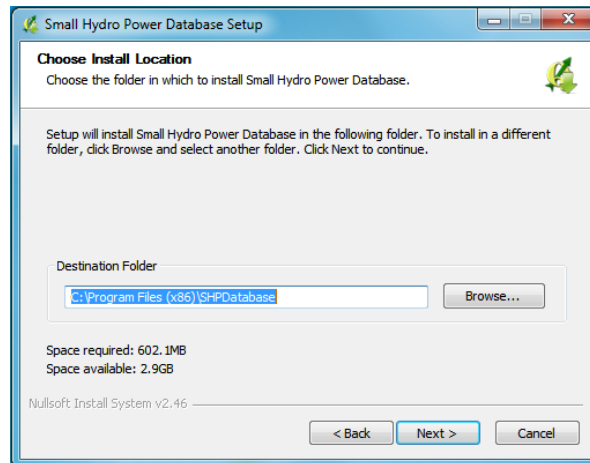


Figure 2.3 – Install Location.

Now you can start the core installation process by pressing **Install** (Figure 2.4).

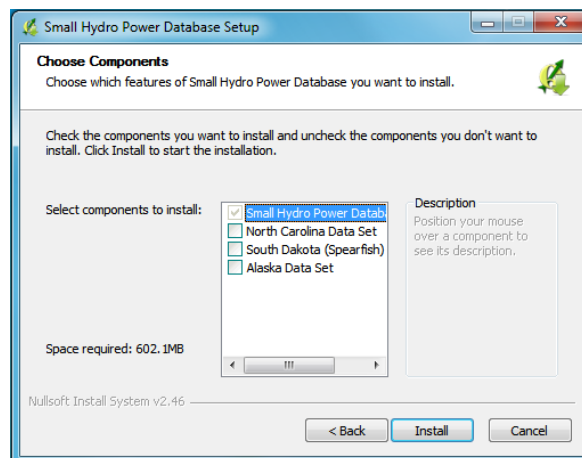


Figure 2.4 – Choose Components.

Wait while SHP installs and when the process ends, click on **Finish**. Your computer will reboot to make sure this process is concluded and all functions are available to function.

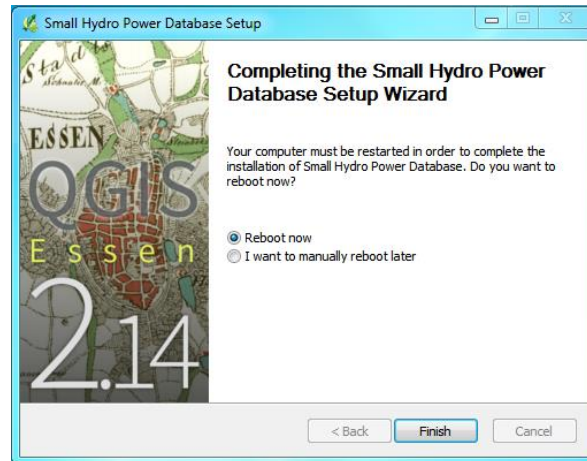


Figure 2.5 – Completing Setup.

For security reasons it is recommended that the software is installed by the System Administrator. Go to your installation folder through Windows Explorer (C:\Program Files (x86)\SHPDatabase or C:\SHP), Figure 2.6, right click with the mouse on the folder “SHPDatabase” and then go to “Properties”.

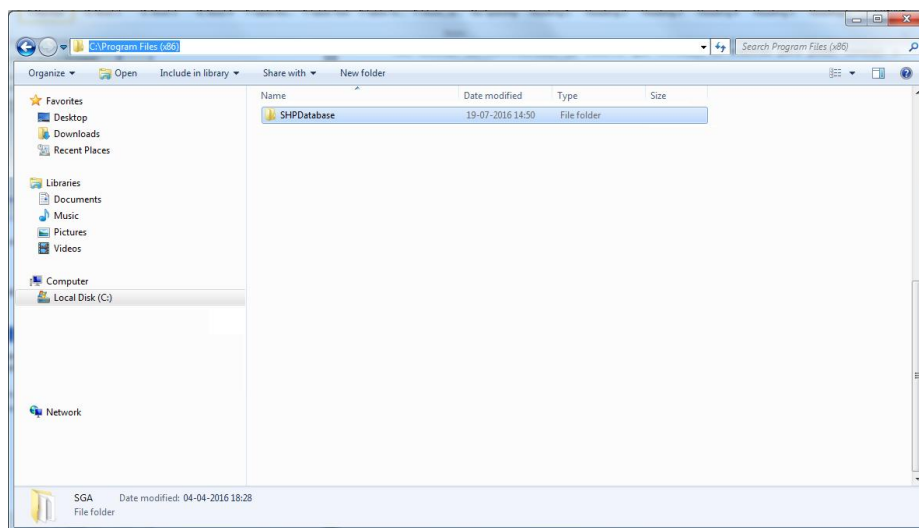


Figure 2.6 – SHP installation folder.

Next you must choose the tab “Security” and select your PC group of users on the first part of the window “Group and user names”. Then click on “Edit”, probably it will require the PC Administrator credentials, so please login the credentials in order to continue and successfully end this installation process.

Then select the option “Full Control” (Figure 2.7). Finally press “OK” and the SHPDatabase is ready for operation.

SMALL HYDROPOWER MAPPING REPORT – ANNEX II

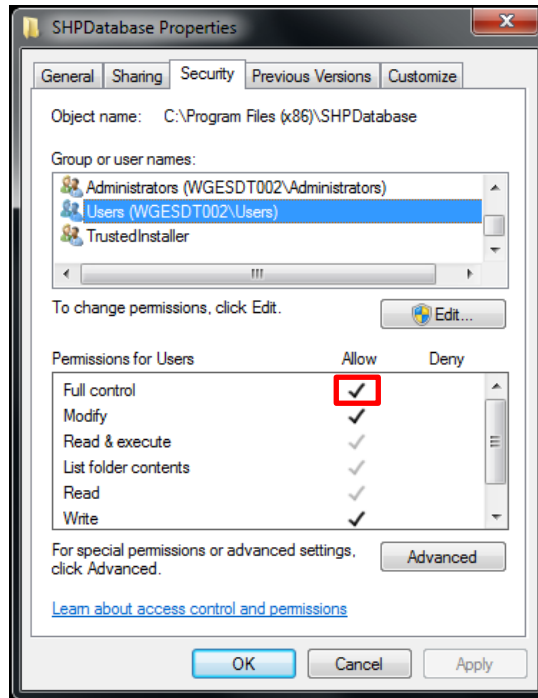


Figure 2.7 – SHP Permissions.

3 GIS DATABASE

3.1 CONTEXT

As previously mentioned, the GIS Database is supported by a user-friendly open source Geographic Information System – QGIS. Therefore we will present the QGIS Interface, all existing GIS database tools and the backup system.

3.2 QGIS INTERFACE

3.2.1 INITIAL SCREEN

When QGIS starts, you are presented with the user interface as shown in the Figure 3.1¹.

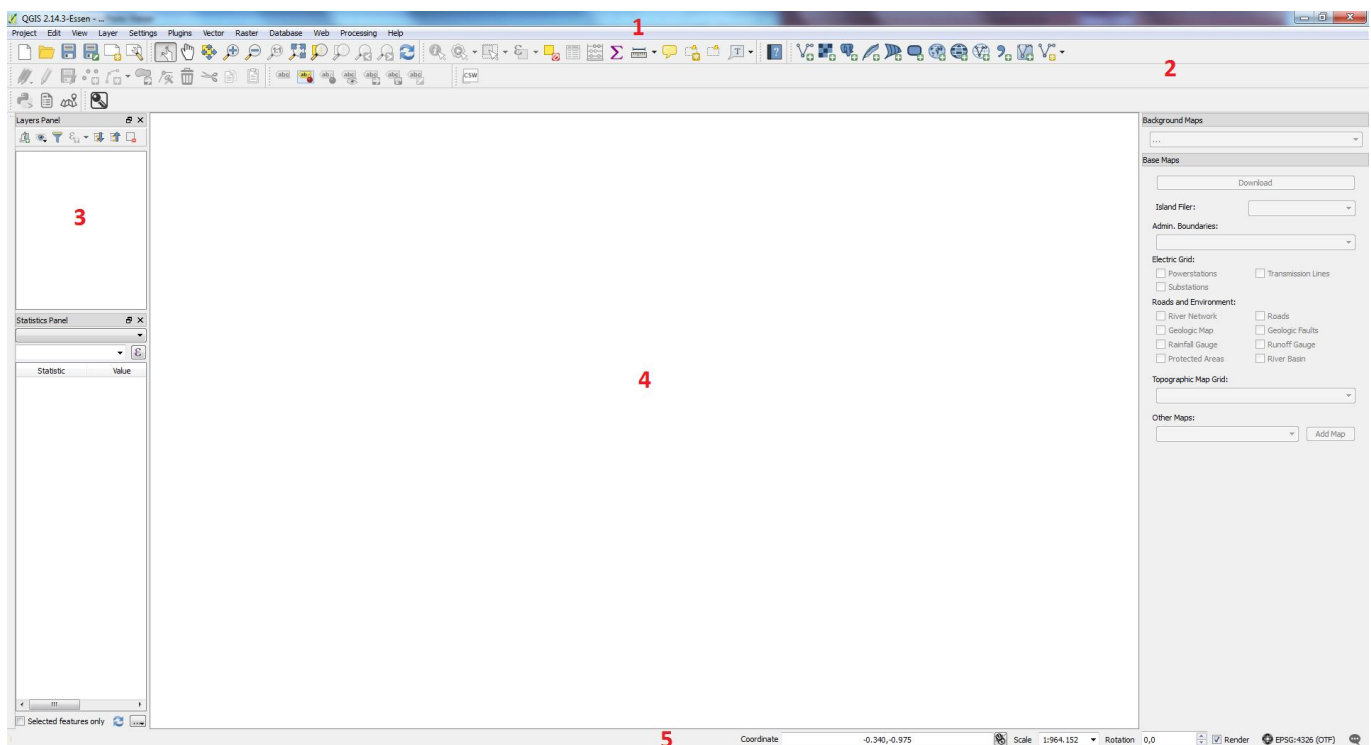


Figure 3.1 – QGIS Interface.

The interface it's divided into five areas:

¹ Your window decorations and icons may appear different depending on your window manager and on your selected shortcuts tools bars. In this image/workstation the package of QGIS Plugins developed for PLN in the project Small Hydropower Mapping and Improved Geospatial Electrification Planning in Indonesia is already installed.

1. Menu Bar
2. Tools Bar
3. Map Legend
4. Map View
5. Status Bar

These five areas are described in more detail in the following sections.

3.2.2 MENU BAR

The “Menu Bar” provides access to various QGIS features using a standard hierarchical menu. This bar has ten options and its tools are described in Table 3.1.

Table 3.1 – Menu Bar options.

1	Project	This button contains options for managing QGIS projects, such as: Create, Edit, Open, Save, etc.
2	Edit	This button contains options for managing features, such as: Add, Move, Delete, Rotate, etc.
3	View	This button provides access to different options on viewing layers' contents towards map navigation.
4	Layer	This button contains options for managing layers, such as: Add (from different sources), Edit, Labeling, Query, etc.
5	Settings	This button contains options for Configure Shortcuts, Options, Projects Properties, etc.
6	Plugins	This button provides access to the option: Manage and Install Plugins and to the Python Console.
7	Vector	This button provides access to: Analysis Tools, Geoprocessing Tools, Geometry Tools, Data Management Tools, etc.
8	Raster	This button provides access to the Raster Calculator that allows you to perform calculations on the basis of existing raster pixel values.
9	Processing	This button contains options for: Graphical Model, History and log, Results viewer, etc.
10	Help	This button contains options for: Help Contents, Check Version, etc.

Although most menu options have a corresponding tool and vice-versa, the menus are not organized exactly like the toolbars.

3.2.3 TOOL BAR

The “Tool Bar” provides access to most of the same functions as the menus, plus additional tools for interacting with the map.

Every menu bar can be moved around according to your needs. Additionally, every menu bar can be switched off using your right mouse button context menu, holding the mouse over the toolbars.

3.2.4 MAP LEGEND

The “Map Legend” area lists all the layers in the project. The checkbox in each legend entry can be used to show or hide the layer.

A layer can be selected and dragged up or down in the legend to change the Z-ordering. Z-ordering means that layers listed nearer the top of the legend are drawn over layers listed lower down in the legend.

3.2.5 MAP VIEW

The “Map View” area is where the maps are displayed. The map displayed in this window will depend on the layers that have been loaded.

The map view can be panned, shifting the focus of the map display to another region, and it can be zoomed in and out.

Tip:

Zooming the Map with the Mouse Wheel

You can use the mouse wheel to zoom in and out on the map. Place the mouse cursor inside the map area and roll the wheel forward (away from you) to zoom in and backwards (towards you) to zoom out. The zoom is centered on the mouse cursor position.

3.2.6 STATUS BAR

The “Status Bar” shows the actual coordinates of the pointer (decimal degrees) as the mouse pointer is moved across the map canvas. This coordinates are composed by Latitude and Longitude (X, Y) on World Geodetic System 1984 (WGS84).





Next to the status bar is displayed the scale of current visualization of the map view. If there’s need to zoom in or zoom out, the scale selector allows the user to choose between predefined scales from 1:500 to 1:1000000. The user can also make use of the scroll button to zoom in or zoom out.

3.3 GIS DATABASE

The GIS Database for national information on Small Hydropower Planning has been built based on PostgreSQL and a package of QGIS Plugins has been developed to support its visualization. The purpose of this package is to facilitate and improve the planning process of small hydro in both grid and isolated systems.

The core data on PostgreSQL is essential to the consistency of the SHP Database, so it is important to understand how the database is structured. All data is held in three main schemas that contain distinct types of information and each schema support different types of geometry (Table 3.2), for more detail of all tables available in each schema see Appendix 1.

Table 3.2 – GIS Database: data structure.

Schema designation	Information type	Geometry type enabled			
		Points 	Lines 	Polygons 	No geometry 
<i>db_admin</i>	User's and permissions	x	x	x	✓
<i>projects</i>	SHP projects	✓	x	x	x
<i>public_shapes</i>	Auxiliary public data	✓	✓	✓	✓

All tool operations are made according to this data organization, so when users add new tables to these schemas it is important that they are aware of how it is structured, in order to maintain the schema's data organization and hence the well-functioning of this package.



Figure 3.2 – GIS Database Icons.

The previously mentioned package of QGIS Plugins is build-up on five tools (Figure 3.2):

- Login
- Database Administration
- Background Maps
- Base Maps
- PLN Small Hydro Database

Note:

When QGIS is started all the package buttons are locked, except the Login tool button. Therefore you must login first, to be able to use the GIS Database and the above mentioned tools.

For security reasons, the access to the GIS Database is based on distinct levels of permissions, which aims to restrict the access to sensitive and confidential data. Therefore it was defined four permission types:

Admin – The user can **create, edit and delete other users** (setting the user permission and PLN Wilayah). This user has access to all information in the database so he can **view and edit all projects** and auxiliary layers, as well. This user can also **import and export** the existing information in the database. It is the *Admin* responsibility to choose which Projects information the *Public* users can have access and change it whenever is needed. It is also the *Admin* responsibility to **create a Restore Point** and if needed **Restore the database** from an available backup or from the restore point.

Edit – The user can **view and edit all projects or only the projects that belong to the user PLN Wilayah** and add/remove to the map canvas all auxiliary layers as the user needs.

View – The user can **view all projects or only the projects that belong to the user PLN Wilayah** and add/remove to the map canvas all auxiliary layers as the user needs.

Public – The user can add/remove to the map canvas all auxiliary layers as the user needs. Nevertheless the user can only **view some projects and some details of those projects** (chosen by the *Admin* user). As the previous profiles, the Public user has access to all projects or only to the projects data of the corresponding PLN Wilayah.

Translating this in package tools, this means that the user has access to:

Admin user – **Login, Background Maps, Base Maps, Database Administration and PLN Small Hydro Database**

Edit user – **Login, Background Maps, Base Maps and PLN Small Hydro Database**

View user – **Login, Background Maps, Base Maps and PLN Small Hydro Database**

Public user – **Login, Background Maps, Base Maps and PLN Small Hydro Database** (with some limitations)

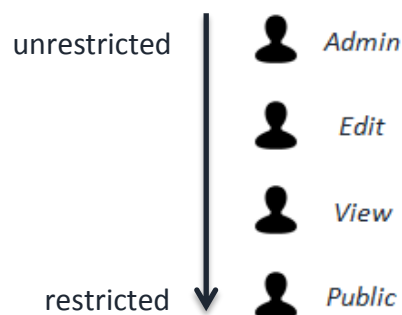


Figure 3.3 – Levels of permissions

3.3.1 LOGIN



Login

The **Login** tool allows the user to login and logout to the GIS Database.

1) Login

To login you must click on this tool icon and this will bring up a new window (Figure 3.4 - left) where you must fill the username and password boxes and when this action is completed click [Login]. You can also press [Exit] to close the Login dialog.

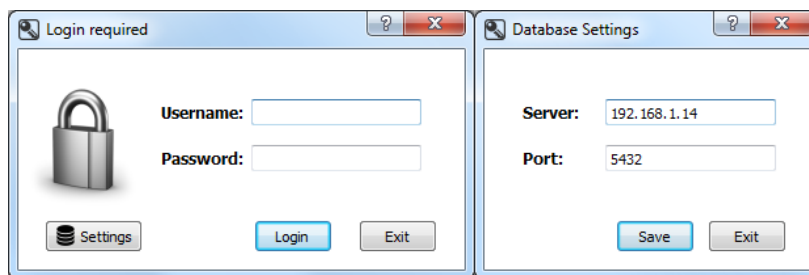


Figure 3.4 – Login dialog (left). Database Settings dialog (right).

This will bring up a new window (Figure 3.5) with the message “Login Successful” in case the credentials are correct and the tool successfully established a connection to the server or with the message “Wrong username or password” in case the credentials aren’t correct.

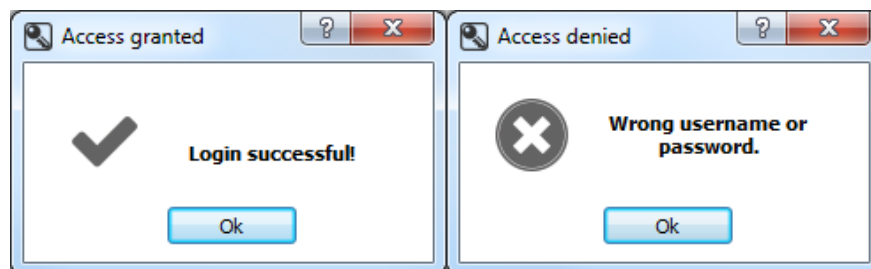


Figure 3.5 – Login messages dialog: Login Successful (left). Wrong username or password (right).

In case you want to edit the server port and IP where the GIS Database is located, you should press [Settings], edit the ‘Server’/ ‘Port’ boxes and click [Save]. This action will only affect the PC where you at. It should be noted that the edition of the database settings will be locked after you login to the database, therefore you need to edit these settings before you continue to login.

As mentioned before, when QGIS is started all the other tools are locked, thus when the user log in to the GIS Database, the tools will be unlocked (depending on the user permission profile the **Database Administration** may or may not be unlocked). Additionally some graphical decorations in the map canvas (Figure 3.6) are set for visualization support, such as: north arrow (top right), copyright label (bottom right), graphical scale bar (bottom left) and coordinate system (status bar).

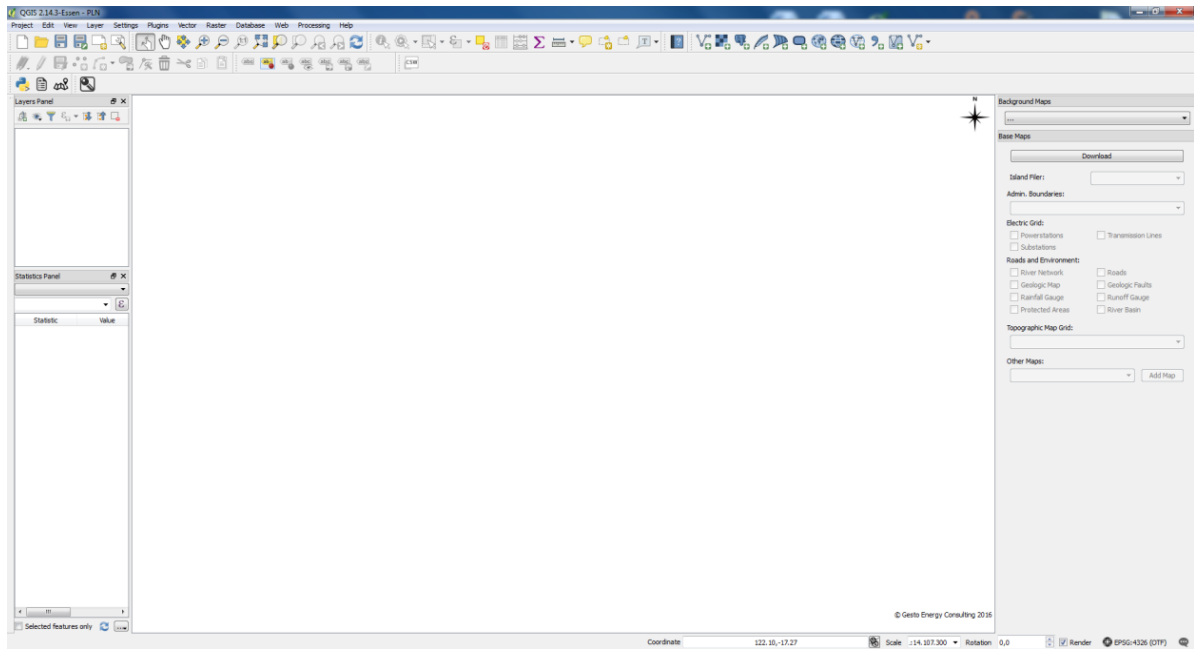


Figure 3.6 – User interface after login as *Admin* user.

Now your GIS Database workstation for national information on Small Hydropower Database is ready for visualization and edition.

Note:

The user accounts definition/creation is a task that belongs only to *Admin* users, so if you do not have an account you need to contact an *Admin* user to create it.

2) Logout

To logout from the GIS database you must press [Logout]. This will bring up a new window with the message “Logout Successful” notifying that your session is ended and finally the SHP database window will be closed. You can also press [Exit] to close the Logout dialog.

Note:

In case you need to reset or change your user password or any detail on your user account, please contact an *Admin* user. This also applies to *Admin* users (for security reasons), in this is case these user must contact other *Admin* user to make any changes on their user account.

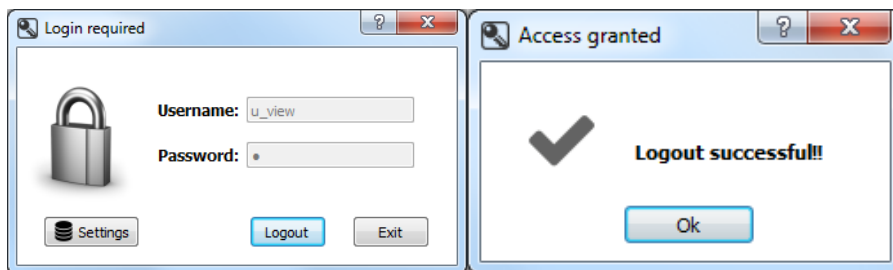


Figure 3.7 – Logout dialog (left). Logout message dialog (right).

3.3.2 DATABASE ADMINISTRATION



Database Administration

The **Database Administration** tool provides several features to manage all the data in the GIS Database. This tool allows you to connect to the GIS Database and to create, delete and edit tables and the 'Public' view as well. You can also import and export tables into your spatial database.

This tool menu has seven buttons:

- Users
- Edit 'Public' view
- Import
- Export
- Edit
- Delete
- Restore Settings

These seven options are described in more detail in the following sections.

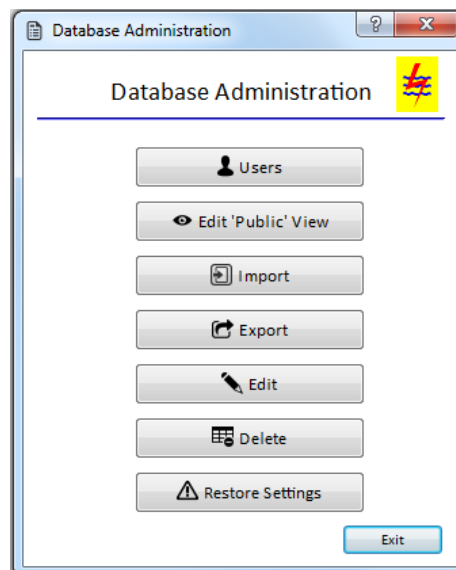


Figure 3.8 – Database Administration tool.

Note:

This tool will only be unlocked to *Admin* users therefore only this group of users will be able to manage the GIS Database for national information on Small Hydropower Planning.

1) User

In this option you can add, edit and remove users thus defining their permission, name, password, PLN Wilayah, etc.

To have access to this option click on [Users] in the main Database Administration dialog (Figure 3.8). This action will bring up a new window (Figure 3.9) where you can manage the existing users and where you can see the ID, username, name, PLN Wilayah and permission of all other users.

To create a new user, click in [Add new user]. This action will bring up a new window (Figure 3.10) where you must fill all the necessary information associated with the user, such as:

- User
- Name
- Password/ Confirm Password
- Permission
- PLN Wilayah

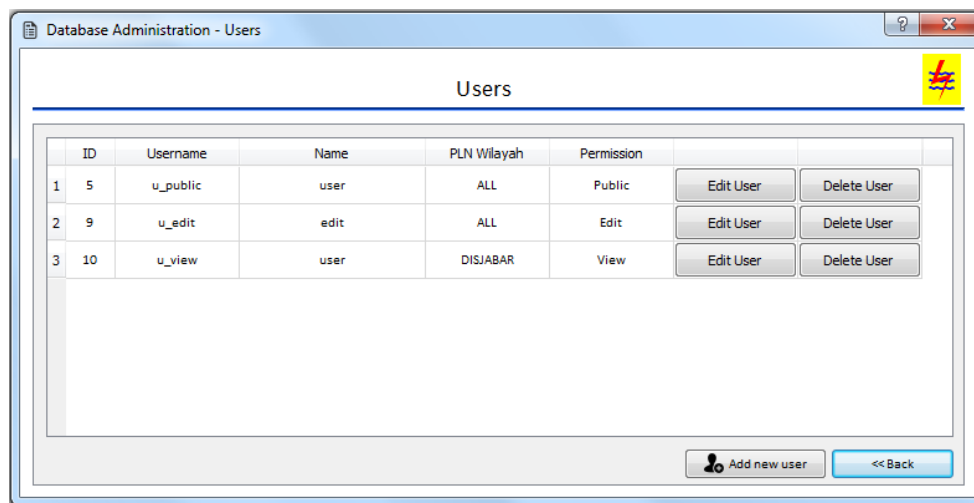


Figure 3.9 – Users Administration dialog.

The 'User' field must be fill with the username that you intend to assign to the new user, nevertheless username has some characters restrictions, so when choosing usernames for users accounts, consider the following:

- Letters (a – z and A – Z), numbers (0 – 9), dashes (-), underscores (_), and dot (.) can be used
- Accents (` , ´ , etc.) or accented letters (à , é , etc.) can't be used
- Dash, underscore or dot can't be used multiple times
- Dash, underscore and dot can't be next to each other
- Dash, underscore and dot can't be at the end or start of a username

On the next field 'Name' you must write the complete name of the new user. The 'Password' field along with the 'User' field will be used as credentials for login into the system, however the password field has also some character restrictions, so when choosing passwords for users accounts, consider the following:

- Any combination of ASCII characters can be used
- Must contain a minimum of 1 character

Note that we recommend the password have at least 8 characters long and a mixture of: upper case letters, lower case letters, digits and symbols (dash, underscore or dot).

The 'Confirm Password' field is used only for validation purposes, so make sure the 'Password'/'Confirm Password' fields are filled with the exactly same characters. The next field 'Permission' is where you should assign which permission profile the user will have (*Admin, Edit, View* or *Public* – for details see section 4.2). In the 'PLN Wilayah' field you must select the PLN Wilayah that this user will have access. The combo box content will change according to the permission previous selected. If you previously select the *Admin* user, the PLN Wilayah combo box will be filled automatically with "All" because this type of users can access to all PLN Wilayah's data.

If you selected any other type of permission profile this combo box will be filled with "All" and all PLN Wilayah short names. If you intend to provide access to all PLN Wilayah, you must choose the option 'All' or if you intend to provide access to one PLN Wilayah, you must choose the option with name of the PLN Wilayah, considering that it's the only PLN Wilayah that the user will have data access to.

Figure 3.10 – Create User dialog.

To close the dialog and cancel the action: press [<<Back] or in order to submit the new user: press [Create]. This action will bring up a new information window notifying that the user was successfully created or a warning message in case some of the input information is considered invalid.

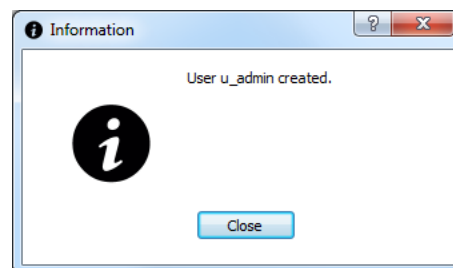


Figure 3.11 – Create User success message.

In the first case the user profile has been added to the GIS Database, so you can press [Close] and continue your tasks.

In the second case the warning window can have three types of error messages:

1. “You must fill all fields to continue”
2. “This username is invalid”
3. “Password and password confirmation do not match”

It is necessary to fill all fields in the Create User dialog, therefore if you don't fill one of them (or all) when you press the [Create], this will open a new window with the first error message. In this case you should press [Close], fill the empty fields and press [Create] again.

As previously mentioned the username has some rules, so if you use any of the invalid characters when you push [Create], will bring up a window with the second error message. In this case you should press [Close] and change the username field to valid characters and finally press [Create] again.

For security reasons, like most software's, when you create a new user it is required a password validation, so the content in the fields 'Password' and 'Confirm Password' need to exactly the same. If they do not match, when you push [Create], this will bring up a window with the third error message. In this case you should press [Close], change the 'Password' and 'Confirm Password' fields and finally press [Create] again.

To edit an existing user account, go to the User Administration dialog (Figure 3.9) and click on [Edit user], in the corresponding table line of the user that you intend to edit. This action will bring up a new window (Figure 3.12) where you must change the field that you intend to edit and then press [Edit].

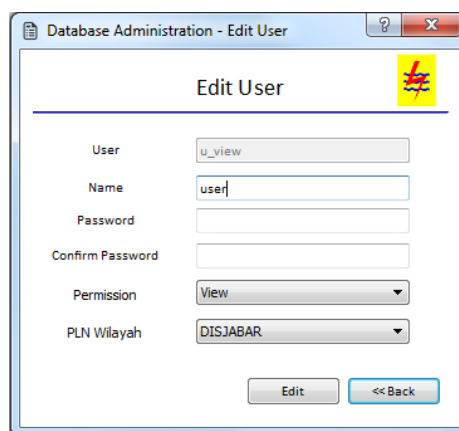


Figure 3.12 – Edit User dialog.

Note that if you don't want to change the user password you don't need to fill 'Password' and 'Confirm Password' fields to submit your changes. Nevertheless if you want to change it, these two fields must be filled with the exactly same characters. To close the dialog and cancel the action: press [<<Back].

The rules in selecting the 'Permission' and the 'PLN Wilayah' are the same of the Create User dialog, so if you select an *Admin* permission the PLN Wilayah will be automatically filled with 'All'. If you choose any other permission profile you will be able to choose one PLN Wilayah or 'All'. When you press [Edit] this

will bring up an information window indicating that the user has been edited, so you can press [Close] and continue your tasks.

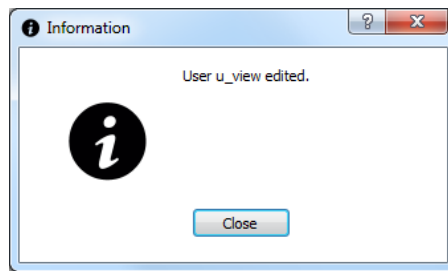


Figure 3.13 – Edit User success message.

To delete a user account go to the User Administration dialog (Figure 3.9) and click on [Delete user] button in the corresponding table line of the user that you intend to remove. This action will bring up a new window (Figure 3.14) where you can see the details of the user profile.

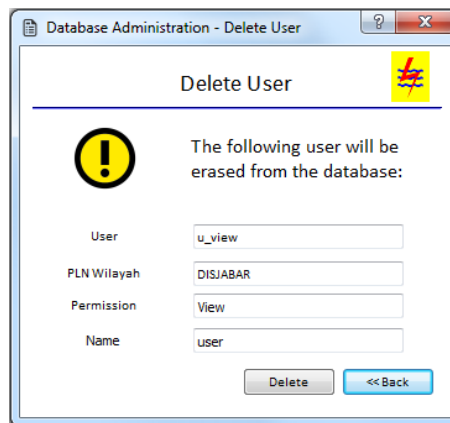


Figure 3.14 – Delete User dialog.

To close the dialog and cancel the action: press [<<Back]. If the user shown in the dialog is the user you intend to erase from the GIS Database press [Delete]. This action will bring up a new window (Figure 3.15) notifying that the user was successfully deleted, so you can press [Close] and continue your tasks.

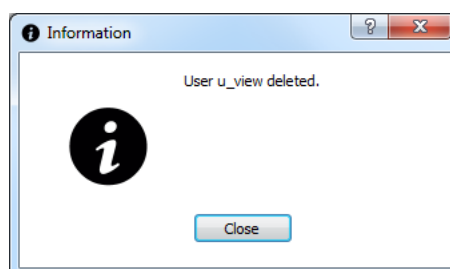


Figure 3.15 – Delete User success message.

2) Edit 'Public' View

In this option you can define which columns can be displayed from the projects table to the users with 'Public' permission.

A view is considered the result set of a stored query on the data, which the database users can query just as they would in a persistent database collection object. In this case we use views to set and restrict which data the 'Public' users can have visualization access.

To have access to this option, go to the User Administration dialog (Figure 3.9) and click on [Edit 'Public' View] button. This action will bring up a new window (Figure 3.16) where you can choose which columns of the selected table the *Public* users will have access to data.

By definition you can have one view per table in the *project* schema (this option is only available for this schema), meaning if you have, for example, three *project* tables you should create three 'Public' views. *Public* users will only have access to the data of the tables in the *projects* schema, if there are 'Public' views created for those tables. Therefore it is important to create 'Public' views for all tables in the *projects* schema. You can edit the created views at any time and how many times you need to.

Note that you will only be able to select tables from the *projects* schema that have the mandatory columns (**id**, **geom** and **pln_wilayah_short**), therefore make sure that the imported/ created projects tables have these three columns.

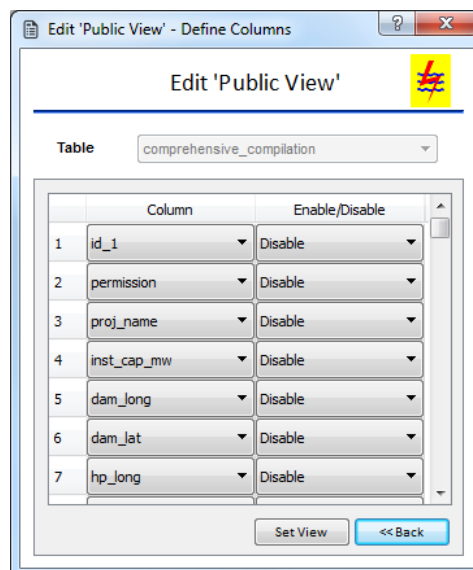


Figure 3.16 – Edit 'Public' view dialog.

To create or edit a 'Public' view, you need to select which table you intend associate a view in the 'Table' combo box. In the first column 'Column' will appear all existing columns of the selected table (except the geom/geometry). In the second column 'Enable/Disable', you should select which columns should or should not appear to the *Public* users, by selecting "Enable" (column is visible for *Public* users) or "Disable" (column is not visible for *Public* users). Only the columns selected as "Enable" will be part of the view, all the other will be ignored.

Note that, there are three columns (**id**, **geom** and **pln_wilayah_short**) that do not appear in this list, for enabling or disabling. These columns are added automatically to the view in order to assure that the created view is valid.

Note:

All the tables in the *projects* schema of the GIS database have a permission column which indicates if the project can or cannot be shown to anyone outside of PLN. We consider **confidential** all projects with **permission “PLN”** and for that reason when any view is created, it is automatically added a constraint to this view where the users will only have access to projects that the value of the permission column it's not 'PLN'.

After you select all columns you intend the *Public* users have access push [Set View]. That will bring up a new window notifying that the 'Public' view was successfully created/ edited, so you can press [Close] and continue your tasks.

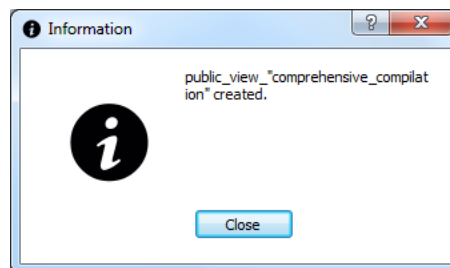


Figure 3.17 – Edit 'Public' view success message.

3) Import

In this option you can import data to the GIS Database by creating new tables or by adding data to existing tables. This allows you to import data to *public_shapes/projects* schema, in two different file formats:

- CSV – stores tabular data (numbers and text) in plain text (extension .csv)
- Shapefile – popular geospatial vector data format for GIS software (extension .shp)

The Shapefile format is very restrict, so you will be able to use any file with the SHP extension. However the CSV format is flexible, so in order to the importation process goes right please make sure your CSV file consider the following:

- Quoting and symbols can't be used
- Columns must be separated by commas
- The header information (columns names) must be in the first line of the file
- The decimal separator must be a point
- The column ID must have a unique number for each record
- The eventual latitude and longitude column must be in decimal degrees
- The eventual geometry column must be in one of these two formats:

- i. Well-known text (WKT). Example: “POINT(-71.06 42.28)”
- ii. Well-known binary (WKB). Example: “0101000000000000000000F03F...”

Note:

In order to import correctly the information on your CSV file please make sure that you **do not have symbols** (commas, semicolons, vertical bars, etc.) **as part of your text**.

It is also important to be aware that MULTIPOINT geometry is not possible to import as CSV – only POINT is supported by the package.

It should be noted that the file format restrict the type of information you can import to the *public_shapes* or *projects* schema (Table 3.3), for instance, if you select an input file of type CSV you will only be able to import data with no geometry or with point geometry, on the other hand if you select an input file of type SHP you will be able to import data with three geometry types: point, line or polygon.

Table 3.3 – Importing options depending on the input file format.

Source File Format	Target Table (DB)							
	New Table				Existing table			
CSV	✓	✓	✗	✗	✓	✓	✗	✗
Shapefile	✗	✓	✓	✓	✓	✓	✓	✓

To have access to these options, click [Import Data] in the main dialog. This action will bring up a new window (Figure 3.18) where you can select the file that contain the data that you want to import.

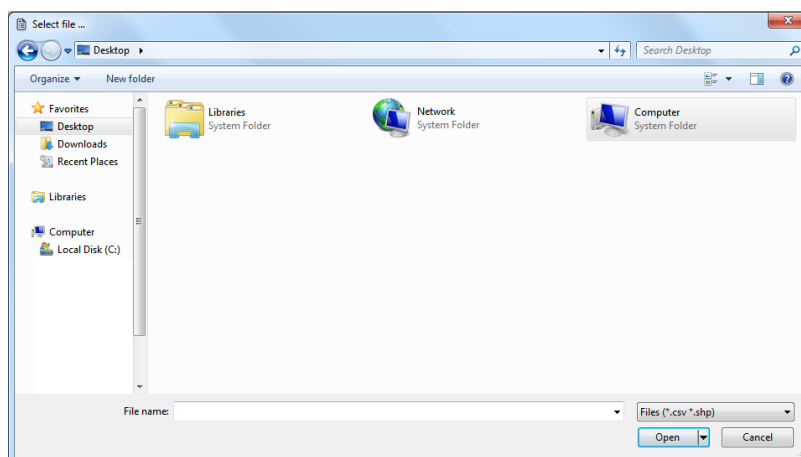


Figure 3.18 – Import data: select input file window.

Now if you intend to import data by creating a new table, select the option 'New Table' in the 'To' combo box. Then select the schema where you want to create this new table and fill the 'Table name' option with the name you want to give to this imported table.

The options 'Table' and the button [Done] will be locked, however the [Done] button will be unlocked when you select these fields:

- i. **Primary Key:** the table will be imported with all columns in the source table, but without geospatial information.
- ii. **Primary Key** and **Geom** (geometry): the table will be imported with all columns in the source table and the geospatial information is created by the geometry column.
- iii. **Primary Key, Latitude** and **Longitude:** the table will be imported with all columns in the source table and the geospatial information is created by the latitude and longitude column.

The 'Table Name' has some characters restrictions, so when choosing the table name, consider the following:

- Lowercase letters (a – z), numbers (0 – 9), and underscores (_) can be used
- Uppercase letters (A – Z), accents (` , ´ , etc.) or accented letters (à, é, etc.) can't be used
- Underscore can't be used multiple times
- Underscore can't be at the end or start of the table name
- Numbers can't be at the start of the table name

In case you have selected a CSV file with geometry in WKB, this will bring up a new window where you should select the coordinate system of your data. As previously mentioned in section 2.1, the WGS84 is the adopt coordinate system in these tools therefore it is necessary that all coordinate in the input files (CSV or SHP) are in that coordinate system.

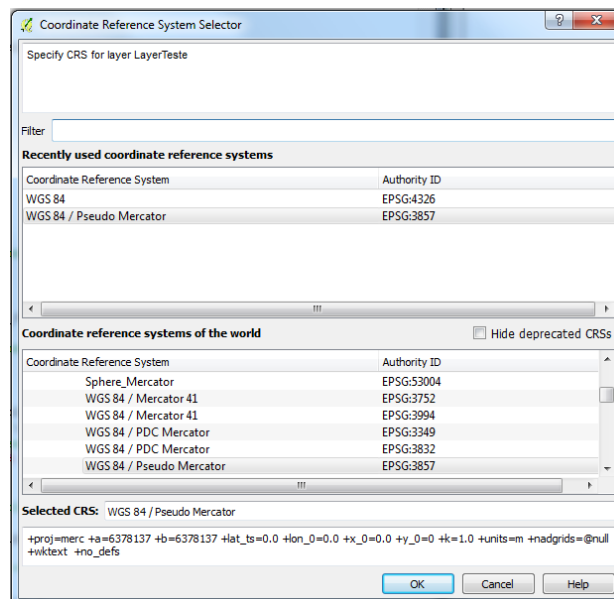


Figure 3.19 – Coordinate Reference System Selector dialog.

Then you have to select which column of your data you want to consider as primary key. You must do this by selecting the name of that column on your source file in the combo box of the “Select Columns” on line 1. If you intend to import a table without geospatial information you can now press [Done]. On the other hand if you want to associate geospatial information to the new table, you need to import/select two coordinates (latitude and longitude in decimal degrees with the point as decimal separator) or directly import the geometry WKT/WKB (can be obtain for example by exporting layers/tables from QGIS).

To import geospatial information by coordinates, you need to select in the “Table Column (DB)” the option ‘latitude’ on line 2 and the ‘longitude’ on line 3 (or vice-versa) and then in the “Source File Column” you have to choose the name of the column of your file that correspond to latitude and longitude coordinates.

To import geospatial information by geometry (in WKT or WKB) you need to select in the “Table Column (DB)” the option ‘geom’ on line 2 and then on the “Source File Column” you have to select the name of the column of your file that correspond to geometry. After all this selections you can press [Done].

Despite having selected only one (Primary Key), two (Primary Key + Geom) or three (Primary Key + Latitude + Longitude) columns of you source table, all columns will be imported to the new table. Nevertheless you have to select from which columns you want to create the geometry of the new table.

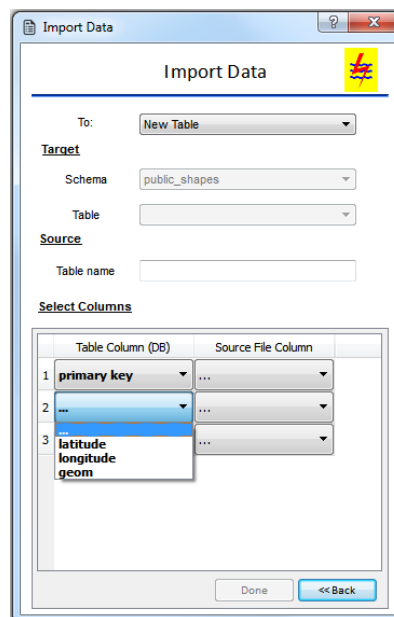










Figure 3.20 – Import data to new table dialog.

Note:

In order to maintain the database structure, **please make sure that all tables created in the projects schema have point geometry** (geospatial data). It is also important that all tables in this schema have as **primary key the column named “id”**.

In case you intend to import data to an existing table in the *public_shapes* or *projects* schema, you need to select which schema contain the table that you intend to import this information and then select the table name of that table, in the combo box ‘Schema’ and ‘Table’.

Table 3.4 - Importing options for Existing Tables depending on the input file geometry and target geometry.

		Source File Geometry			
					
Target Table Geometry (DB)		✓	✓	✓	✓
		x	✓	x	x
		x	x	✓	x
		x	x	x	✓

Note that in the ‘Table’ combo box it will only appear the names of the tables with the same geometry type as the selected file for importation or with no geospatial information (geometry).

The option ‘Table name’ and the button [Done] will be locked, however the [Done] button will be set as unlocked when you select at least these fields:

- i. **Primary Key** and another field: the input will be imported with the selected columns, but without geospatial information
- ii. **Primary Key** and **Geom** (geometry): the input will be imported with the selected columns and the geospatial information is created by the geometry column
- iii. **Primary Key, Latitude** and **Longitude**: the input will be imported with the selected columns and the geospatial information is created by the latitude and longitude column

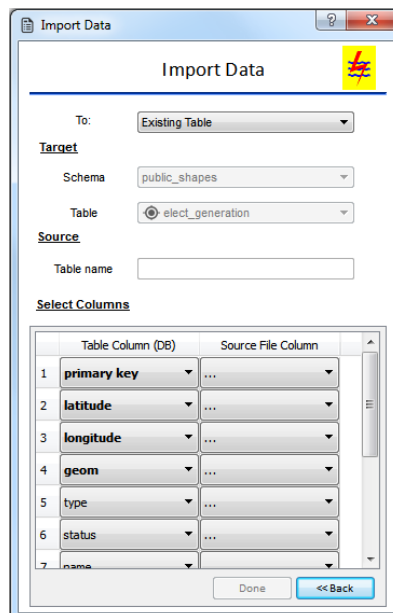


Figure 3.21 – Import data to existing table dialog.

When you select the table name will appear in the “Select Columns” section the names of all the columns contained in the selected table. In this section you have to select at least the “Source File Column” that corresponds to the primary key in order to successfully import the data. It is important to note that **only the lines that have correspondence in the “Source File Column” will be imported to the GIS database table**, all the other columns of the source file will be ignored.

As mentioned before, you need to make the correspondence of the “Source File Column” on the latitude/longitude line or on the geometry line in order to import the geospatial information of your source table.

In case your source table has the geospatial information in coordinates - latitude/longitude format (in separated columns) - you have to go to the line ‘latitude’ (“Table Column (DB)”) and on the same line of the “Source File Column” select the name of the column of your source table that has the latitude data and proceed the same way for the longitude.

On the other hand if your source table has the geospatial information in geometry format (WKT or WKB), go to the line ‘geometry’ in the “Table Column (DB)” and on the same line of the “Source File Column” select the name of the column of your source table with the geometry information.

If you do not select the latitude/longitude or geometry column, the data will be imported without the geospatial information. Note that you always need to select another field apart from the ‘primary key’ for the import process can be successfully concluded.

After all this selections you can press [Done]. That will bring up a new window notifying that the table was successfully imported or that the importation process has failed, in the first case you can press [Close] and continue your tasks, on the second case something went wrong, so please try again and follow the instructions previously mentioned in this section.

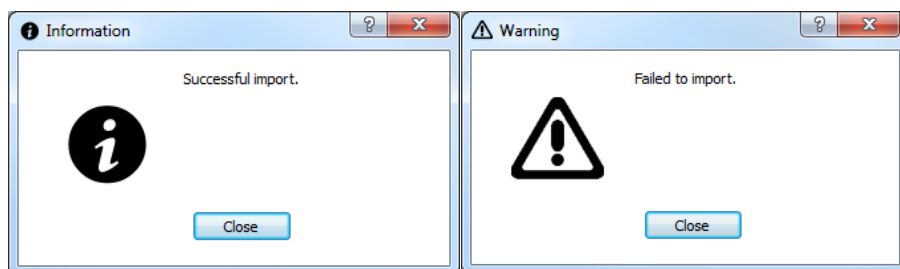


Figure 3.22 – Successful import (left). Fail to import messages (right).

4) Export

In this option you can export any existing table in the *public_shapes* or *projects* schema, in three different formats:

- CSV – stores tabular data (numbers and text) in plain text (extension .csv)
- Shapefile – popular geospatial vector data format for GIS software (extension .shp)
- KML – used to display geographic data in an Earth browser such as Google Earth (extension .kml)

To have access to these options: click [Export Data] in the main dialog. This action will bring up a new window (Figure 3.23) where you can select which schema and table you intend to export.

For coherence reasons, you will only be able to export tables without geospatial information (geometry or coordinates) to CSV, therefore when you select a table without spatial data the radio buttons 'Shapefile' and 'KML' will be locked. Like in the previous options, the [Export] button will be locked until you have selected the schema, table and the format of the table you want to export.

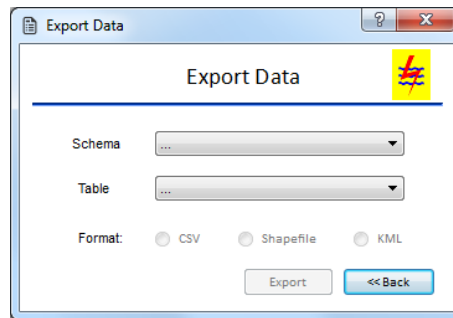


Figure 3.23 – Export data dialog.

To create this file click [Export] and this will open a new window (Figure 3.24) where you can choose the name of the exported file and the location where it will be saved. To close the dialog and cancel the action: press [<<Back].

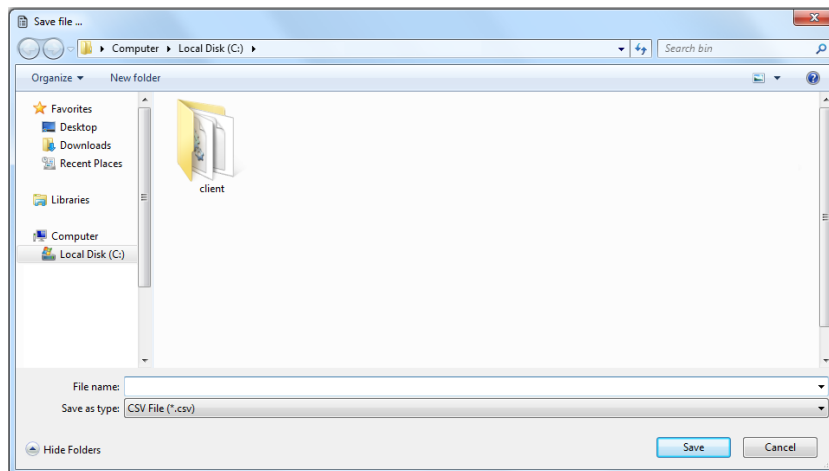


Figure 3.24 – Export data: save file window.

Once you done this and pressed [Save] a new window will appear notifying that the file was created (Figure 3.25), so you can press [Close] and continue your tasks.

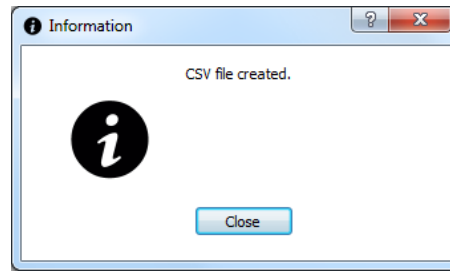


Figure 3.25 – Export table success message.

It should be noted that despite exported table's as CSV with a point, line or polygon geometry type, are prepared for you to open it in QGIS (in: **Layer -> Add Layer -> Add Delimited Text Layer**), they are not prepared for you to extract the point/line/polygon coordinates directly from the CSV file when you open it (in Excel for example).

5) Edit

In this option you can add, edit and delete features of any existing table (with or without geospatial information) in the *public_shapes* or *projects* schema.

To have access to these options: click [Edit Table] in the main dialog. This action will bring up a new window (Figure 3.26) where you can select which schema and table you intend to edit.

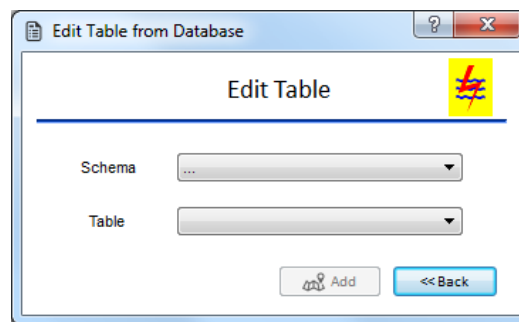


Figure 3.26 – Edit table dialog.

To edit the table, first select the schema where the table belongs, the list of tables in the 'Table' combo box will change depending on which schema you choose. To close the dialog and cancel the action: press [<<Back].

The [Add] button will be unlocked once you have selected the schema and table that you want to edit. To add this table to your map canvas press [Add], this will bring up a new window notifying that the table was successfully added, so you can press [Close] and continue your tasks.

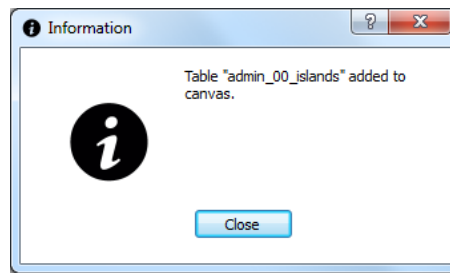



Figure 3.27 – Edit ‘Public’ view success message.

Once the table is on your workstation go to: **right click on the layer -> Toggle Editing** and then **right click on the layer -> Open Attribute Table**. The table is now ready for editing. When you finish your edition please press  (on the Attribute table) and your changes will be saved. It should be noted that all changes made are permanent and reflected in the GIS Database.

Note:

In order to ensure the well-functioning of the export and import options, **characters like commas, semicolons and quotation marks** shouldn’t be used in any line/column of any table. Therefore it is import to avoid the use of these characters when adding new data or when editing.

6) Delete

In this option you can delete any existing table in the *public_shapes* or *projects* schema from the GIS Database. To have access to these options click on [Delete Table] button in the main Database Administration dialog. This action will bring up a new window (Figure 3.28) where you can select which schema and table you intend to erase from the GIS database.

In this option you will only be able to delete some of the tables in the *public_shapes* schema. The other tables related to Admin. Boundaries, Electric grid and Roads and Environment (see Appendix 1), are considered essential to the well-functioning of this tool, therefore you will not be able to delete them.

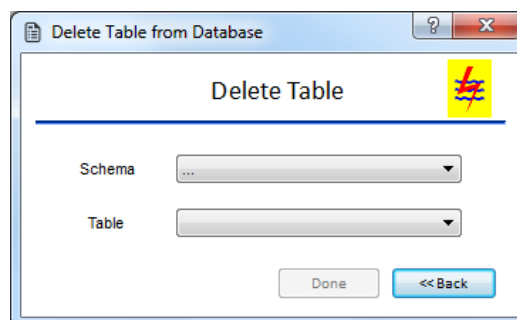


Figure 3.28 – Delete table dialog.

To delete the table first select the schema where the table belongs. The list of tables in the ‘Table’ combo box will change depending on which schema you choose.

The [Done] button will be unlocked only when you have selected the schema and table that you want to edit. To close the dialog and cancel the action: press [<<Back].

To remove this table from the GIS Database: press [Done]. This action will bring up a new window (Figure 3.29) notifying that the user was successfully deleted, so press [Close] and you can continue your tasks.

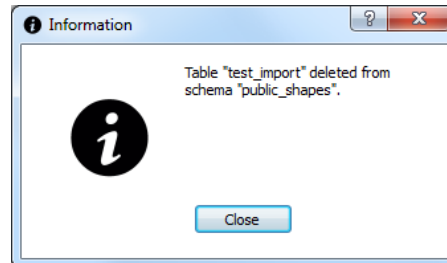


Figure 3.29 – Delete table success message.

Note:

This action will erase permanently the selected table directly from the database. So in case you delete any table by mistake, you need to restore the database from a backup/restore point in order to recover the table and the related data.

7) Restore Setting

In this option you can create a restore point of your current GIS Database and also restore it from an automatic backup or from a restore point.

Restore points are created to allow users a choice of previous system states and usually these restore points are created before key changes are made to the system. So in this option you can create a restore point whenever it seems necessary, nevertheless there is only one restore point, thus if you create a new restore point, this will replace the previously created restore point.

This restore point can be used to restore the database, however the system as an automatic/scheduled backup system in order to assure the data integrity (for details see section 4.3), thus can be also used to restore the database.

To have access to these options: click [Restore Settings] in the main dialog. This action will bring up a new window (Figure 3.30) where you can create a new restore point of your GIS database or restore the database itself. It should be noted that **all changes made in the GIS Database, after the restore point had been created or after the selected backup had been created, depending on what you have selected, will be lost.**

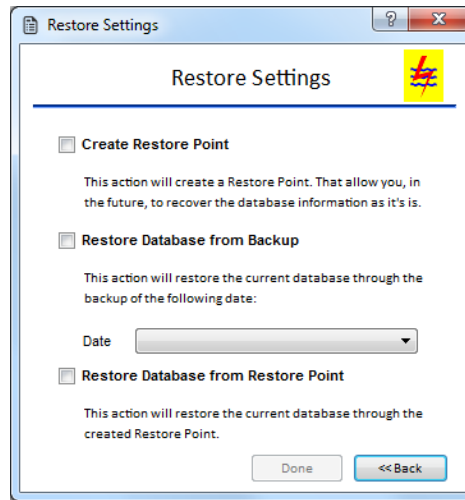


Figure 3.30 – Restore Settings dialog.

To create a restore point of the database as it is, select the checkbox [Create Restore Point] and then press [Create]. This will bring up a window with a message asking for confirmation if do you want to continue the operation, where you should select [Yes] to continue or [No] to cancel the operation. If you press [Yes] it will bring up a new window notifying that the creation of the Restore Point was successful, on the other hand if you press [No] you will be back at the Restore Settings dialog and you can continue your tasks.

To restore the GIS Database, select the checkbox [Restore Database from Backup], in case you intend to restore it from an automatic backup file, or select the checkbox [Restore Database from Restore Point], in case you want to restore it from the existing Restore Point.

Then press [Restore], however if you intend to restore it from a backup you need first to select in the combo box the date of the backup that you want to restore, this combo box will be filled once you press the checkbox “Restore Database from Backup”.

This will bring up a window (Figure 3.31) with a message asking for your confirmation to continue, where you should select [Yes] to continue or [No] to cancel the operation.

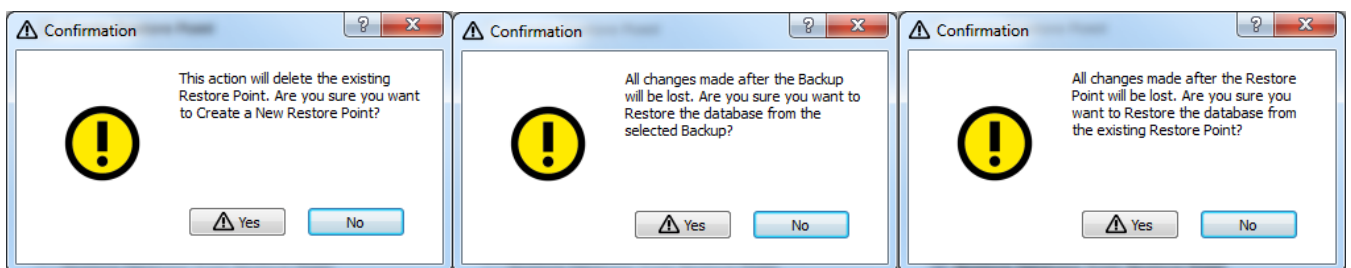


Figure 3.31- Confirmation Windows: Create a new restore point (left), Restore the database from a backup (middle) and Restore the database from the existing Restore Point (right).

Restore your database involve deleting all your current data and copying all saved data in your backup/restore point to the database, therefore when you select this option, your session will be automatically ended.

Thus we recommend that you save your project in **Project -> Save As**, before you select any restore option. The **restore process take approximately one minute, after the SHP window closes you can restart the program, login again** and verify that the database is now in the exact state it was in when the backup/restore point was created.

3.3.3 BACKGROUND MAPS



Background Maps

The **Background Maps** tool allows the user to choose an online worldwide map to be displayed as background map towards facilitate data visualization and especially planning. These maps will provide you a detailed and updated source of geographic data.

This tool provides you access to four online maps:


- Google Satellite
- Open Street Maps
- Bing Roads
- Bing Aerial

These four maps have some similar information, however they have distinct features, hence you should find which map fits the best to your planning workstation.



Figure 3.32 – Background Maps tool.

To display a background map, use the combo box (Figure 3.32) in order to select the map that you want to display in the map canvas. This action will add the selected layer to your workstation.

These maps will always appear on the bottom of the layers tree of you visualization. To remove the layer from the workstation use the combo box and select  .

3.3.4 BASE MAPS



Base Maps

The **Base Maps** tool allows you to customize your planning workstation with relevant auxiliary geographic information for Small Hydropower Planning.

This tool is designed for adding four types of data:


1. Administrative Boundaries
 - Islands
 - PLN Wilayah
 - Provinces
 - Regencies/Cities
 - NTT MMU Sula Districts
 - NTT MMU Villages
2. Electric Grid
 - Power Stations
 - Substations
 - Transmission Lines
3. Roads and Environment
 - Roads
 - River Network
 - River Basins
 - Geologic Map
 - Geologic Faults
 - Rainfall Gauge
 - Runoff Gauge
 - Forest Areas
4. Topographic Map Grid

As previously mentioned this tool is designed for adding specific types of data that seemed fit to a planning workstation, nevertheless you can add any other data from the database that you find useful and/or relevant.

To have access to all features in this tool, first you must click on the [Download] button. This will download all base layers to your PC, towards the improvement of the performance of data visualization. During the download process it will appear a progress bar showing the progress of the download, when this action is finished the progress bar will disappear and you can start adding layers to your workstation.

Considering that most users will only have access to projects data of their own PLN Wilayah this tool provides a Filter by Island option that will influence the Administrative Boundaries, the Electric Grid and the Roads and Environment layers.

To filter by Island, select which Island you want to restrict your data in the ‘Island Filter’ combo box. When the selection in the combo box is changed, all the Administrative Boundaries, Electric Grid, Roads and Environment layers are removed and the respective checkboxes are unchecked/removed, so it is recommended that you choose the filter first and then select which layers you want to add to your workstation to avoid having to select all the layers again if you had already selected them. By default the combo box is set as “All”, meaning that you will be able to see the data from all islands.

To add to your workstation an Administrative Boundaries or Topographic Map Grid use the corresponding combo box and select the layer that you intend to add to your visualization. To remove the layers from the workstation use the combo box to select  .

To add to your workstation any Electric Grid, Roads, Environment, etc. layers, check the corresponding box. In these two types of data it is possible to have all layers displayed in the map canvas at the same time. To remove the layer from your map canvas, uncheck the corresponding box by clicking again in it.

To add other maps from the GIS Database use the ‘Other Maps’ combo box, select the table you want to add and then press [Add Map]. Some of the tables in the *public_shapes* schema can be added in other options, therefore, in this specific option you will only be able to add the tables that are not in the previous options

Towards an intuitive and easy visualization and understanding of all data added to your workstation, most layers have associated: symbols, scale visibility and forms (presented in Appendix 1). These layouts can be changed at any time.

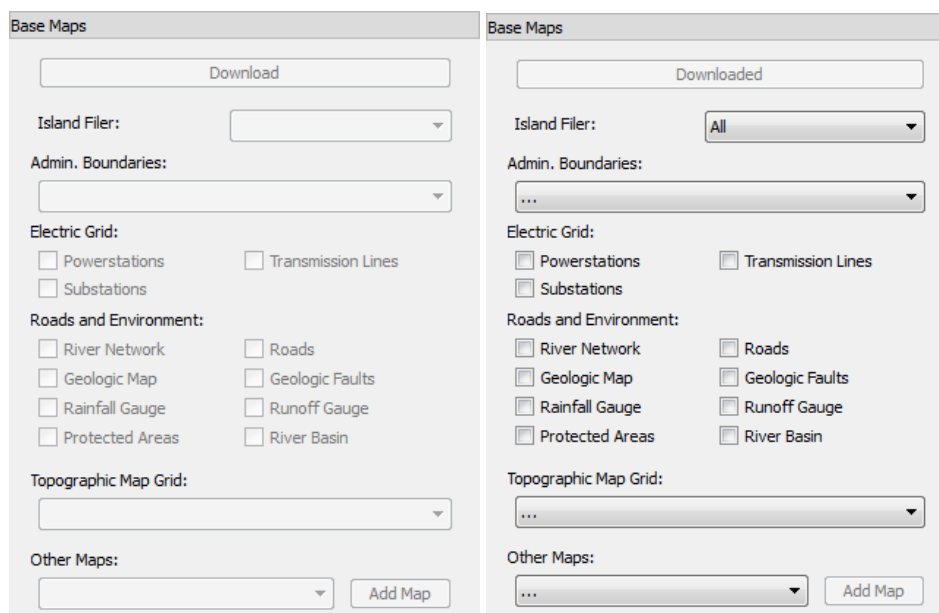



Figure 3.33 – Base Maps tool: before download files (left); after download files (right).

When you're consulting the represented data in map canvas (by selecting  for example), you are presented with a dialog that lets you visualize/edit the attributes for that feature. However, this dialog is not, by default, very intuitive. Therefore when the data is load to the map canvas it is associated to a defined layout that includes a customized intuitive form, to change the associated form: **right click on the layer -> Properties -> Fields.**

You can also set another symbol to the layer in **right click on the layer -> Properties -> Styles** and change the scale visibility in **right click on the layer -> Properties -> General -> Scale dependent visibility.**

3.3.5 PLN SMALL HYDRO DATABASE



PLN Small Hydro Database

The **PLN Small Hydro Database** tool provides you access to the existing projects on your GIS Database.

In this tool you can add and filter the spatial tables from the GIS Database to your workstation. This will complete your workstation composition and you will be ready for start small hydropower planning.

This tool menu has three buttons:

- Add Projects
- Default Filters
- Custom Filters

To be able to click in one of this buttons you need to use the 'Table' combo box to select which projects table you intend to add to your map canvas or filter. After this selection the three buttons will be unlocked. To close the menu dialog press [Exit].

Any project in the database need three base information's: the **unique identifier (id)**, the **location (geom)** and the **PLN Wilayah short name (pln_wilayah_short)** where the project belongs. For that reason these information/columns are considered mandatory for all tables in the projects schema and if any table in this schema does not have these three columns it will not appear as an option for add to your planning workstation.

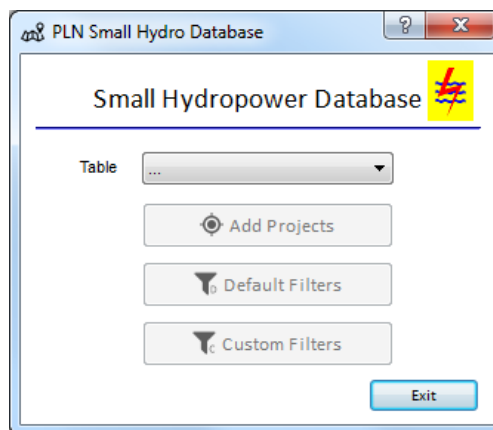


Figure 3.34 – PLN Small Hydro Database tool.

Note:

As previously mentioned, *Public* users have some limitations on which projects they can have access to. These limitations are defined by the creation of public views, therefore for *Public* users, in this combo box will show only the tables that have public views created.

The [Default Filters] and [Custom Filters] buttons will be locked in three different scenarios: (i) the logged in user has *Public* permission, (ii) the selected table do not have any project at all or do not have

any project in the user PLN Wilayah (iii) the selected table do not have the mandatory fields (**status**, **ipp_pln**, **inst_cap_mw**, **province**). For that reason it is recommended that in this case you set your Projects layer filter in **right click on the layer -> Filter**.

1) Add Projects

This option will add to your workstation the spatial table previously selected in the combo box. To add the Projects layer to the map canvas, first select which table you want to add and then click on [Add Projects] button. This action will bring up a new window notifying that the layer is added to your map canvas (Figure 3.35) and then press [Close] and you can continue your tasks.

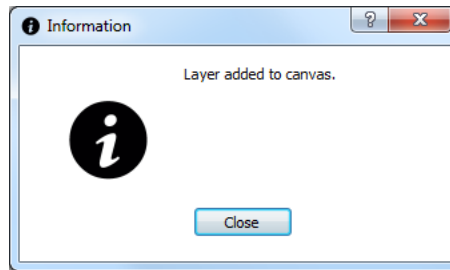


Figure 3.35 – Add projects success message.

Note:

To *Admin* and *Edit* users this option provide you access to editing your Projects data and therefore add new projects, delete the existing, change their status, etc.

2) Default Filters

This option allows you to set some default filters in your Projects layer that will facilitate the visualization of your data.

To apply a default filter to the Projects layer, first select which table you want to add/visualize and then click on [Default Filters] button. This action will bring up a new window (Figure 3.36) and in this window you can now set your default filters.

The Default Filters option supports two different types of filters:

- Location filter
 - ❖ PLN Wilayah
 - ❖ Province
- Attribute filter
 - ❖ Size
 - ❖ Developer
 - ❖ Current Phase

To filter by PLN Wilayah use the 'PLN Wilayah' combo box and select which PLN Wilayah you want to add to your map canvas by selecting the corresponding PLN Wilayah short name. In case you don't

intend to set any filter by PLN Wilayah just select “All”. If you are an *Edit* or *View* user, this combo box will be locked and will be filled with your PLN Wilayah (defined when your user account was created by the *Admin* user). It should be noted that only the PLN Wilayah with projects, in the selected table, will appear in the combo box.

In the ‘Province’ combo box will appear the existing provinces, with projects, in the PLN Wilayah, previously selected, or all provinces in case you have selected “All” in the ‘PLN Wilayah’ combo box. Only after you have selected both combo boxes (‘PLN Wilayah’ and ‘Province’) the [Done] button will be unlocked. In the attribute filters all radio buttons are checked by default. If you intend to exclude a determined type of information you must uncheck the corresponding radio button or check it if you intend to include it instead. You can apply any combination of these five filters.

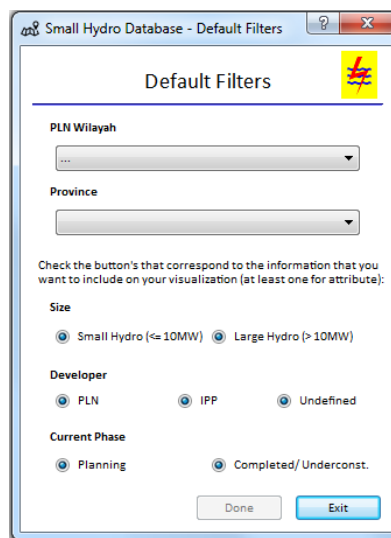


Figure 3.36 – Default Filters dialog.

It is important to notice that the [Done] button will be locked if you uncheck all radio buttons associated to an attribute, thus you need to have at least one radio button checked for attribute to continue (to avoid applying filters that will result in no data).

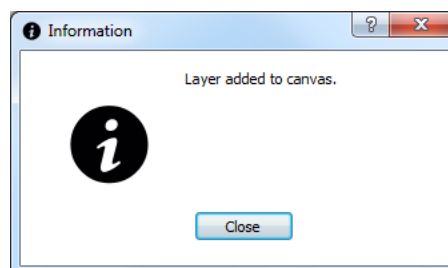


Figure 3.37 – Set default filters success message.

To apply the filter press [Done], this action will remove the current Projects layer that you may have on your map canvas and will be added a new one with the selected filters. To cancel the operation press [Exit]. Once you pressed [Done] the filtered layer will be added to your workstation and will bring up a

new window notifying that the layer is added to your map canvas (Figure 3.37), press [Close] and you can continue your tasks.

Example:

Add to the map canvas all the small hydro projects currently in the planning phase that were developed by PLN in Java Barat province that belongs to DISJABAR PLN Wilayah.

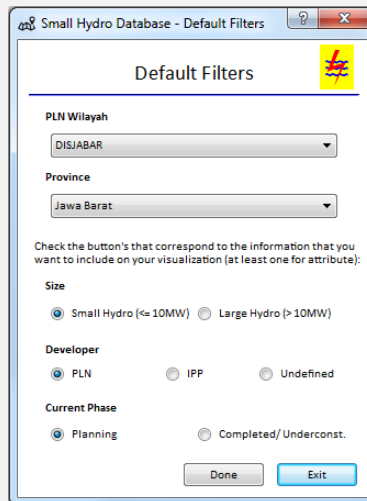


Figure 3.38 – Default filters example.

3) Custom Filters

This option allows you to set custom filters in your Projects layer to facilitate your data visualization and planning. The purpose of this option is similar to the Default Filters option nevertheless, in Custom Filter, you will be able to apply filters without restrictions and with any required complexity by executing queries. Therefore you will be able to execute SQL queries against your *projects* database schema and then view the spatial output for queries by adding the results to your workstation as a query layer.

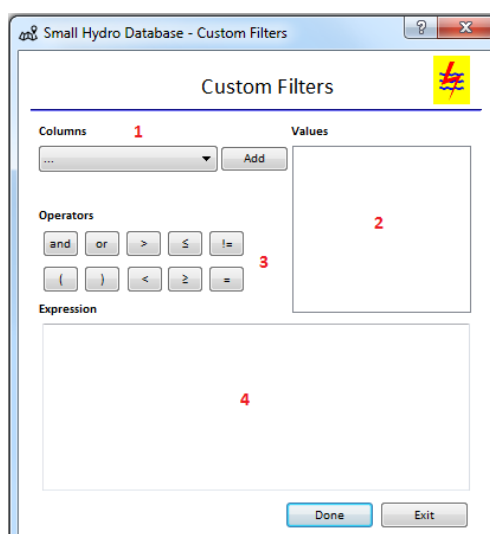


Figure 3.39 – Custom Filters dialog.

To apply a custom filter in your Projects layer, first select which table you want to add/visualize and then click on [Custom Filters] button. This action will bring up a new window (Figure 3.39) that it is divided in four sections: the Column section (1), the Values section (2), the Operators section (3) and the Expression section (4).

The Column section contains, in the combo box, all existing columns of the projects table so you will be able to search through any of them. To add an attribute/column to the expression, use the combo box (to select the column) and click [Add]. You can use the various fields, values and operators to construct the expression/query.

The Values section lists the distinct values of an attribute/column. To list all possible values of an attribute, select the attribute in the Columns combo box and click [Add]. To add a value to the expression box, double click its name in the Values list.

The Operators section contains all usable operators. To add an operator to the expression box, click in the appropriate button. Relational operators (= , != , > , < , ≥ , ≤) and logical operators (AND, OR) are also available.

The Expression section is where your filter expression will appear. The expression is editable nevertheless **is recommended that you built the expression through the push buttons and list and not through typing**. If you want to delete part or all the expression you can select the part of the expression that you intend to delete and press backspace/delete.

To apply the filter press [Done], this action will remove the current Projects layer that you may have on your map canvas and will be added a new one with the selected filters. To cancel the operation press [Exit]. Once you click [Done] this will bring up a new window indicating if the expression is valid or not (Figure 3.40), if the expression created by you is invalid because has no results, will appear a warning window with the message “This expression has no results. Please try again”.

On the other hand if the expression is invalid because has syntax errors, will appear a warning window with the message “This expression has an error. Please try again”. And finally if the expression is valid will appear the information window with the message “Layer added to canvas”.

In case your query turns out to be valid just press [Close]. On the other and if the query turns out to be invalid press [Close], delete your expression (or part it) and please try again.



Figure 3.40 – Layer added to canvas information (left). Warning messages: expression has an error (middle) and expression has no result (right).

Example:

Add to the map canvas all the projects with inst. capacity under 2 MW, developed after 1990 in the province of Bali.

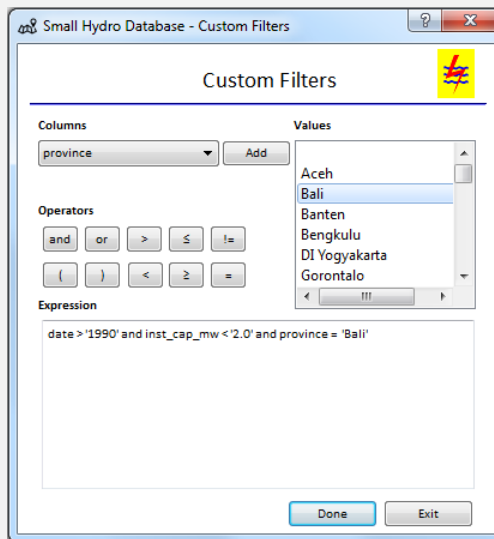


Figure 3.41 – Custom Filters example.

3.4 BACKUP SYSTEM

For assure the security and integrity of all data in the GIS database, it is scheduled an automatic backup system. This backup system will allow you to restore the database to a previous day in case of need, for example, in case of data loss, etc.

Therefore every week it is created a backup file, so the *Admin* user can restore the database in case it seems needed. The backup files created every week will be stored in the server during a period of three months (sixty days), after that the files will be automatically deleted.

APPENDIX 1 – DATA BASE STRUCTURE AND LAYERS LAYOUT

Table 3.5 – *Public_shapes* schema: existing tables and corresponding layers symbols

Table name	Description	Symbol	Scale Visibility (Max. – Min.)
admin_00_islands*	Island		1:2.000.000 – 1:0
admin_01_provinces*	Provinces		None
admin_02_regencies*	Regencies and Cities		None
admin_03_ntt_mmu_sula_districts	NTT MMU Sula Districts		None
admin_04_ntt_mmu_villages	NTT MMU Villages		None
admin_PLN_wilayahs*	PLN Wilayah		None
elect_generation*	Power Stations		1:2 000 000 – 1:0
elect_grid*	Transmission Lines		1:8 000 000 – 1:0
elect_substations*	Substations		1:2 000 000 – 1:0
gen_roads*	Roads		1:8 000 000 – 1:0
geo_map*	Geologic Map		1:16 000 000 – 1:0
geo_fault*	Geologic Faults		1:4 000 000 – 1:0
hydro_rainfallgauges*	Rainfall Gauge		1:2 000 000 – 1:0
hydro_runoffgauges*	Runoff Gauge		1:2 000 000 – 1:0
gen_forest_areas*	Forest Areas		1:16 000 000 – 1:0
hydro_riverbasins*	River Basins		1:16 000 000 – 1:0
hydro_rivers*	Rivers		1:16 000 000 – 1:0

SMALL HYDROPOWER MAPPING REPORT – ANNEX II


hydro_water_bodies*	Water Bodies		1:16 000 000 – 1:0
---------------------	--------------	---	--------------------

Table 3.6 – *Projects* schema: existing tables and corresponding layers symbols

Table name	Description	Symbol	Scale Visibility (Max. – Min.)
comprehensive_compilation*	Comprehensive compilation		None
list_most_promissing_sites*	List of most promising sites		None
pln_shp_planning*	PLN SHP planning		None

* Tables considered essential to this tool, therefore they cannot be deleted.

**ANNEX III – GIS AND ORDBMS TRAINING PRESENTATION
AND MATERIALS**



Gesto

ENERGY CONSULTING

Energy Sector Management Assistance Program (ESMAP)

Small Hydropower Mapping in Indonesia

GIS training

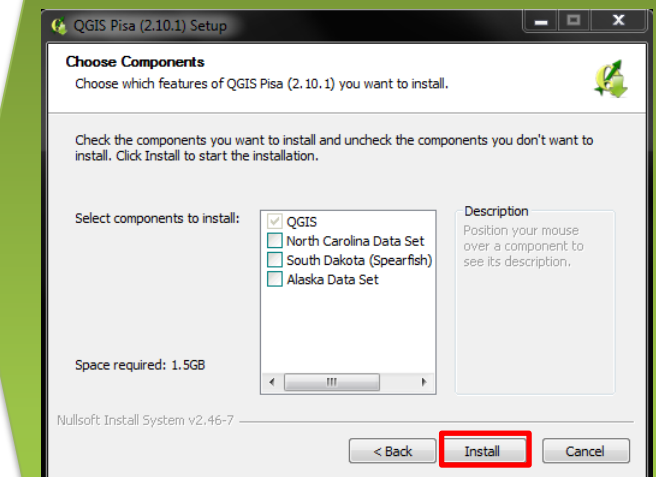
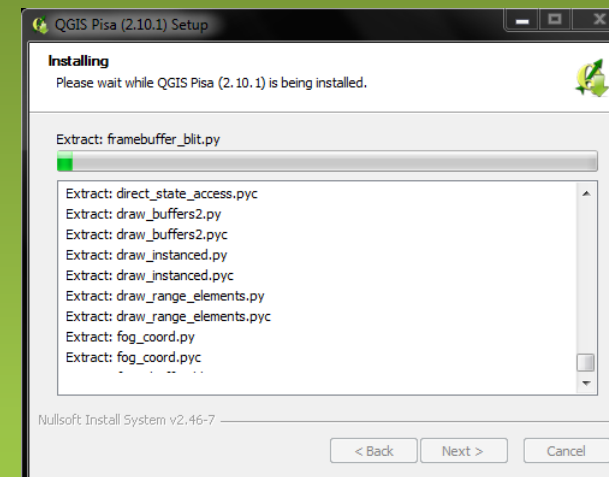
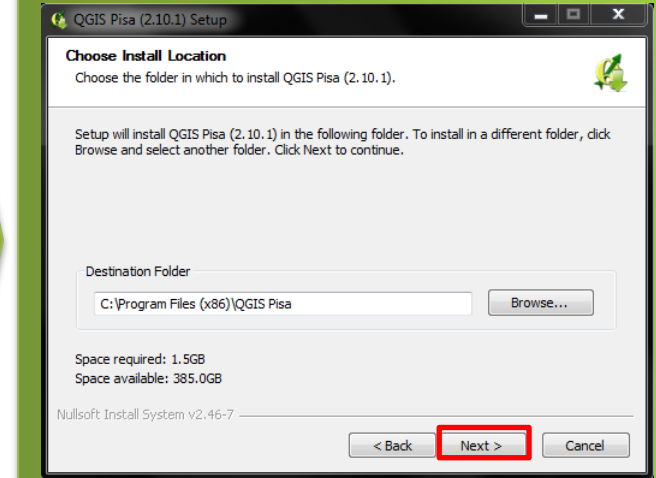
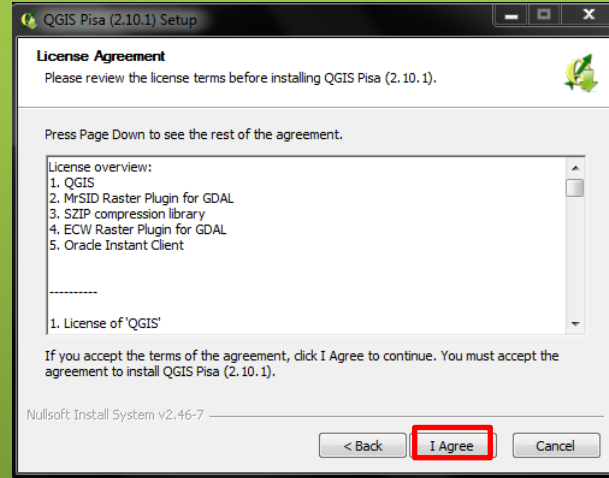


1. SOFTWARE INSTALATION
2. INTRODUCTION TO GIS
3. QGIS SOFTWARE TRAINING
4. DATABASES EDITING AND OPERATION



1. SOFTWARE INSTALATION

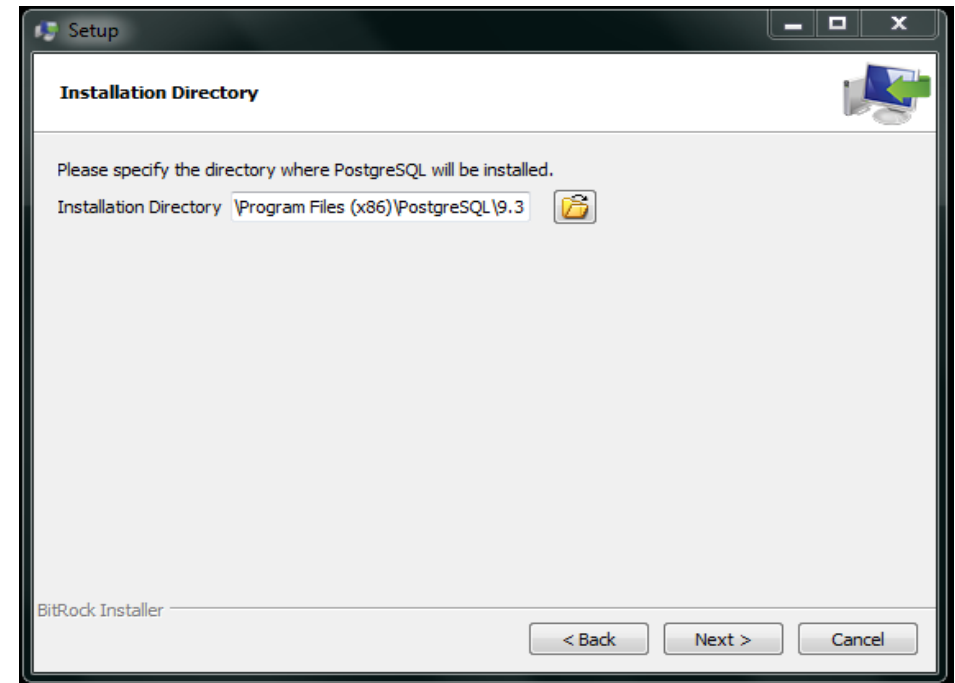
1. SOFTWARE INSTALATION: QGIS 2.10



1. SOFTWARE INSTALATION: POSTGRESQL 9.3

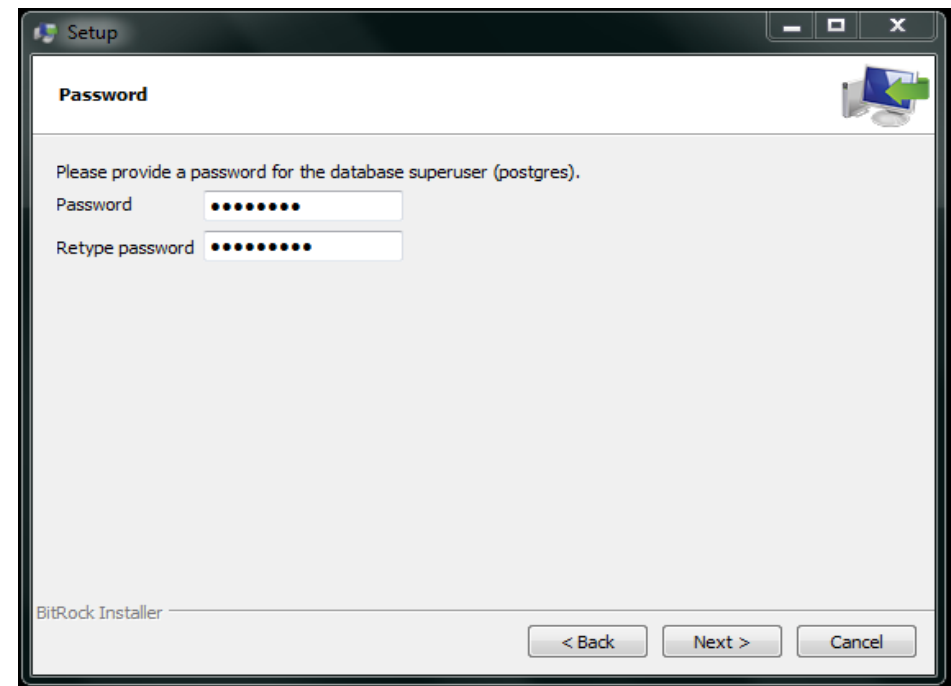
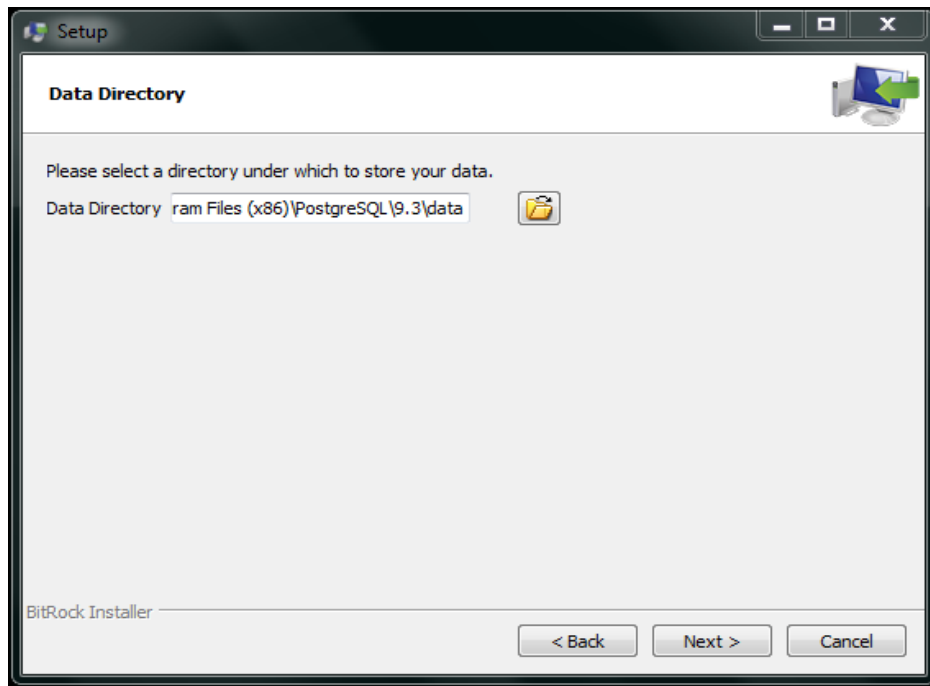
1. In the main menu just start the setup configuration by pressing *Next*.

2. Change the path for the PostgreSQL installation or keep the default directory.



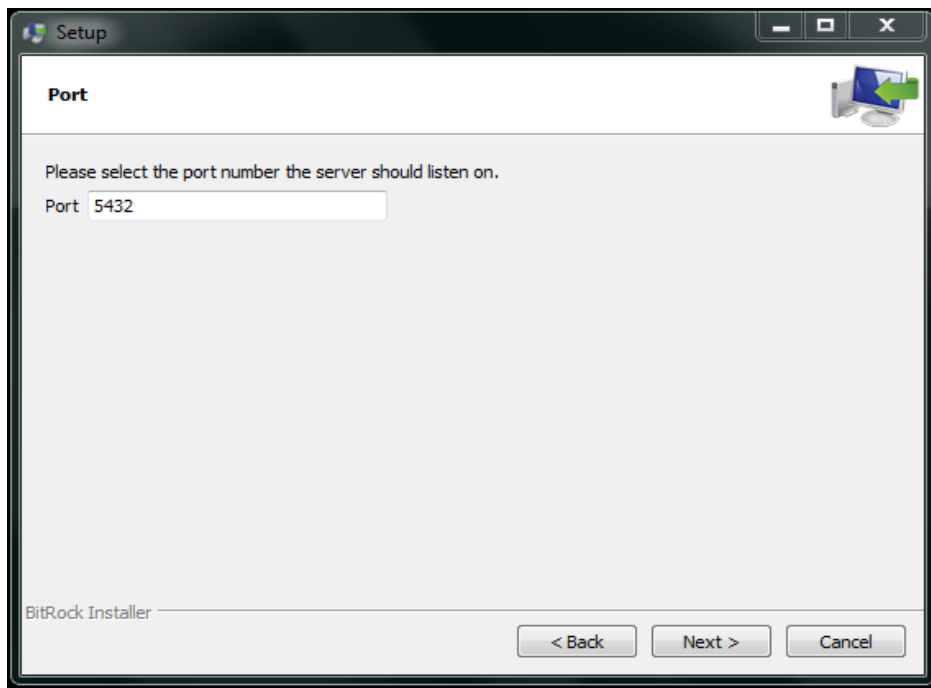
3. Change the path for the PostgreSQL data or keep the default directory.

4. Define password for the *superuser* (“postgres”). Keep in mind that this password can’t be recovered if lost.

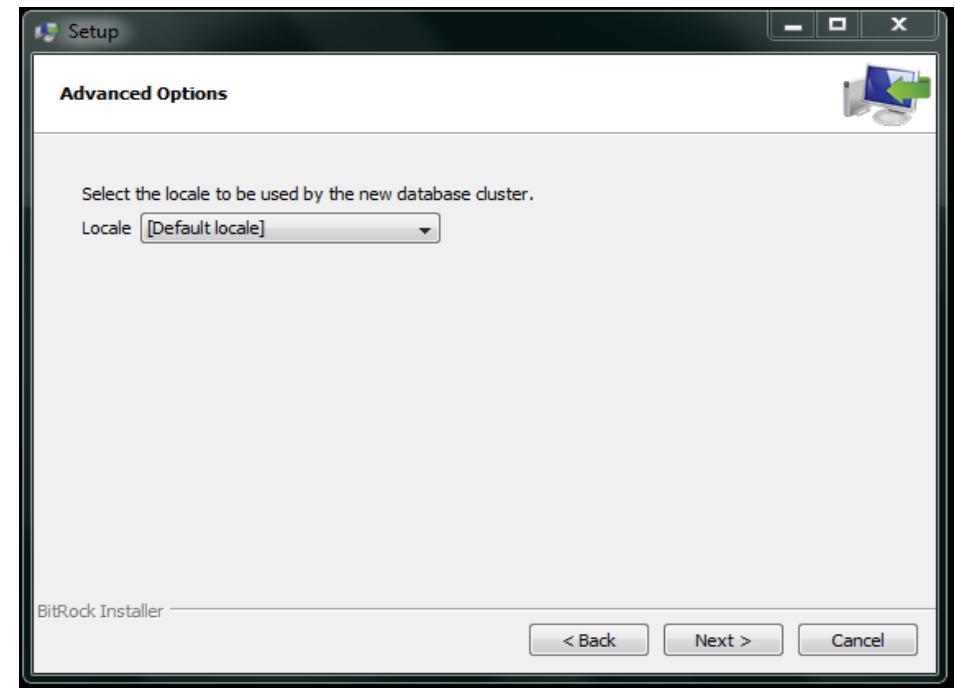


1. SOFTWARE INSTALATION: POSTGRESQL 9.3

5. Select the port number for your localhost server or keep the default port.

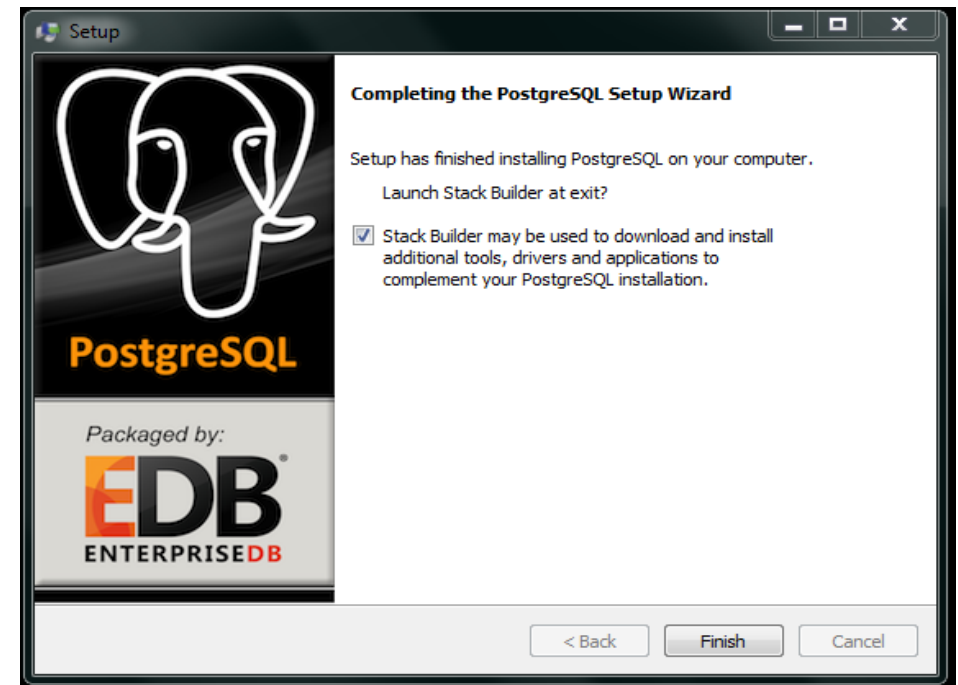
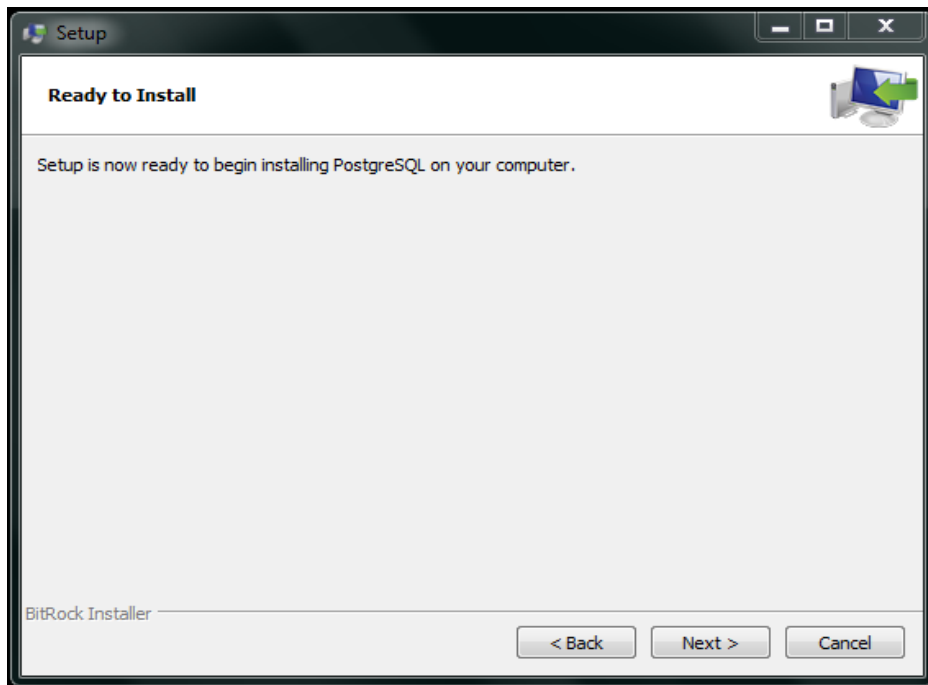


6. Keep the "Default locale" on the advanced options.



7. Press *Next* to start the installation.

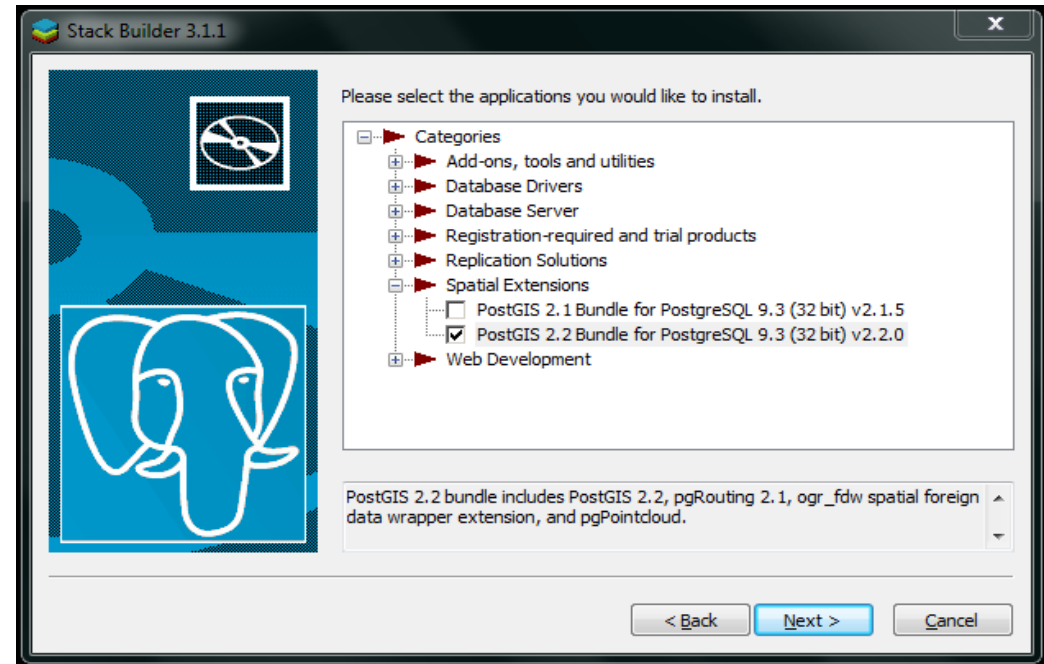
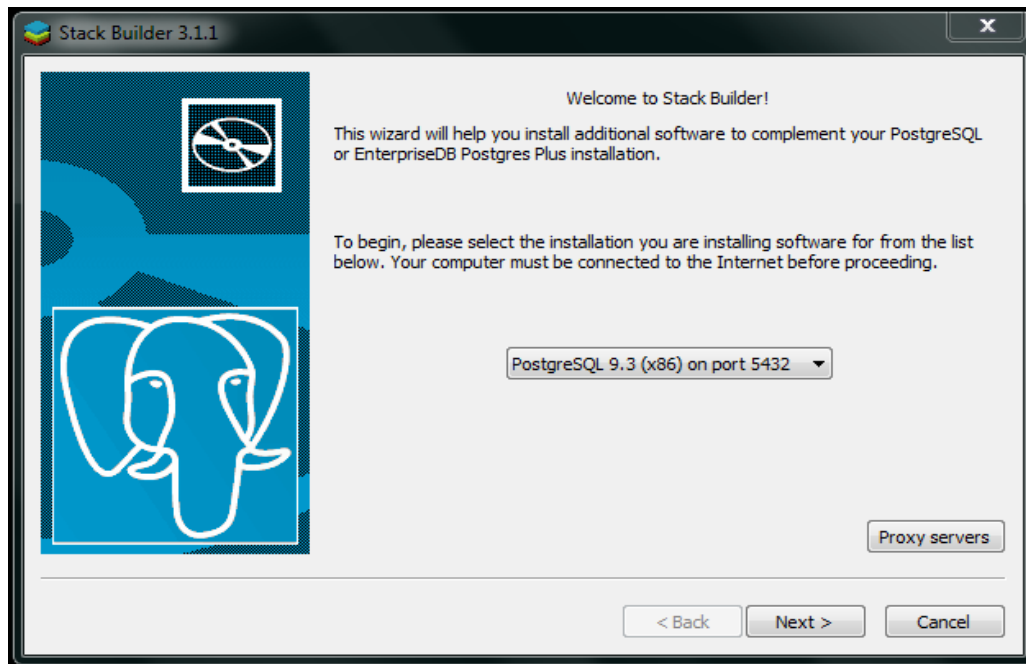
8. Before pressing *Finish* select the *Launch Stack Builder at exit* option.



1. SOFTWARE INSTALATION: POSTGRESQL 9.3

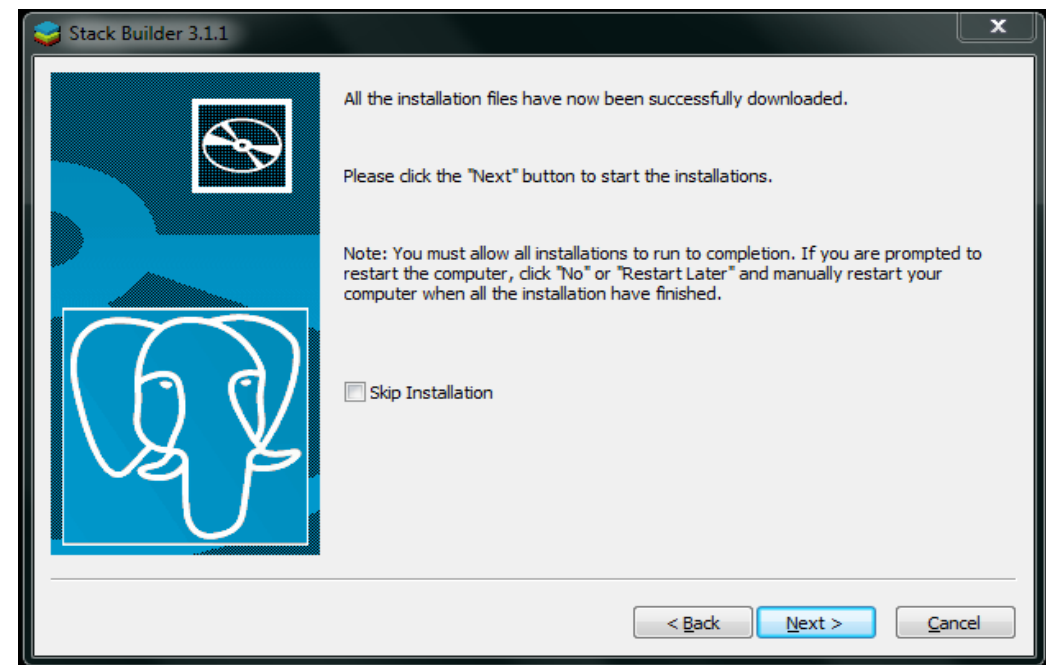
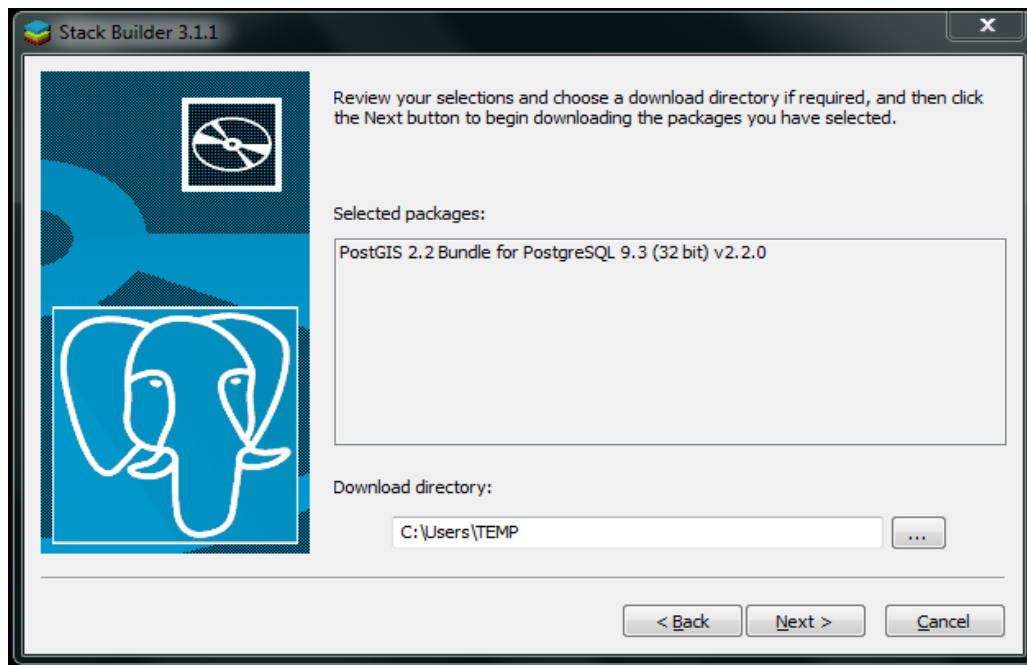
9. Select the *PostgreSQL 9.3* option and press *Next*.

10. Select the *PostGIS 2.2* option under the *Spatial Extensions* and press *Next*.



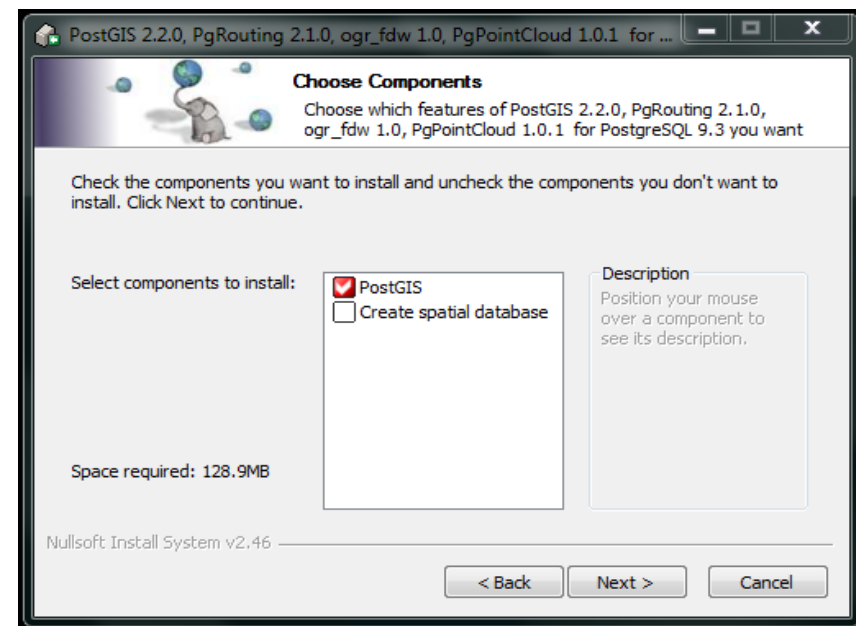
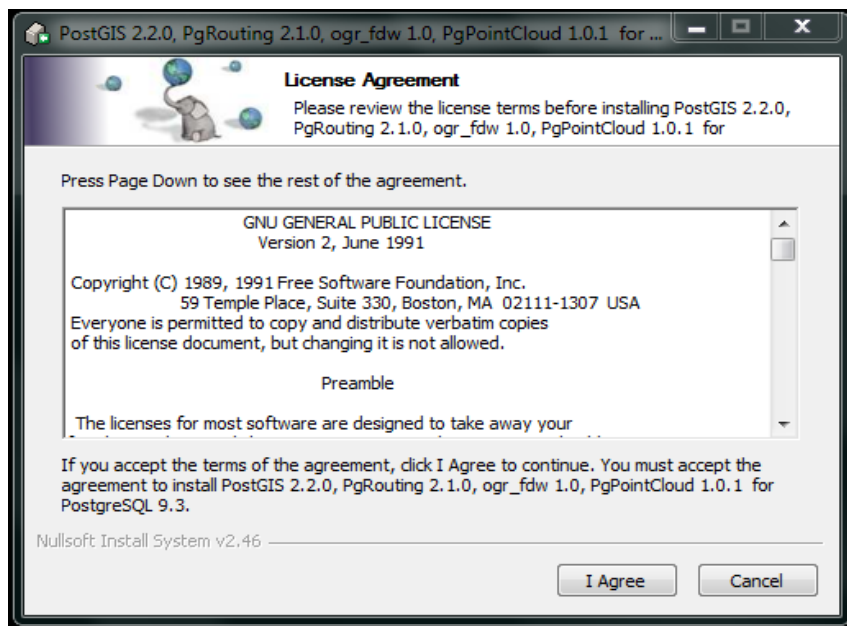
11. Confirm the selected packages (*PostGIS 2.2*) and specify the download directory or keep the default path.

12. Press *Next* to start the installation.



13. The PostGIS has a GNU – General Public License, describe at this step. Press “I Agree”.

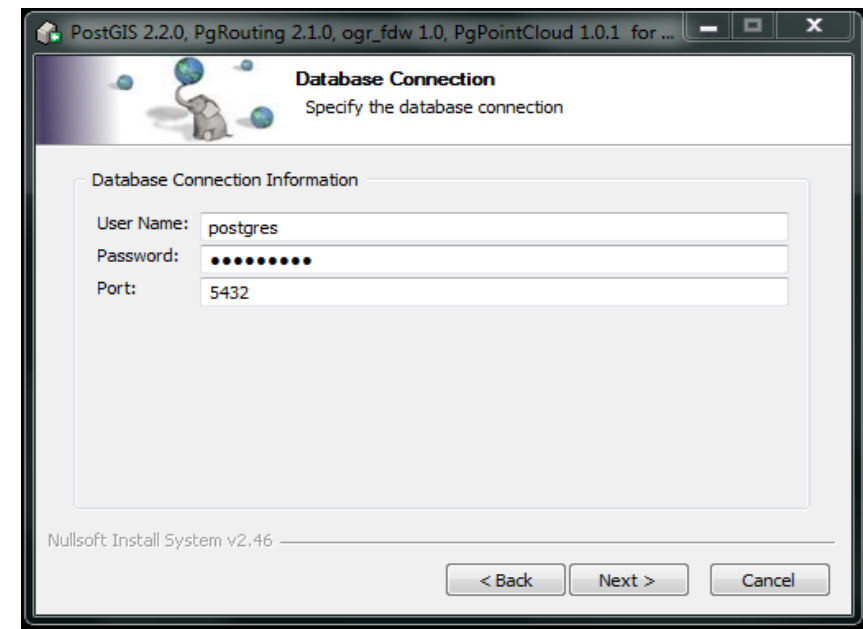
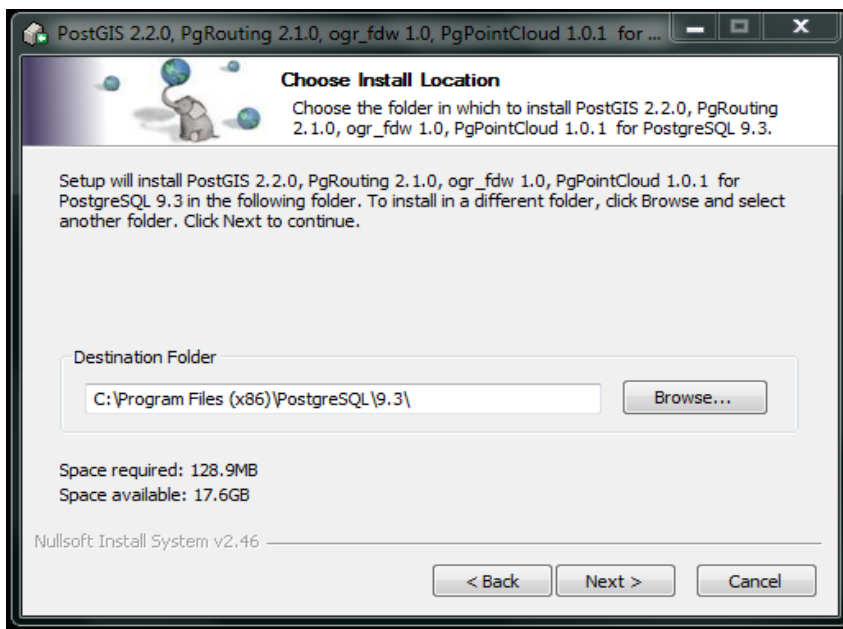
14. Don't select the *Create spatial database* and just press *Next*.



1. SOFTWARE INSTALATION: POSTGRESQL 9.3

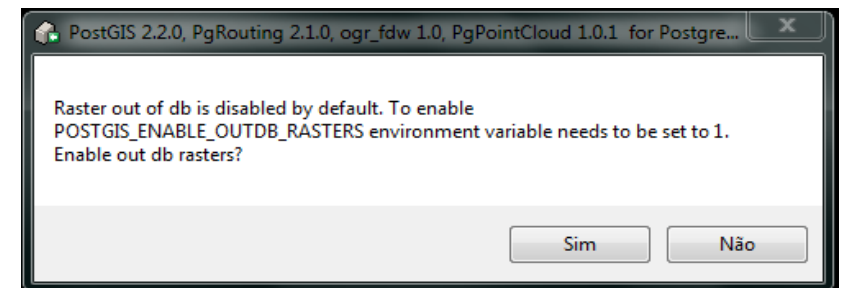
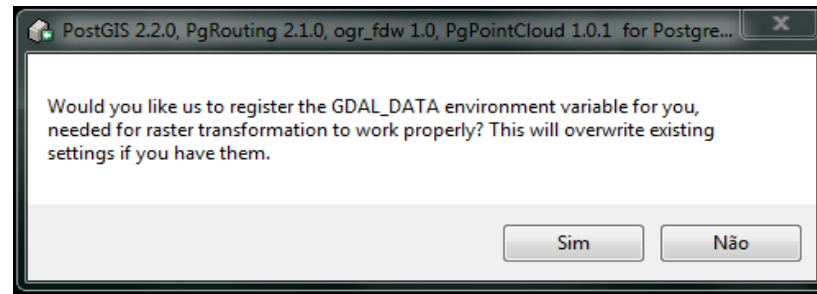
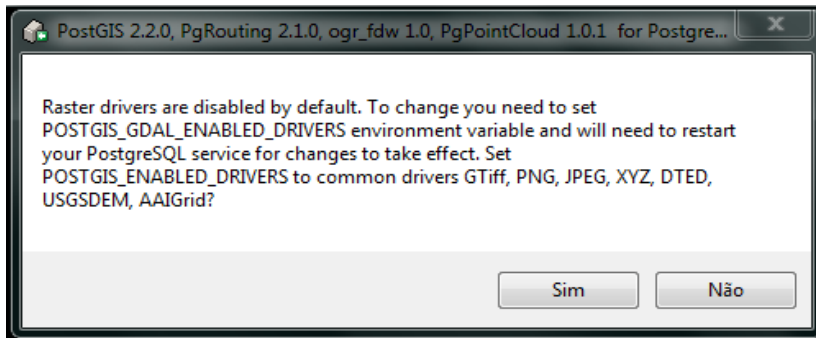
15. Choose Install location or keep the default path.

16. Write the earlier defined password for the “*postgres*” username and the server port number.

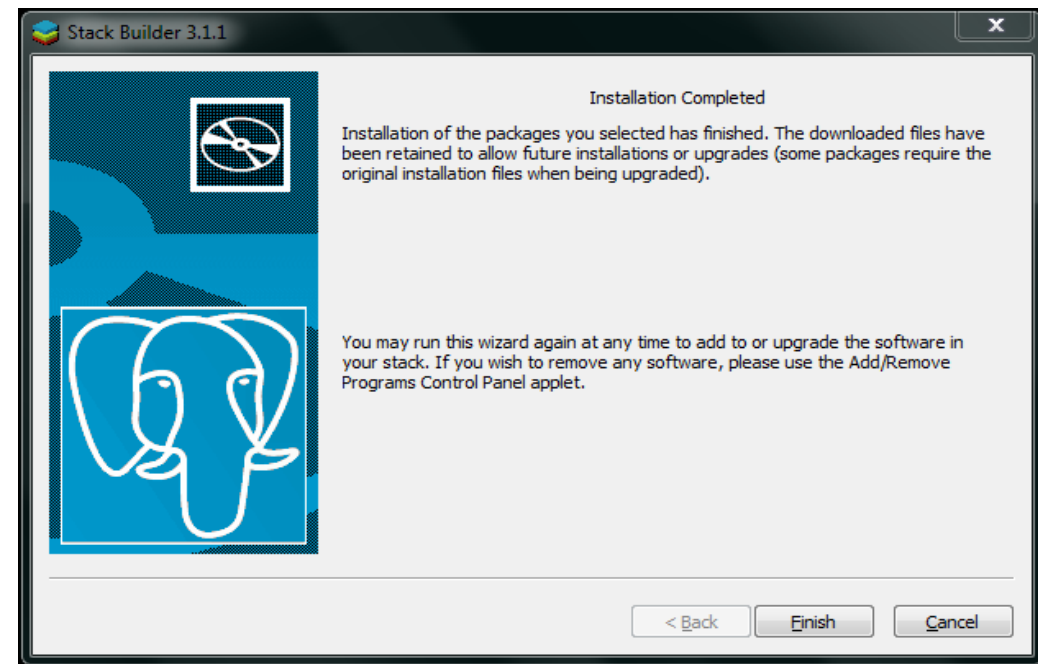
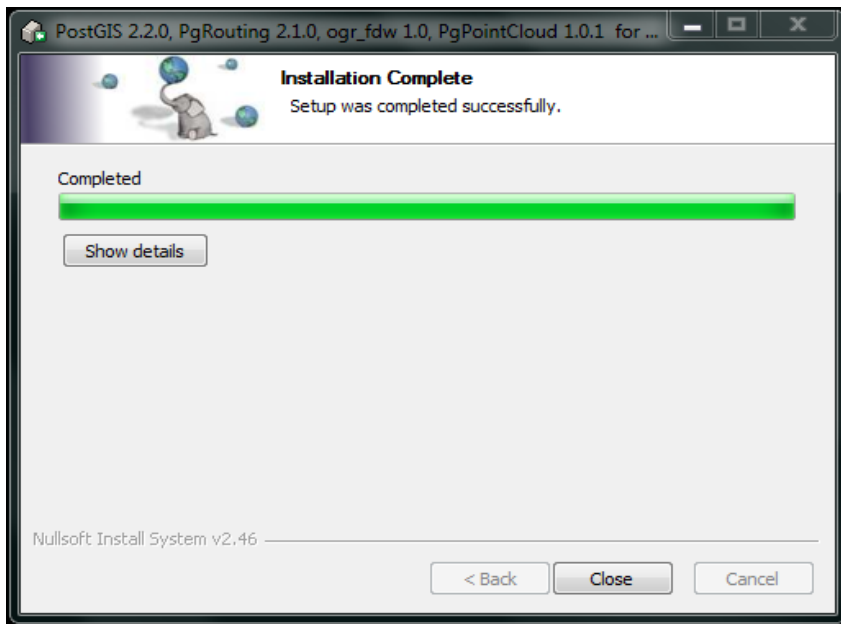


1. SOFTWARE INSTALATION: POSTGRESQL 9.3

17. Press Yes on the three following boxes.



18. Installation complete. Once the download and installation process has completed, Stack Builder will show a summary indicating any problems encountered. Press *Close* and then *Finish* to finish the Installation.

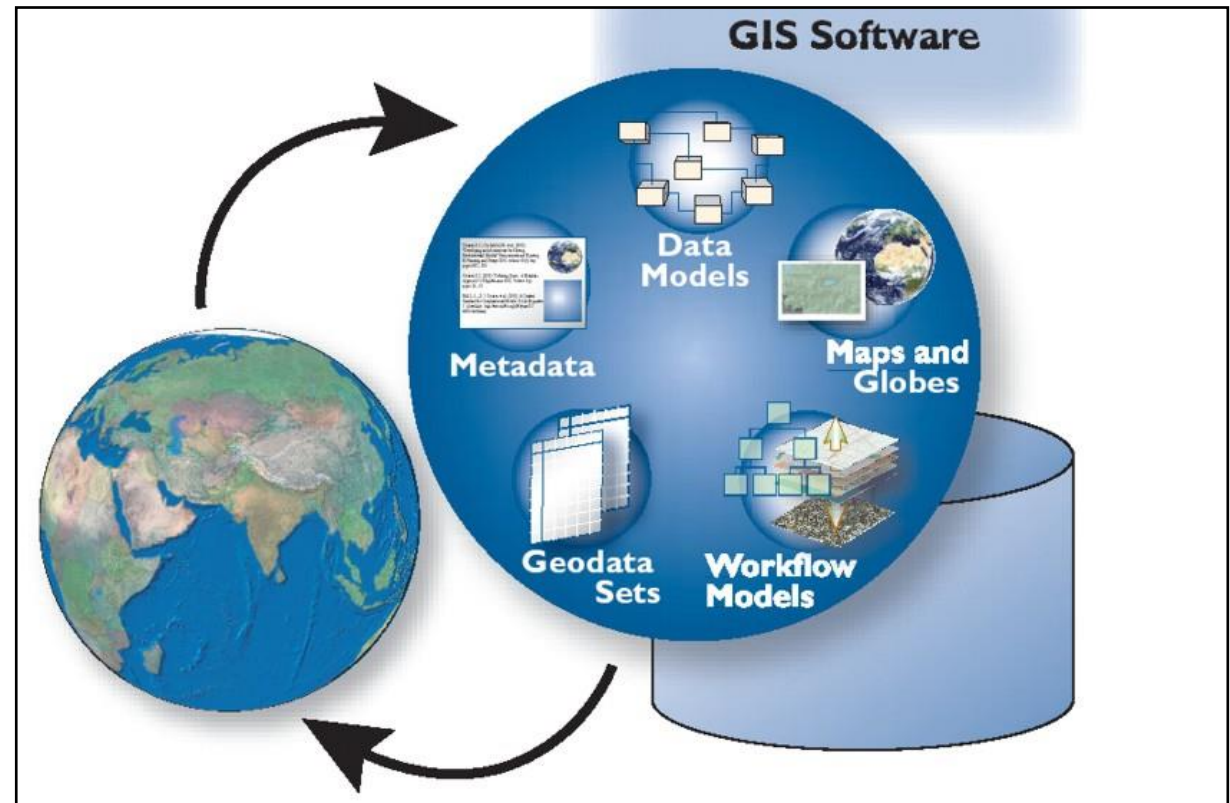




2. INTRODUCTION TO QGIS

GIS

A geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. GIS can show many different types of data on one map. This enables people to more easily see, analyze, and understand patterns and connections between data.



Storage/ Organization of data

Data storage using a small physical space;
It allows creating data by interacting with a geographical interface;
No problem regarding deterioration of data, in comparison with the traditional paper sheets;
Immediate access;
It allows the replication of data with no loss of quality.

Visualization of data

It allows viewing any level of information;
It allows you to create thematic maps according to custom settings.

Spatial queries

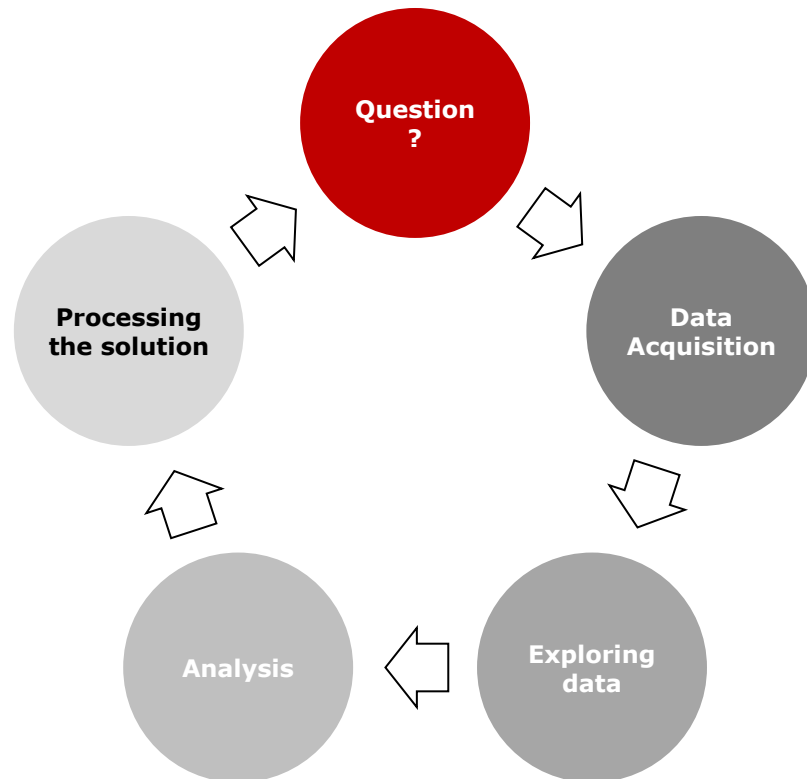
Dynamic and robust interaction between the user and data;
It allows to access the properties of a particular object;
It allows the identification of sites containing particular properties.

Spatial analysis

Includes a set of functions capable to highlight particular hidden patterns.

Generation of maps

Tools for generating high quality maps;
It allows an easy handling of coordinate grids;
It allows a simple use of cartographic items (scale, legend, north, etc.).



Question

Identification of the problem and respective main variables.

Data Acquisition

Collecting data in order to solve the question. This data may be collected from a number of sources: online databases, in-site measurements or “from scratch”.

Exploring data

Exploring the geographical data with a suitable symbology.

Analysis

Analysis of the given data and specification of the methodology to approach the problem.

Processing the solution

Generation of thematic maps which will act as a “bridge” between the analyzer and the source.

2. Introduction to QGIS: Type of information handled.

In a GIS the information is encoded and represented through data models with spatial location, geo-referencing and a set of quantitative and qualitative descriptors.

The representation of geographic features may have a vector or raster format.

Vectorial

In the vector data model space is occupied by a series of objects (points, lines and polygons), described by their properties and mapped according to a geographic coordinate system.

Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices.

Vector models are useful for storing data that has discrete boundaries, such as country borders, land parcels, and streets.

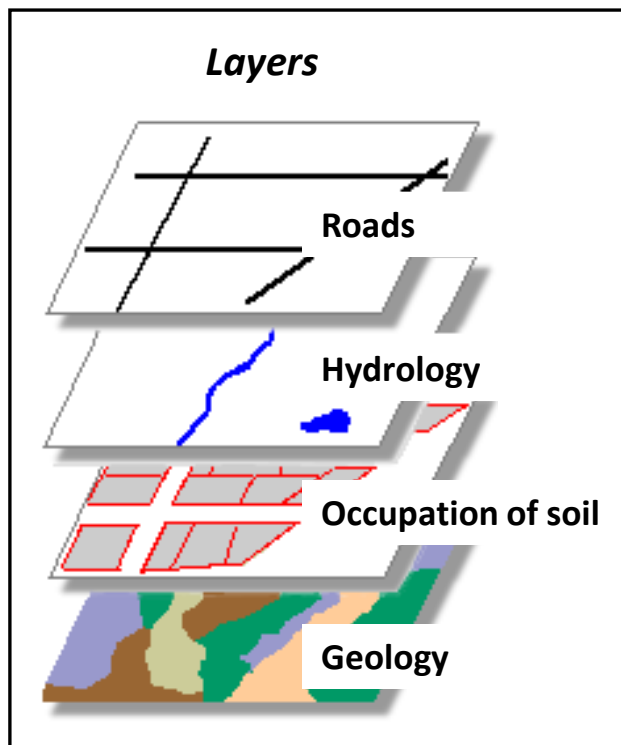
Raster

A spatial data model that defines space as an array of equally sized cells arranged in rows and columns. Each cell contains an attribute value and location coordinates.

Cell values vary continuously to form a surface. It is assumed that the value assigned to each cell is what is found at the center of the cell.

PROCESSING DATA IN A GIS

A GIS organizes and stores the information in a particular area or region as collection of thematic layers that can be linked geographically.



Each **layer** contains similar features (of the same type: points, lines and polygons) that share the same geographic extent, coordinate system and attributes.

BASIC CONCEPTS: *FEATURES, ATTRIBUTES AND LAYERS*



Feature

It is a geographic object on a map, which can be stored as points, lines or polygons.



Attribute

Information on a feature, usually stored in a table associated with a unique identifier.



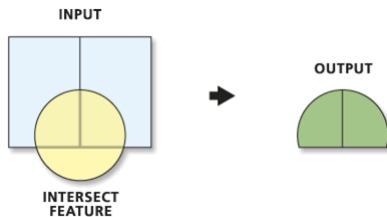
Layer

Representation of geographic data on the map;
It shows a set of geographic data that is connected by attributes;
Includes definition on how the data appears on the map.

2. Introduction to QGIS: The main functions of GIS.

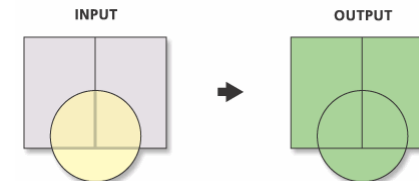
Intersect

Computes a geometric intersection of the input features. Features or portions of features which overlap in all layers and/or feature classes will be written to the output feature class.



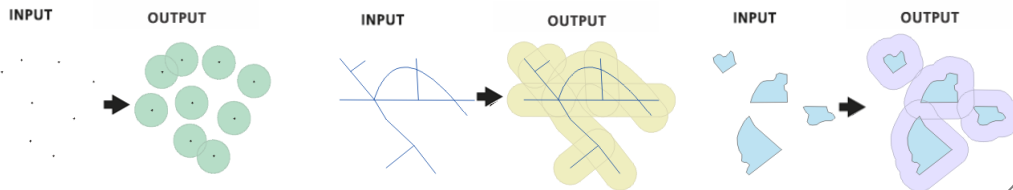
Union

Computes a geometric intersection of the Input Features. All features will be written to the Output Feature Class with the attributes from the Input Features, which it overlaps.



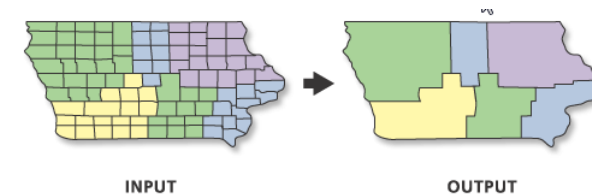
Buffer

Creates buffer polygons around input features to a specified distance. An optional dissolve can be performed to combine overlapping buffers



Dissolve

Aggregates features based on specified attributes.



Voronoi

Creates a Voronoi diagram in current region from an input vector map containing points or centroids.

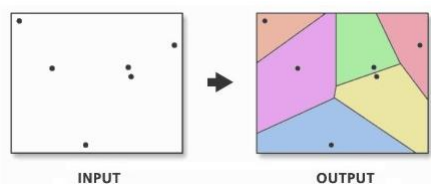


Table joins

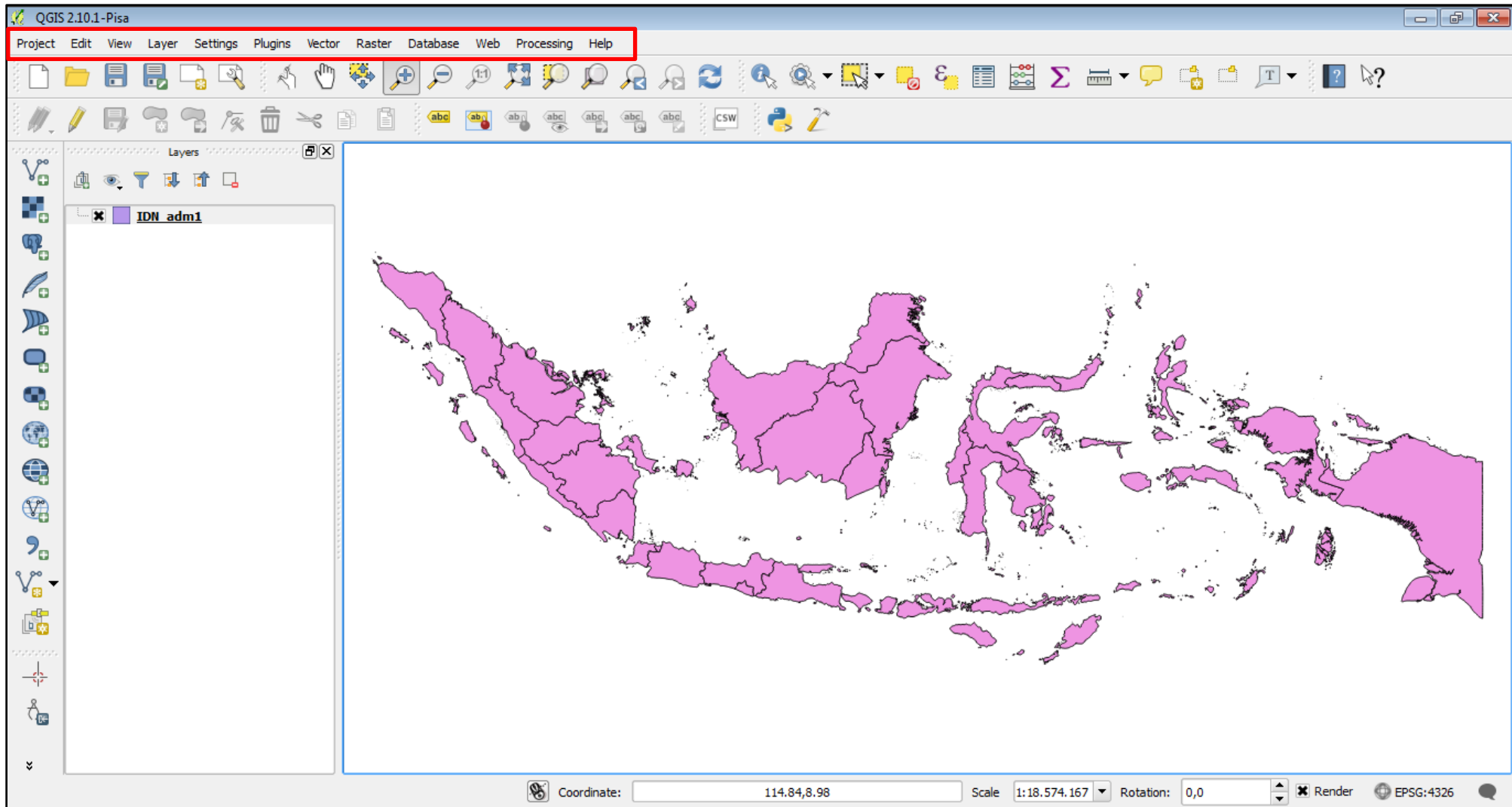
Joins a table view to a layer (or a table view to a table view) based on a common field.

The records in the Join Table are matched to the records in the input layer or table view. A match is made when the input join field and output join field values are equal. This join is temporary.

INPUT		OUTPUT			
OBJECT ID#	Landuse Code	Landuse Code	Landuse Type	Join Table Landuse Code	Join Table Landuse Type
1	2	0	Unclassified	2	water
2	0	1	shrub	0	Unclassified
3	1	2	water	1	shrub

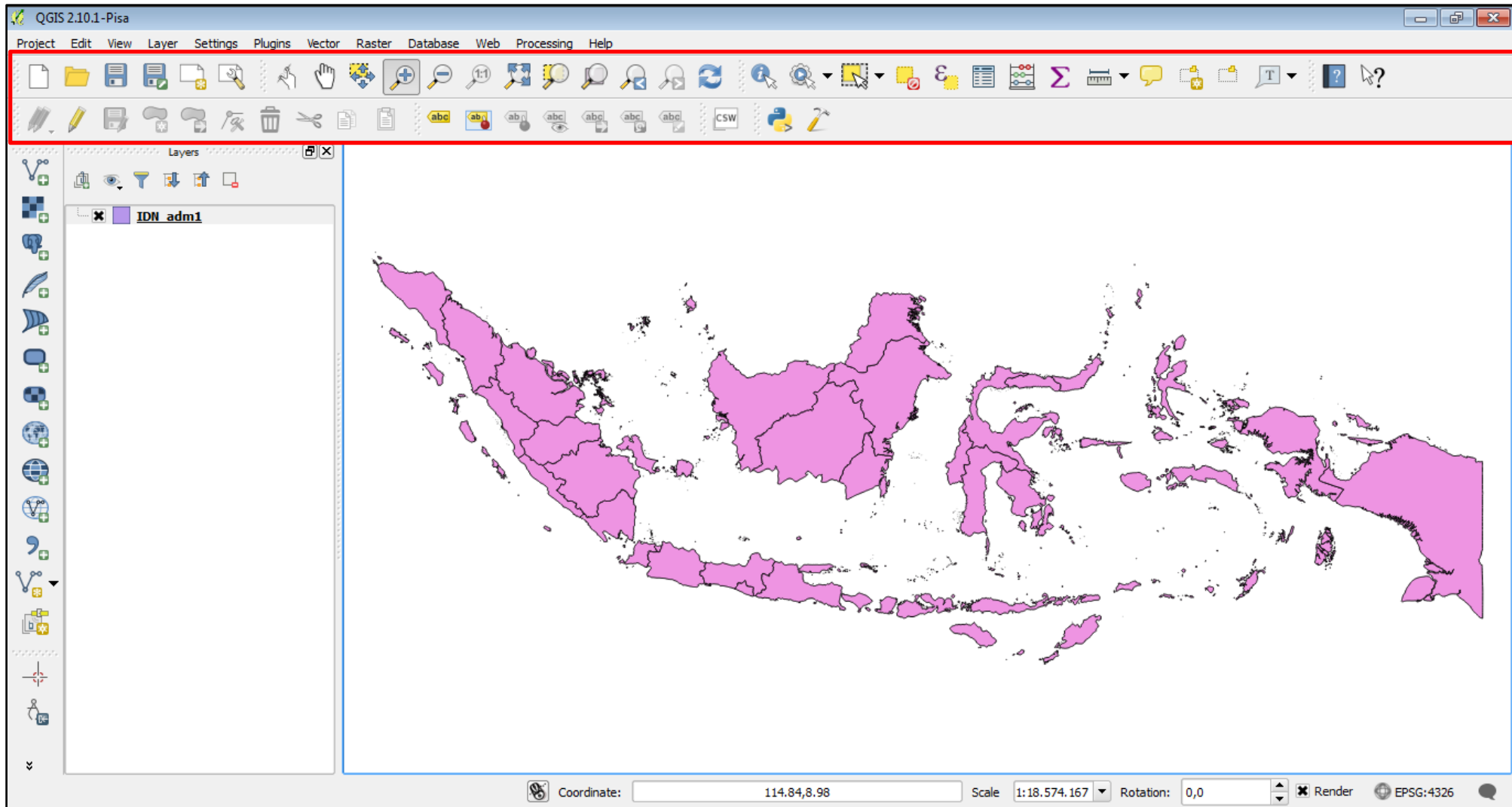
2. Introduction to QGIS: the “Menu Bar”

The “Menu Bar” provides access to various QGIS features using a standard hierarchical menu.



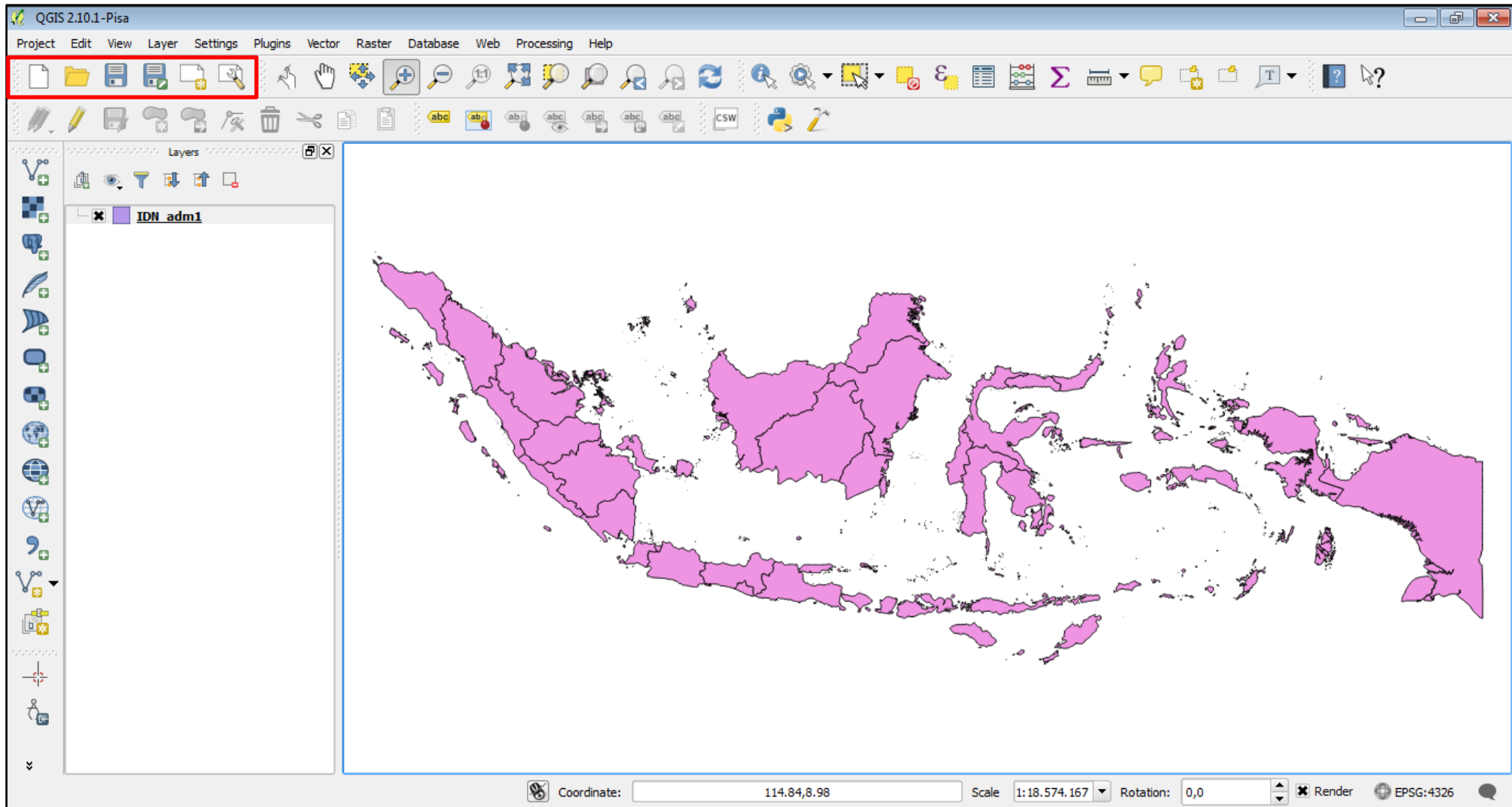
2. Introduction to QGIS: the “Tool Bar”

The “Tool Bar” provides access to most of the same functions as the menus, plus additional tools for interacting with the map.



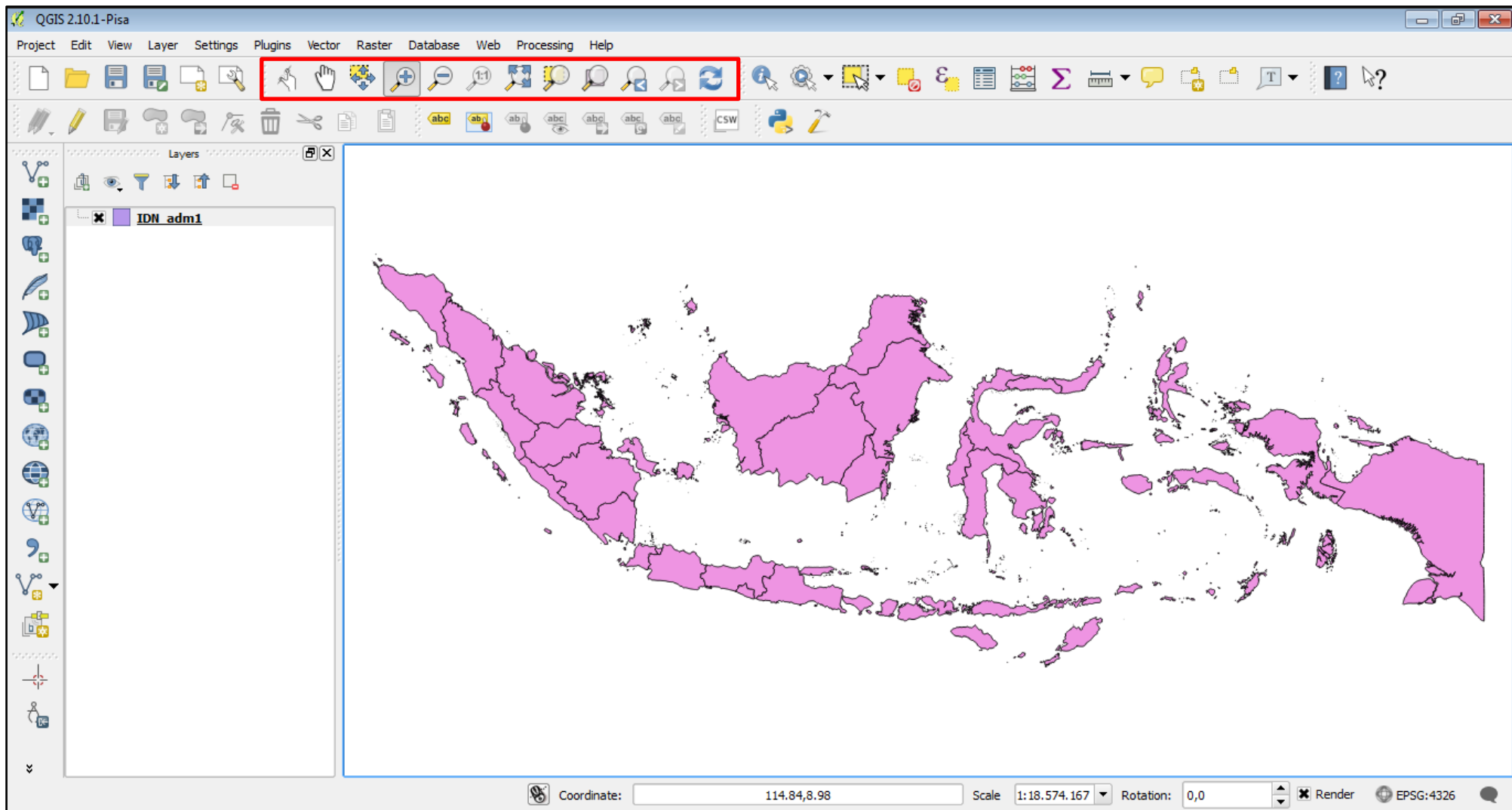
2. Introduction to QGIS: the “File Bar”

The “File Bar” includes the main options of the “Project” tab on the “Menu Bar”. One is able to create/add new projects or save current projects. This bar also provides access to layout capabilities.



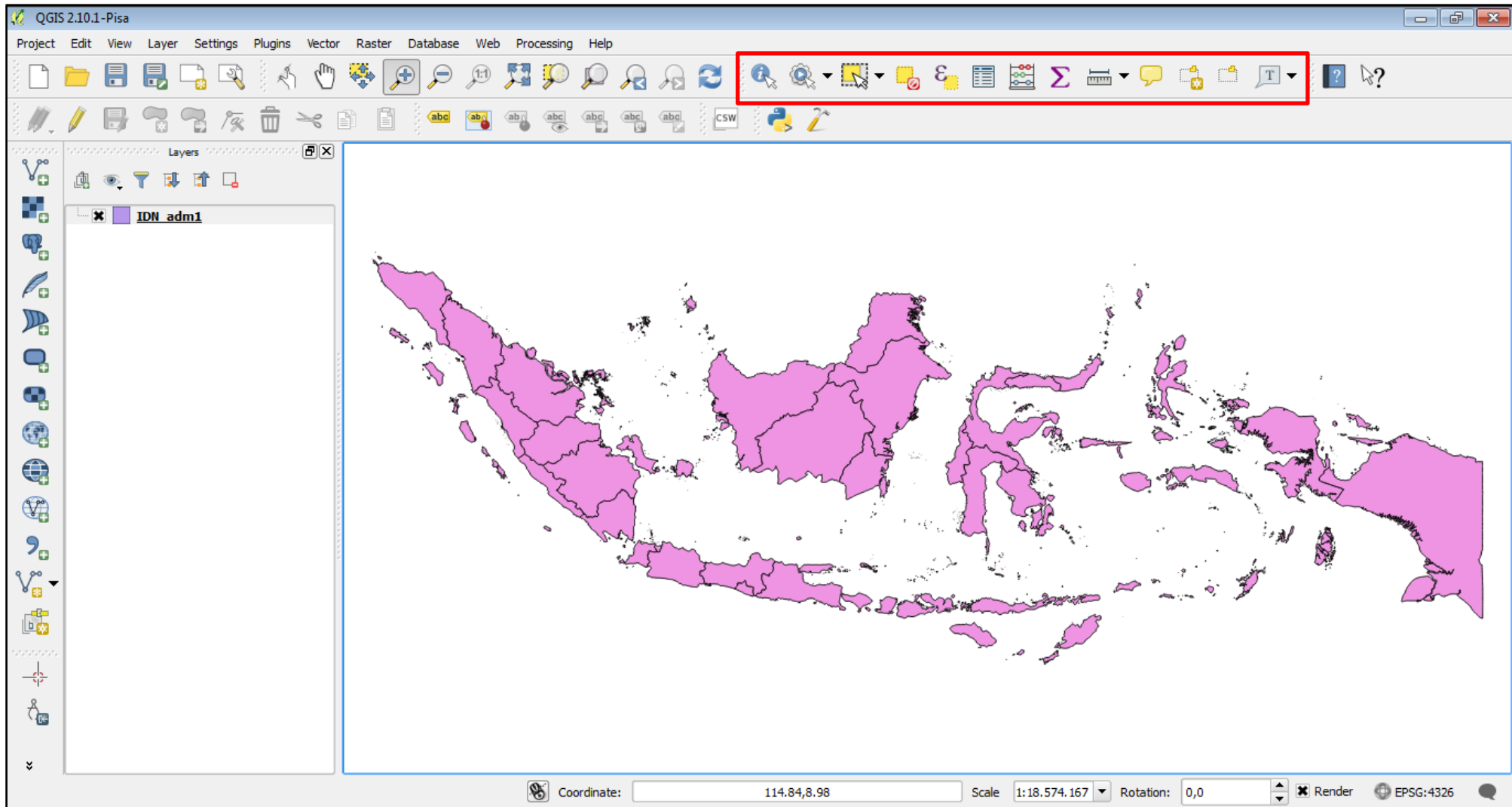
2. Introduction to QGIS: the “View Bar”

The “View Bar” allows to access different options on viewing layers’ contents. These options include zooming in and out and also zooming to a specific selection of features or extent.



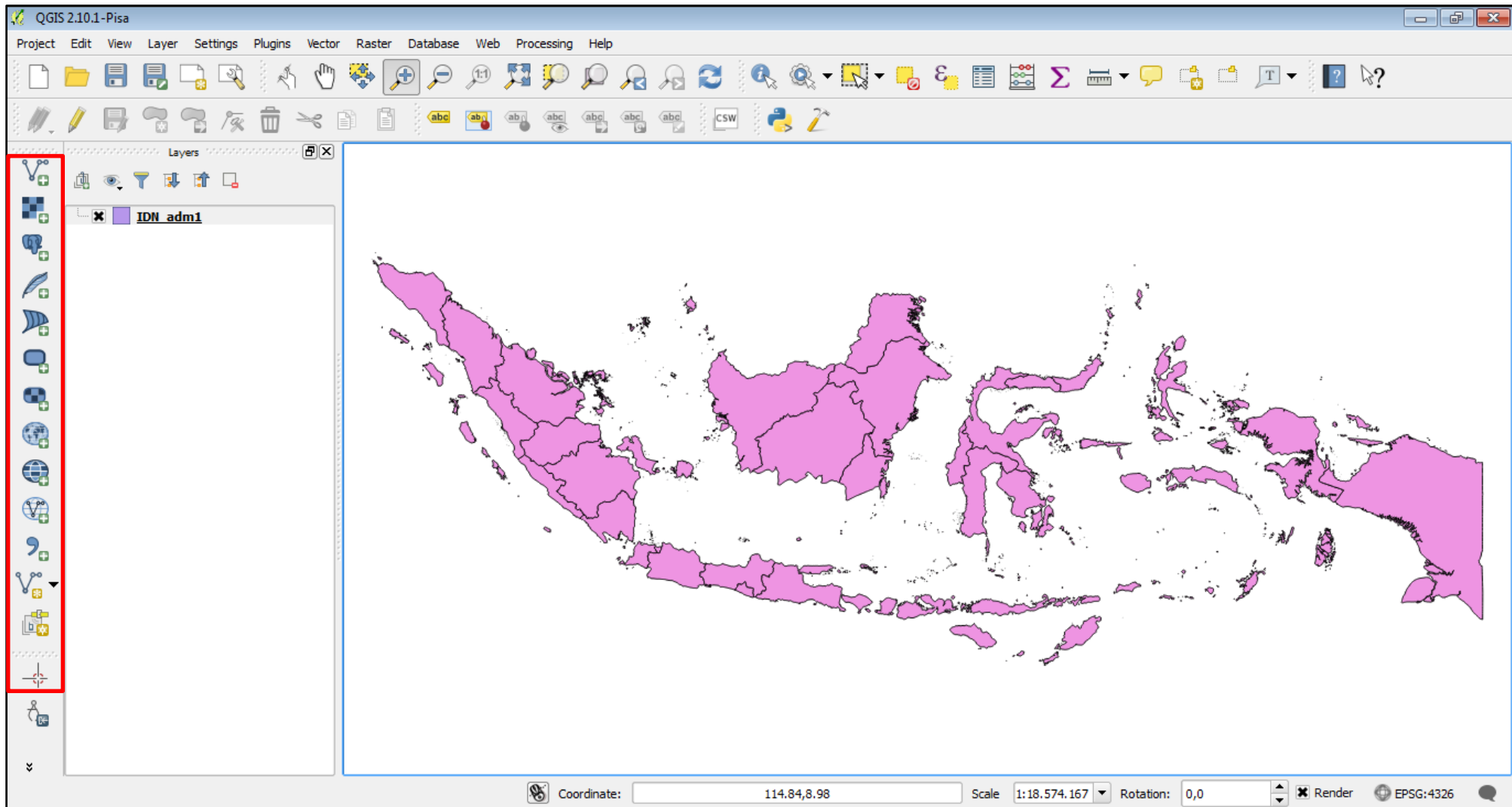
2. Introduction to QGIS: the “Attribute Bar”

The “Attribute Bar” gives access to the layers’ attributes and allows numerical/logical operations with those attributes. Using this bar also allows to select and view shape’s attributes while navigating in the canvas. Other functionalities include measurement of areas and lengths on the map canvas.



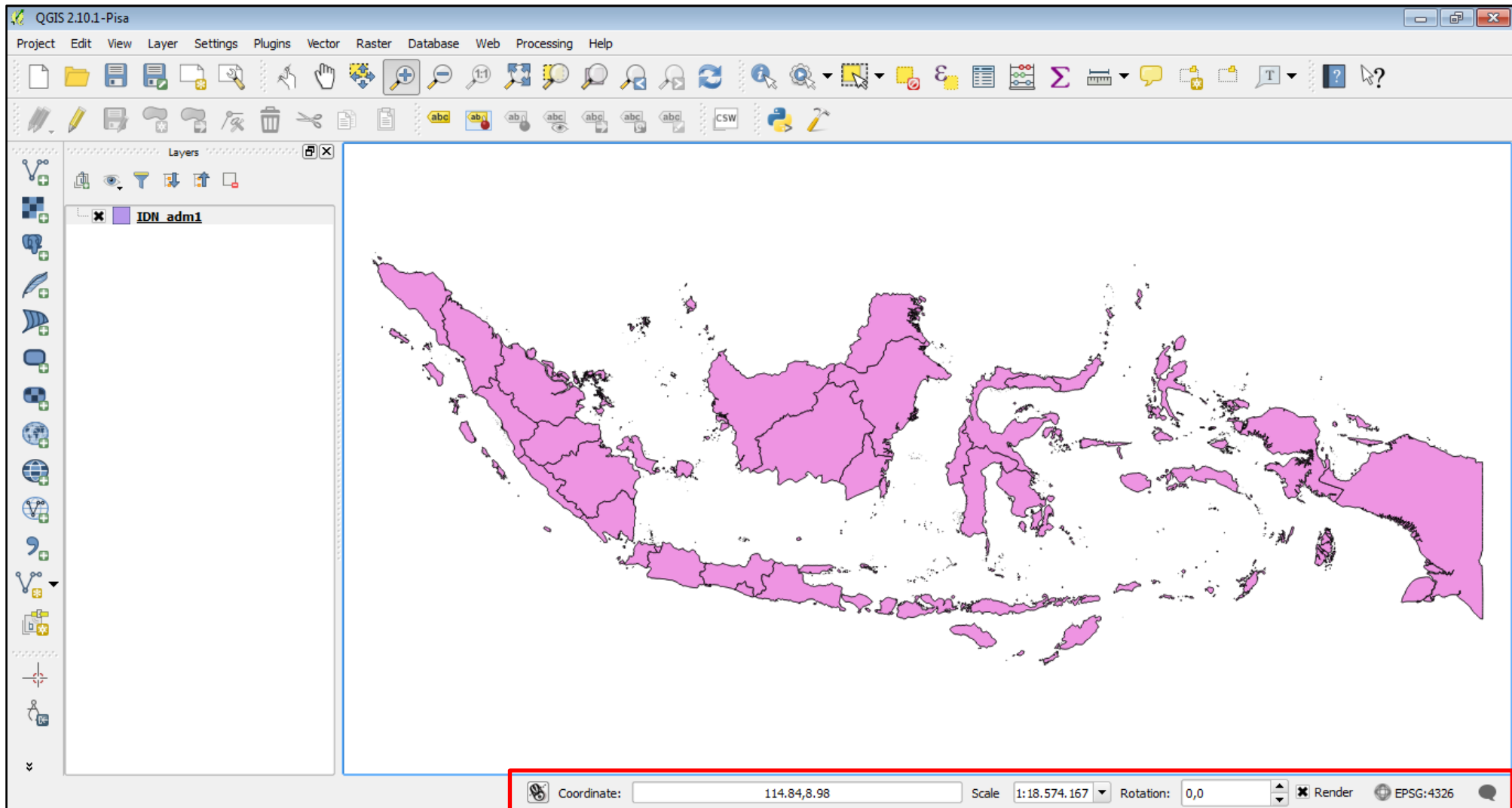
2. Introduction to QGIS: the “Layers’ Manager Bar”

The “Layers’ Manager Bar” allows to add different types of layers (vectorial, raster, WMS...) and create new shapefiles. Through this bar it is also possible to connect to any GeoSpatial database.



2. Introduction to QGIS: the “Status Bar”

The “Status Bar” gives information (coordinates) on the position in the map canvas. It also shows the current scale and rotation angle of the canvas. Information regarding the Coordinate Reference System is also available on the right side of the bar.



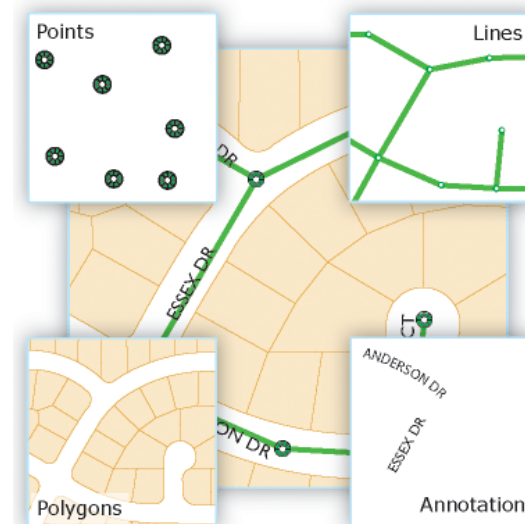


3. QGIS SOFTWARE TRAINING

Tutorial 1

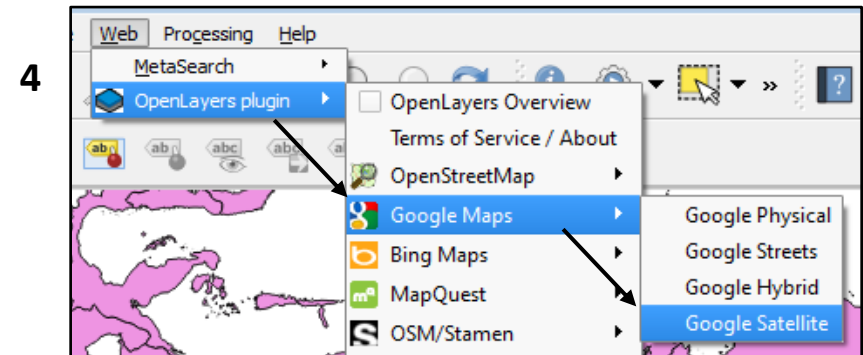
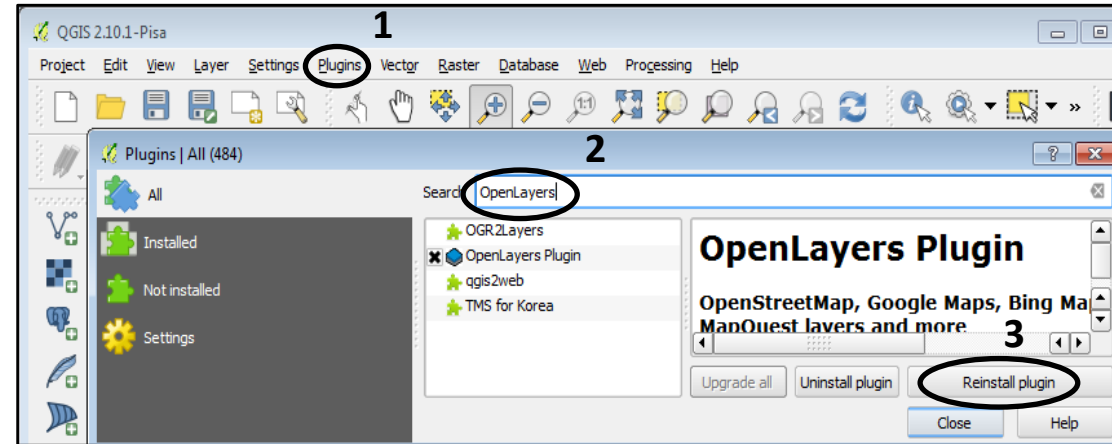
Exercise: Create a shapefile, add some points and calculate the respective coordinates.

- Create a vectorial shapefile;
 - Insert new features;
- Use the field calculator;



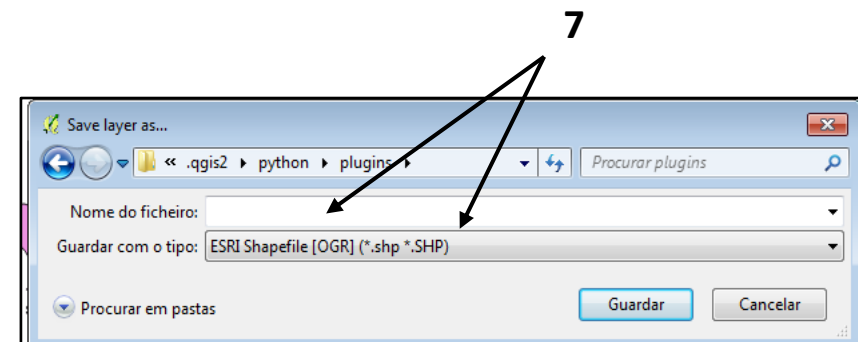
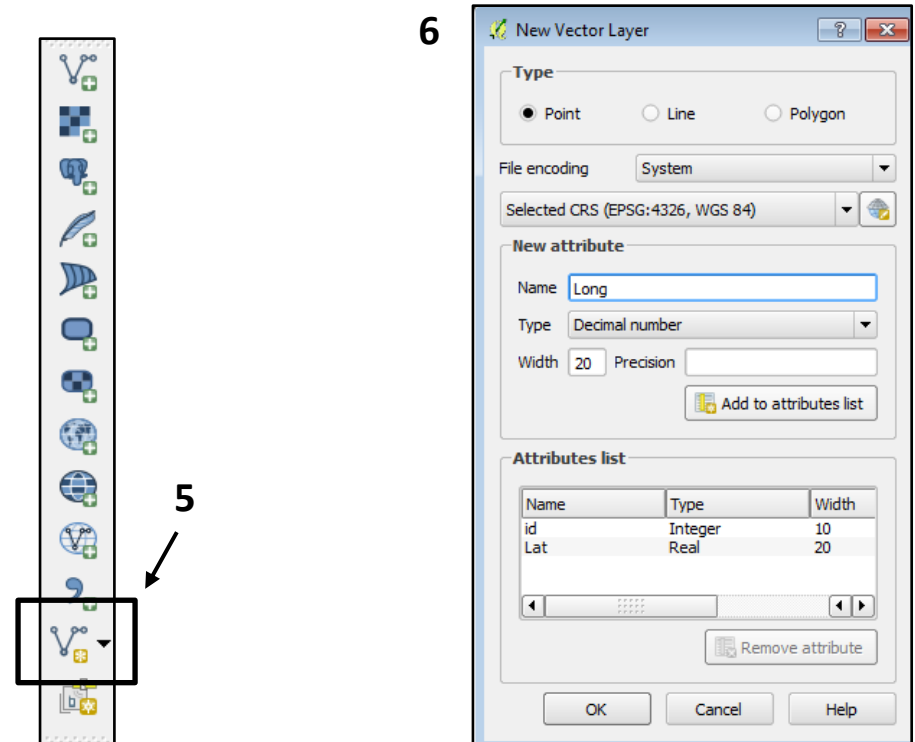
3. QGIS software training: Tutorial 1 (creating and editing shapefiles)

1. Install OpenLayers plugin by clicking “Plugins” on the “Menu Bar”. The plugins’ box will pop-up.
2. Search for “OpenLayers” and select the “OpenLayers Plugin”.
3. Click “Install plugin” and close the “Plugins” box.
4. Now let’s add a basemap to the canvas. Click “Web” on the “Menu Bar”, followed by “OpenLayers Plugin”, “Google Maps” and finally “Google Sattelite”.



3. QGIS software training: Tutorial 1 (creating and editing shapefiles)

5. Create a new layer by clicking the “New Vector Layer” on the “Layers’ Manager Bar” on the right side of the GUI.
6. Now add some new attribute fields. Type “Lat” on name and select “Decimal Number” on type. Press “Add to attribute list” and repeat this procedure to the attribute “Long”. Press “Ok”.
7. Now type “Houses_Jak” on the name field and select “ESRI shapefile” as file type.



3. QGIS software training: Tutorial 1 (creating and editing shapefiles)

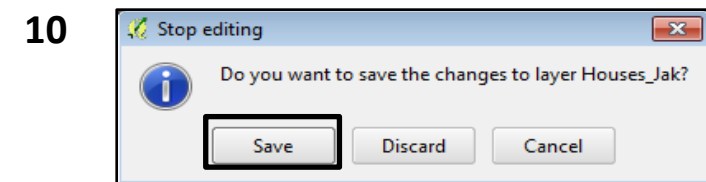
8. Now zoom in the “Google Sattelite” layer anywhere in Jakarta. Use the “Zoom in” and “Pan Map” options on the “View Bar”



9. Let’s add some new points to the shapefile. Select the layer “Houses_Jak” on the “Layers’ Manager” and press the “Toogle Editing” button, followed by the “Add Feature” button.

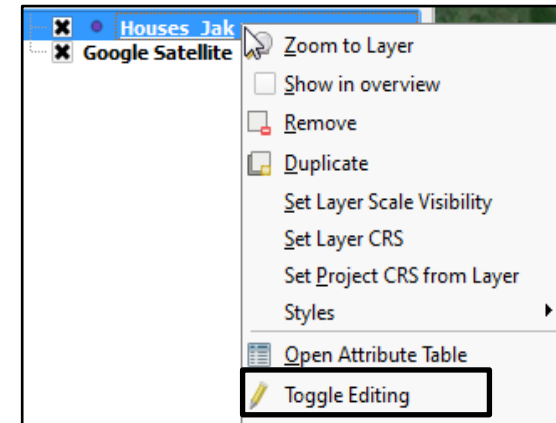


10. Now click on top of some buildings to add points. Press the “Toggle Editing” button when finished and save changes.



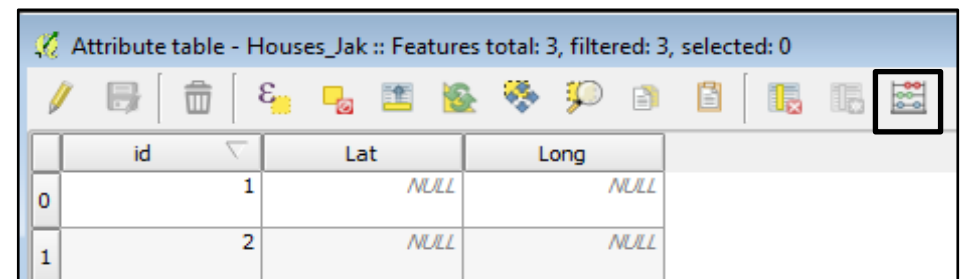
11. Let's finish by calculating the coordinates of the new points. Right click on "Houses_Jak" layer a press "Open Attribute Table".

11



12. Click the "Open Field calculator" and a new box will pop-up.

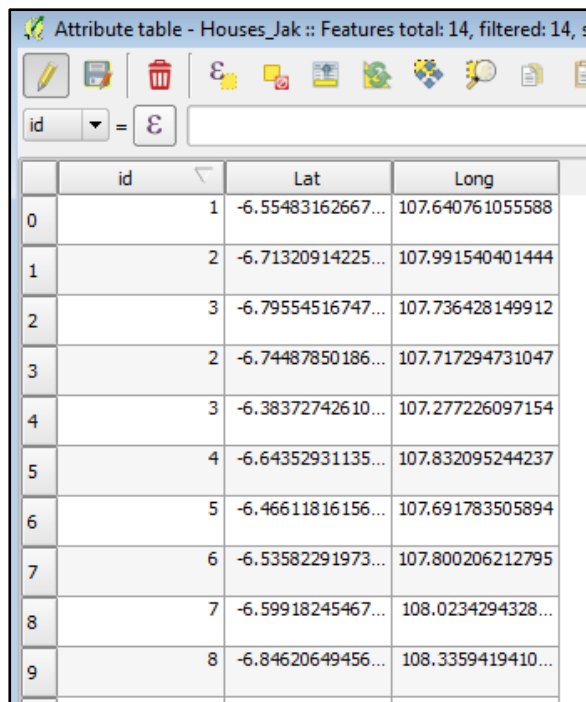
12



3. QGIS software training: Tutorial 1 (creating and editing shapefiles)

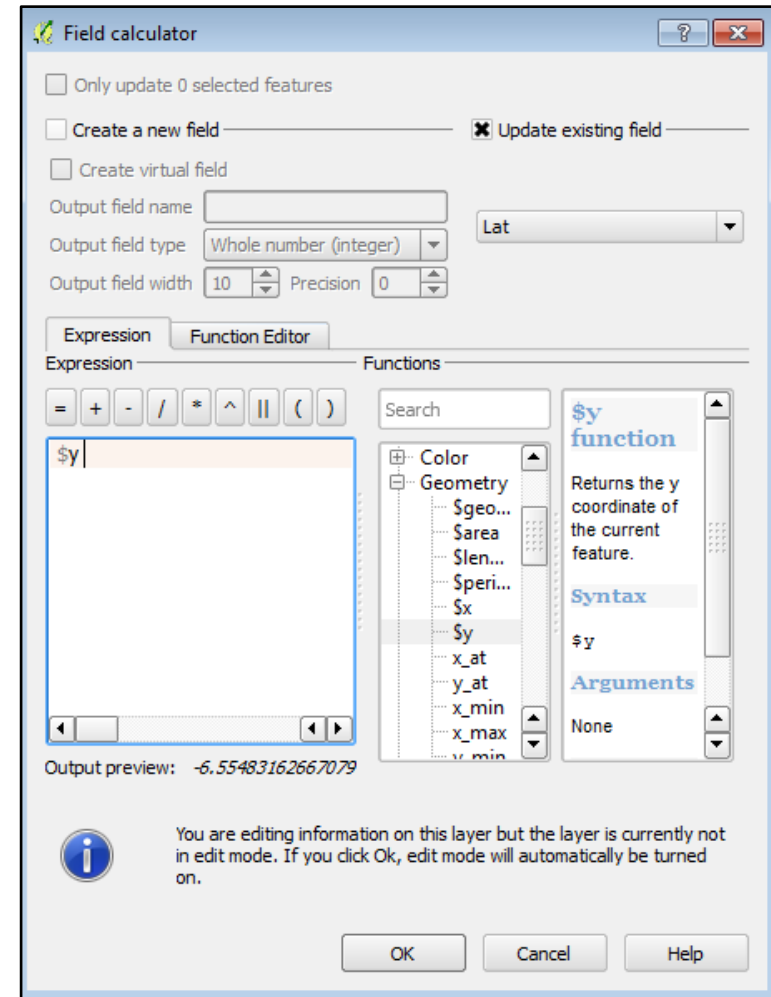
13. Now calculate the latitude and longitude of the points by ticking the checkbox “Update existing field”, followed by selecting the field “Lat” on the combo box. Finally, search for the function “Geometry” -> “\$y” and double-click it. Press “ok”.
14. Repeat the last step for the attribute “Long”. Instead of using the “\$y” function, use the “\$x” function.

The “Attribute Table” should now look as follows:



	id	Lat	Long
0	1	-6.55483162667...	107.640761055588
1	2	-6.71320914225...	107.991540401444
2	3	-6.79554516747...	107.736428149912
3	2	-6.74487850186...	107.717294731047
4	3	-6.38372742610...	107.277226097154
5	4	-6.64352931135...	107.832095244237
6	5	-6.46611816156...	107.691783505894
7	6	-6.53582291973...	107.800206212795
8	7	-6.59918245467...	108.0234294328...
9	8	-6.84620649456...	108.3359419410...

13



3. QGIS software training: Tutorial 1 (creating and editing shapefiles)

Let's practise:

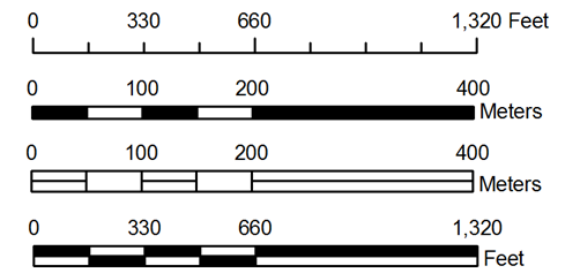
1. Create a shapefile (type: lines) with an attribute named "Length". Add some features to the layer that represent parts of roads in Jakarta. Use the OpenLayers plugin to help you. When finished, calculate the length of the roads by accessing the field calculator in the "Attribute Table". Right click on the layer and press "Layer properties", followed by "Style". You may now specify the colour and the width of your lines.
2. Create a shapefile (type: polygons) with an attribute named "Area". Add some features to the layer that represent green spaces in Jakarta. Use the OpenLayers plugin to help you. When finished, calculate the area of the polygons by accessing the field calculator in the "Attribute Table". Use the "Measure" tool on the "Tool Bar" to confirm the area given in the "Attribute Table".



Tutorial 2

Exercise: Create a map with the standard elements: labels, scale bar and north arrow.

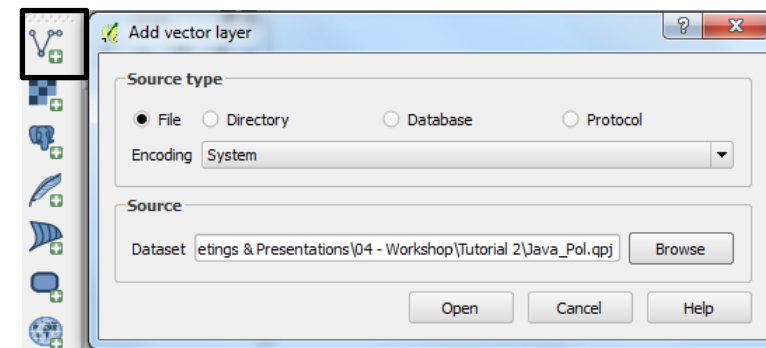
- Create a map;
- Define the basic properties of the features;
 - Add a scale bar;
 - Add a north arrow.



3. QGIS software training: Tutorial 2 (creating a map)

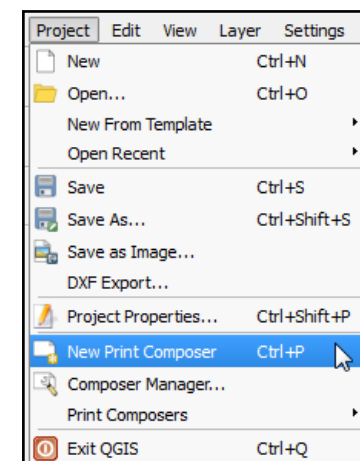
1. Load the layers “Java”, “Java_Pol”, “railways_proj” and “water_areas” from the folder “.../tutorial 2/shapefiles/”.

1



2. To start creating a map go to “Project” on the “Menu Bar”, followed by “New Print Composer”.

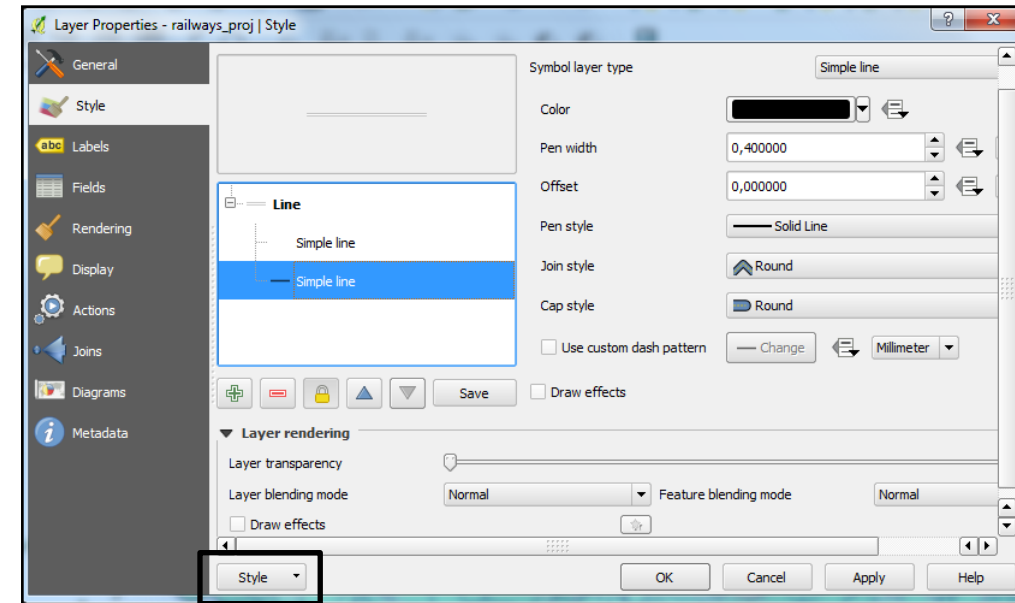
2



3. QGIS software training: Tutorial 2 (creating a map)

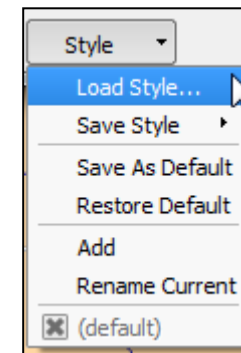
3. Edit the layout of the layers. Right click on top of the “Roads” layer, followed by “Style”. On the active tab select the outer line, set the “Pen width” to 0,4 and the colour to black.

3



4. Repeat the last step for the other layers or load the styles on the tab “Style”. For loading styles go to the folder “.../tutorial 2/styles” and load any “*.qml” file.

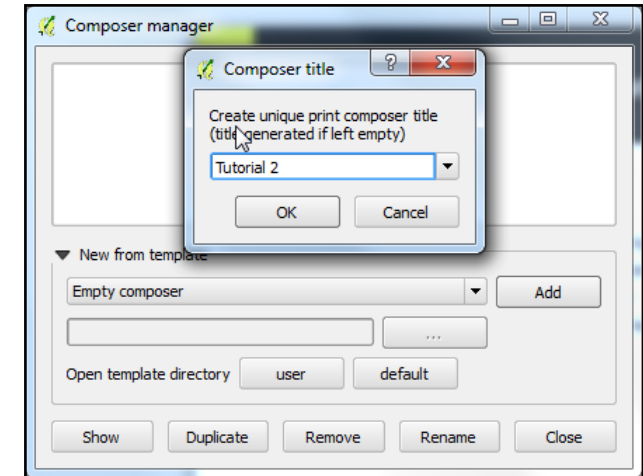
3



3. QGIS software training: Tutorial 2 (creating a map)

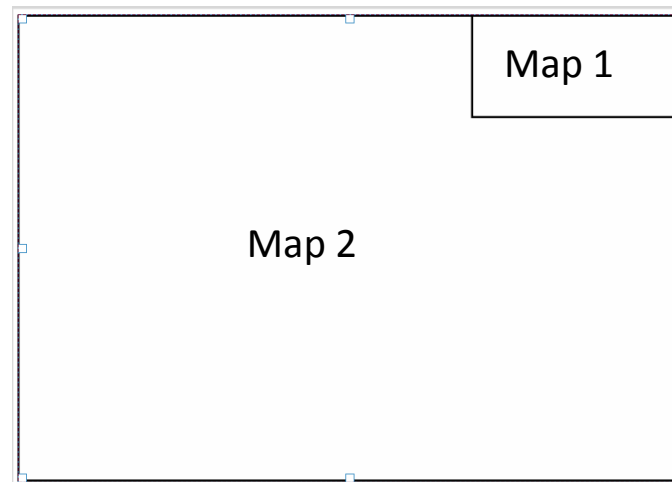
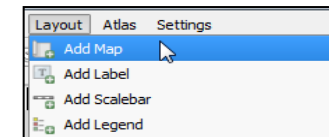
3. On the dialog box popping-up click “Add” and define the composer’s name on the second dialog box.

3



4. Add two new Views. Go to “Layout” on the “Menu Bar”, followed by “Add Map”. Repeat the last step for the second map.

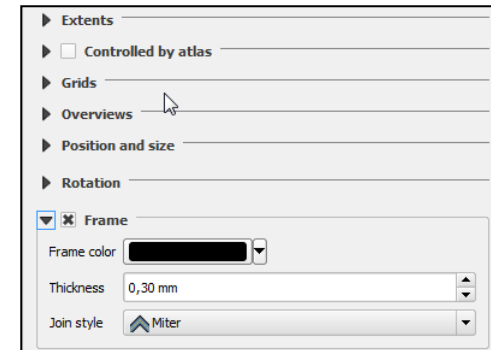
4



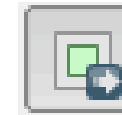
3. QGIS software training: Tutorial 2 (creating a map)

5. Define the frame of each map. Select any map and go to “Item properties” on the right panel. Go to the tab “frame” and set the colour to black and the “Thickness” to 0,30mm.
6. Press the icon “Move item content”, on the left bar, to adjust the content of each map to the window.
7. Set the scale on each map by accessing the tab “Item Properties”, followed by “Main Properties” on the right side panel.

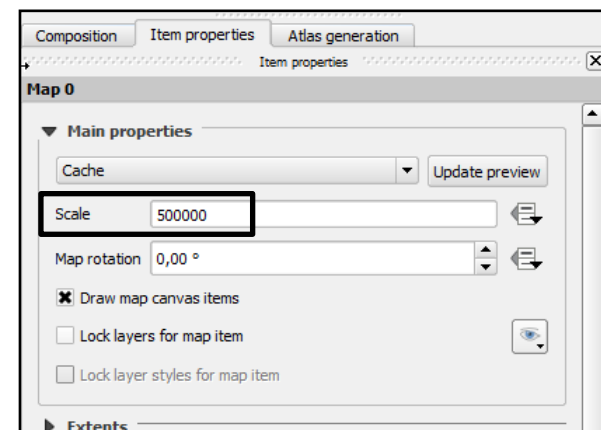
5



6



7



3. QGIS software training: Tutorial 2 (creating a map)

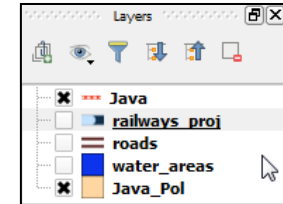
8. Go to the “Layer’s Panel” and unselect the the three layers “roads”, “Water_areas” and “railways_proj”.

9. Add a scale bar to the map. Go to “Layout”, followed by “Add Scalebar”.

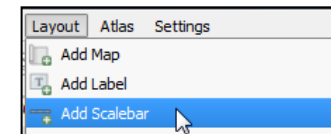
10. Now let’s add a north arrow to the map. Select “Layout”, followed by “Add Image”. On the image properties go to “Search directory” and select a north arrow.

11. In order to add a title, select “Layout” followed by “Add label”.

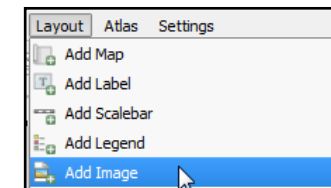
8



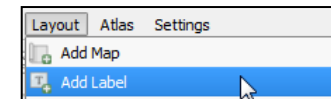
9



10



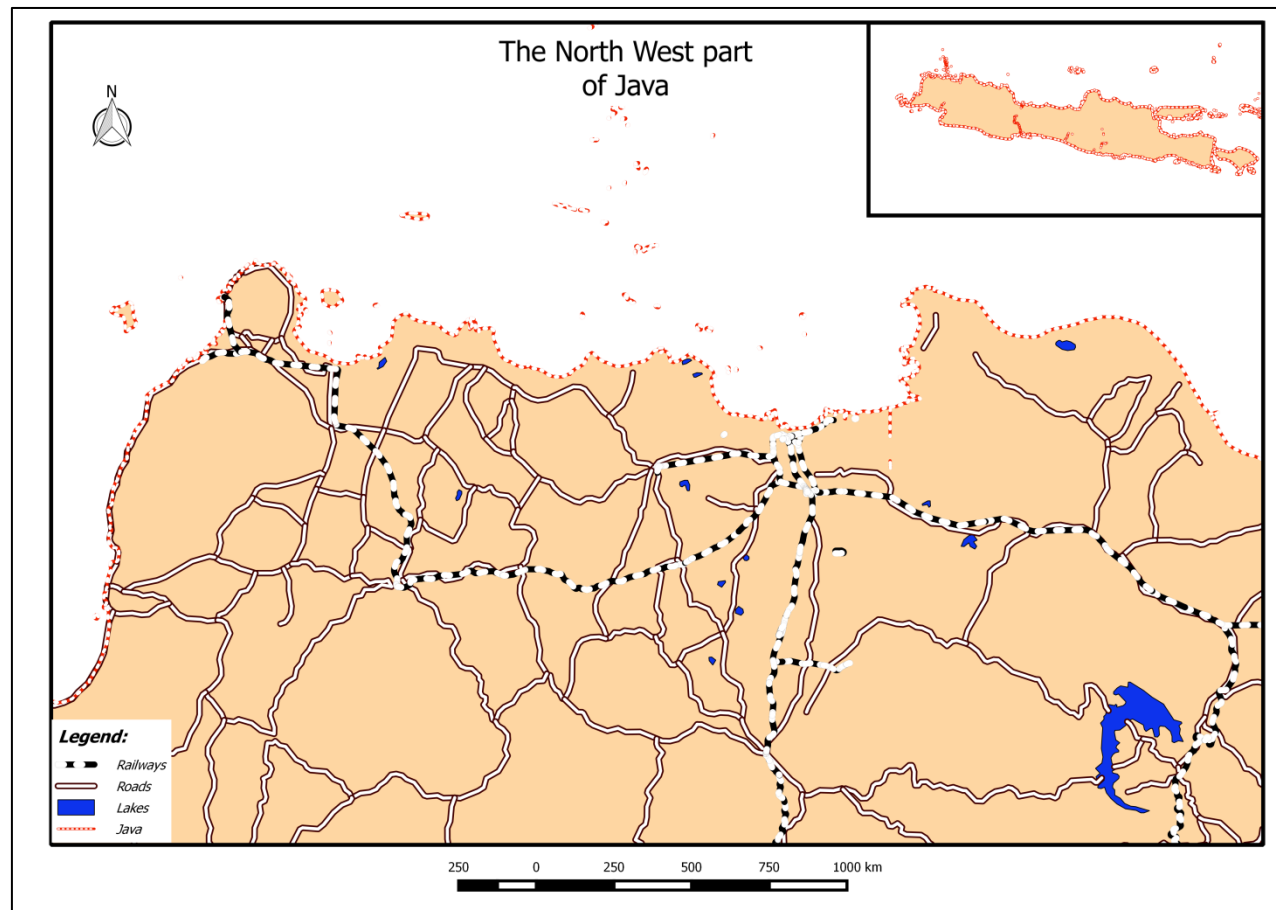
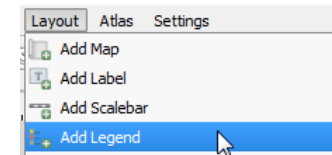
11



3. QGIS software training: Tutorial 2 (creating a map)

12. Finally add a legend by selecting “Add layout”, followed by “Add Legend”. Adjust the font and the size of labels on the panel.

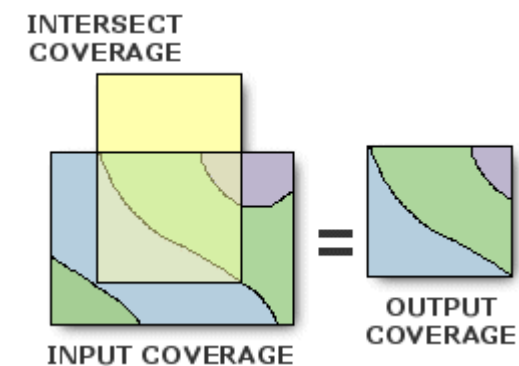
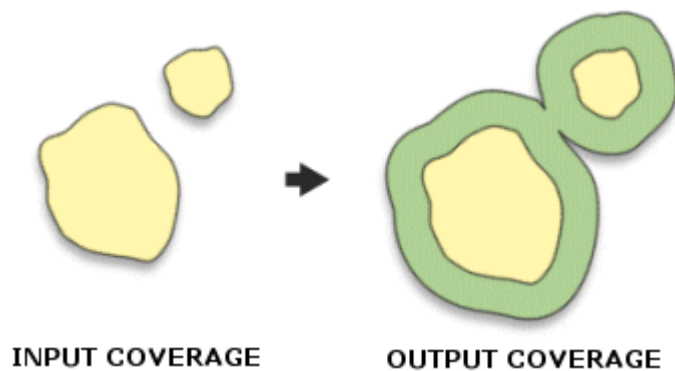
12



Tutorial 3

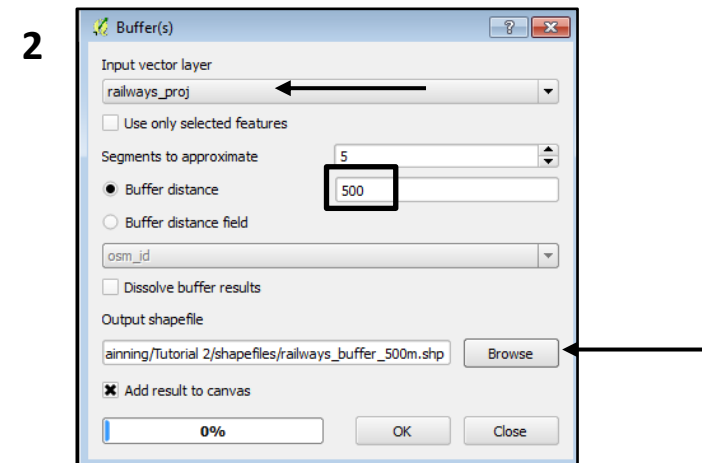
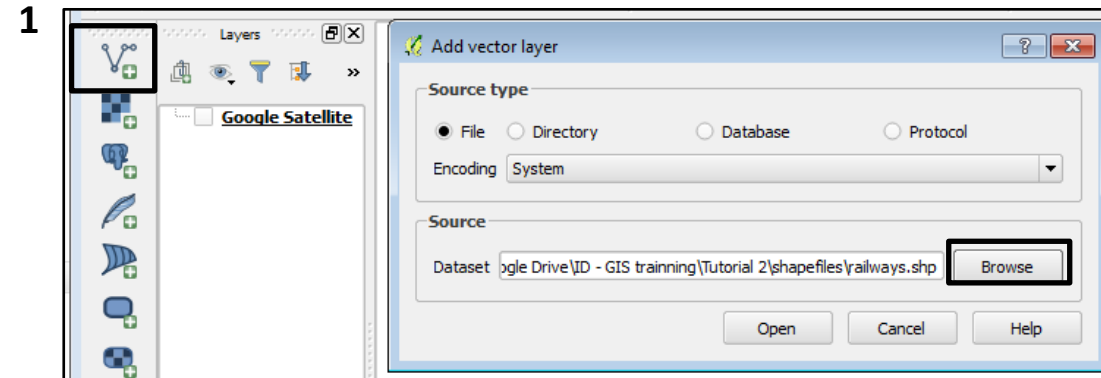
Exercise: Obtain a vectorial shapefile that contains schools not farther than 500m from railways or not farther than 100m from any point of interest.

- Add existing shapefiles;
- Intersect function;
- Merge function;
- Buffer function;
- Dissolve function.



3. QGIS software training: Tutorial 3 (the basic geoprocessing tools)

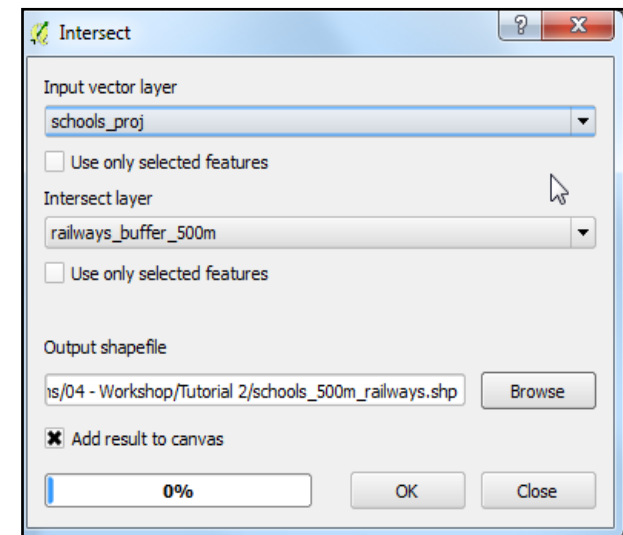
1. Firstly add the three shapefiles containing the schools, railways and points of interest in Indonesia by clicking the “Add Vector Layer” button on the “Layers’ Manager Bar”. Location: ...\\tutorial 2\\shapefiles (select the “.shp” file)
2. Apply the “buffer” function to the railway layer. Click the “Vector” option on the “Menu Bar”, followed by “Geoprocessing tools” and “Buffer”. Tick “Buffer distance” and set a distance of 500m. Set the input vector layer as the railways. Finally, set the output file as “railways_buffer_500m” (for example).
3. Repeat the last step for the “Interest_Point” layer and set a distance of 100m. Set the output file as “Points_buffer_100m” (for example).



3. QGIS software training: Tutorial 3 (the basic geoprocessing tools)

4. Use the “Intersect” function to obtain the schools not farther than 500m from railways. Go to the “Vector” option on the “Menu Bar”, followed by “Geoprocessing Tools” and finally “Intersect”. Set “schools_proj” as input and “railways_buffer_500m” as intersect layer. Finally, set “schools_500m_railways” as the output layer.
5. Repeat the last step to obtain the schools not farther than 100m from “Points of Interest”. Set the output layer as “Schools_100m_PtsInterest”.

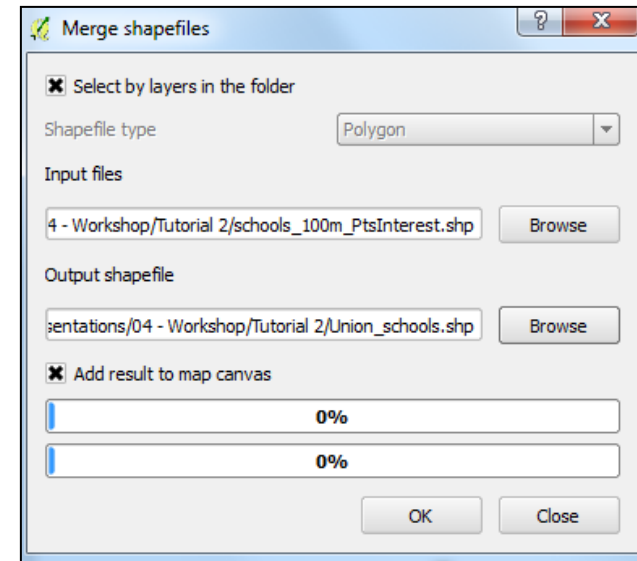
4



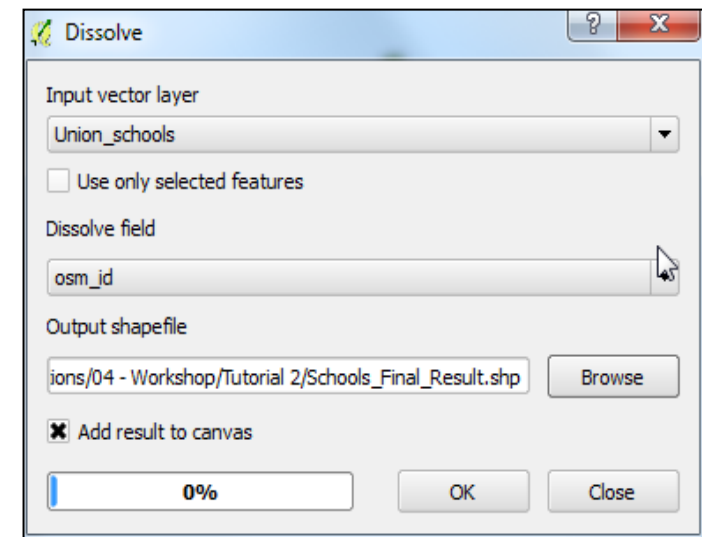
3. QGIS software training: Tutorial 3 (the basic geoprocessing tools)

6. Use “Merge” to obtain schools that meet at least one condition specified in 6 and 7. Go to “Vector” on the “Menu Bar”, followed by “Data Management Tools” and finally “Merge”. Select the layers obtained in steps 6 and 7 as inputs and “Schools_Union” as output. Do not forget to tick “Select by layers in the folder”.
7. Use the function “Dissolve” to eliminate repeated features in the layer “Union_Schools”. Go to “Vector”, followed by “Geoprocessing Tools” and finally “Dissolve”. Select “Union_schools” as the input layer and the “osm_id” for dissolve field. Set “Schools_Final_Result” as the output layer. Open the resulting “Table of Attributes”, **you should have obtained 3796 schools**. Use the “Measure Tool” to inspect the results. Remember that no school should be located closer than 100m from any point of interest or closer than 500m from any railway stretch.

6

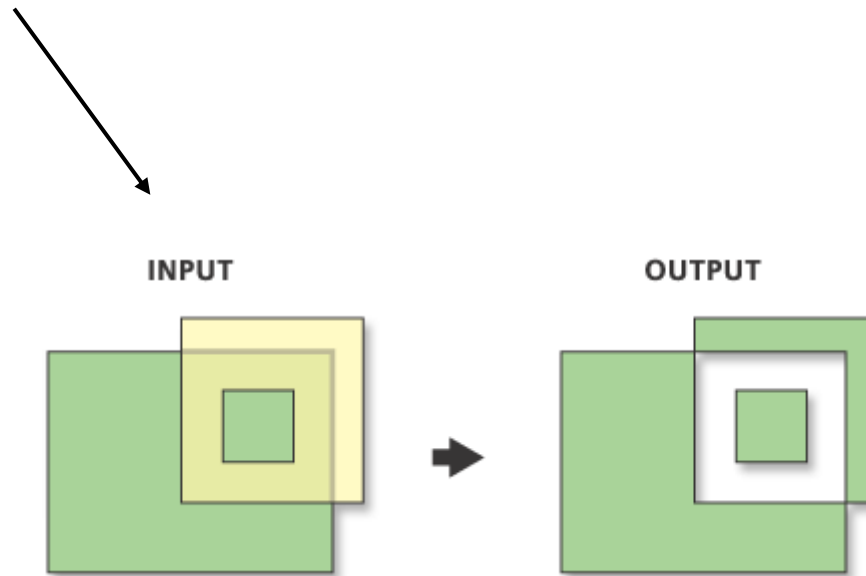


7



Let's practise:

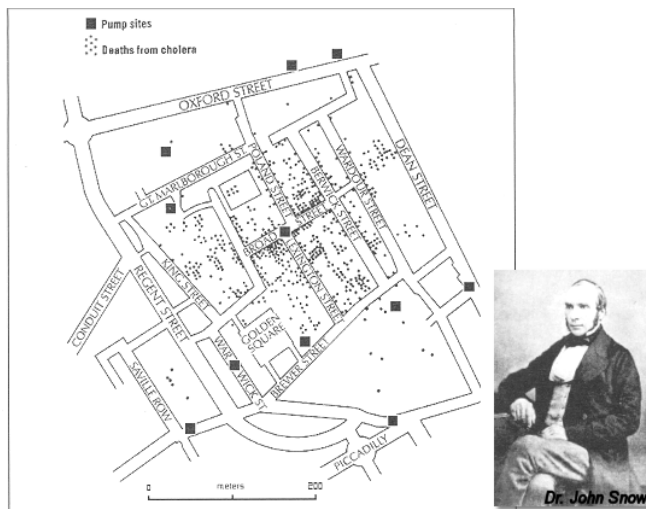
1. Create a shapefile with schools not farther than 200m from railways and not farther than 200m from any point of interest.
2. Create a shapefile containing schools farther than 200m from railways and farther than 200m from any point of interest (**Tip: use the “Diference” function on “Vector” -> “Geoprocessing Tools” -> “Difference”**).



Tutorial 4

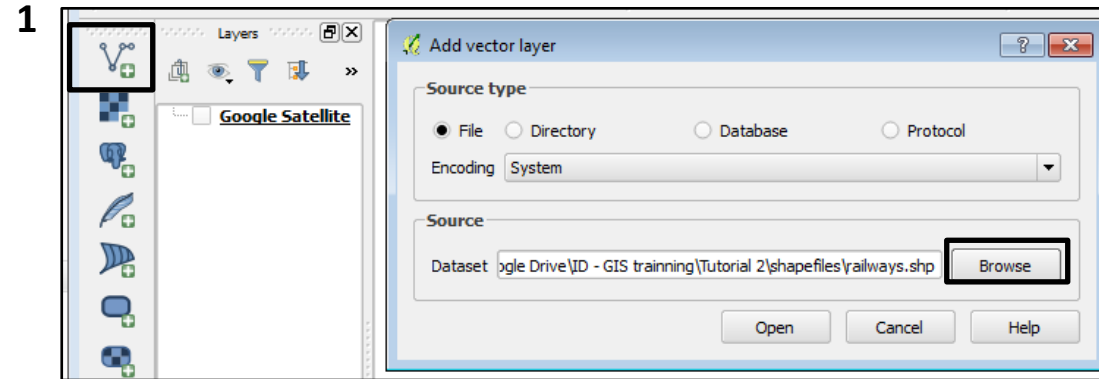
Exercise: Find the water-pump responsible for the outbreak of colera in 1854, in the district of Soho, London (the John Snow's case study)

- Add existing shapefiles;
- Create Voronoi polygons;
 - Count features;

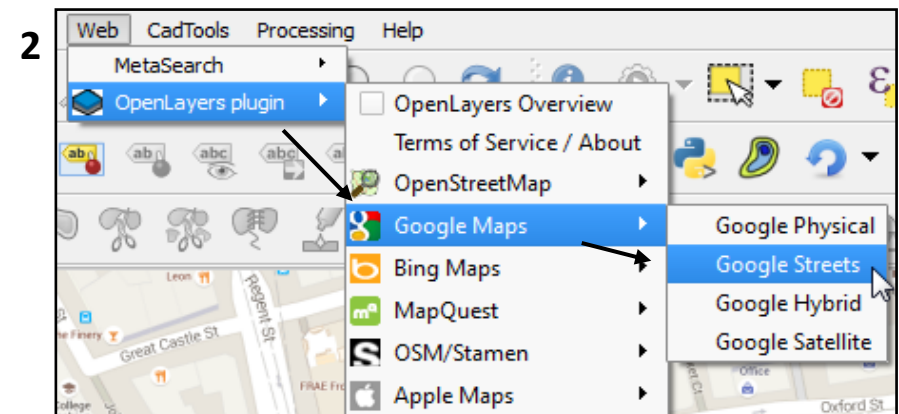


3. QGIS software training: Tutorial 4 (the basic geometry tools)

1. Firstly add the three shapefiles containing the deaths and the pumps in the district of Soho, London, by clicking the “Add Vector Layer” button on the “Layers’ Manager Bar”. Location: ...\\tutorial 3\\shapefiles (select the “.shp” file).

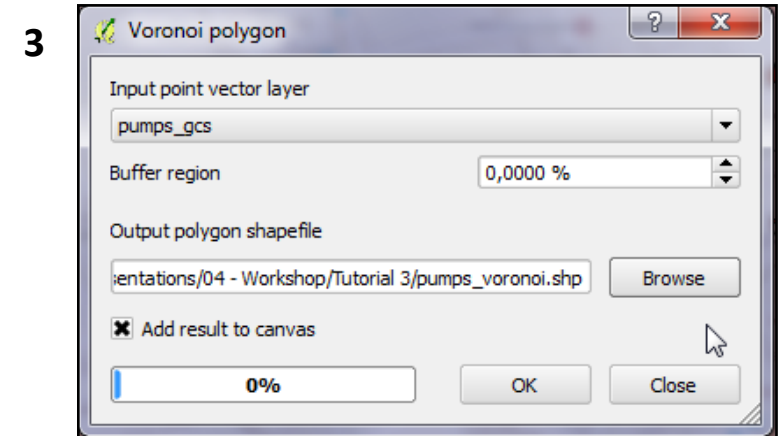


2. Now add a basemap to the canvas. Click “Web” on the “Menu Bar”, followed by “OpenLayers Plugin”, “Google Maps” and finally “Google Streets”.

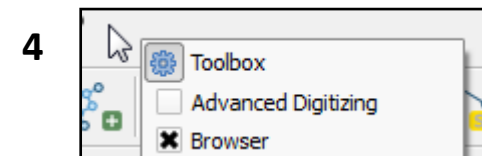


3. QGIS software training: Tutorial 4 (the basic geometry tools)

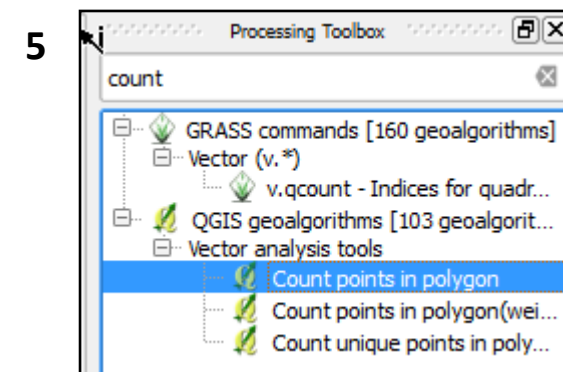
3. Create the Voronoi polygons associated with the pumps in the district of Soho, London. Go to “Vector” on the “Menu Bar”, followed by “Geometry Tools” and “Voronoi Polygons”. Set “pumps_gcs” as the input layer and “pumps_voronoi” as the output layer.



4. Activate the Toolbox. Right click on the “Menu Bar” followed by “Toolbox”.

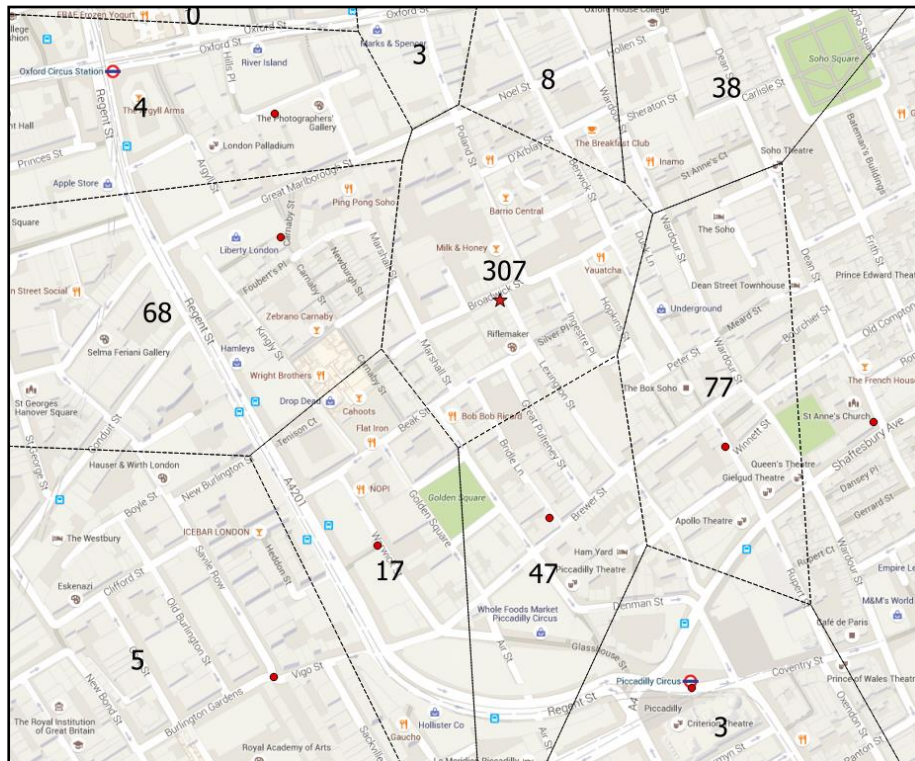


5. Search for “Count” and click the “Count points in polygon ” function.

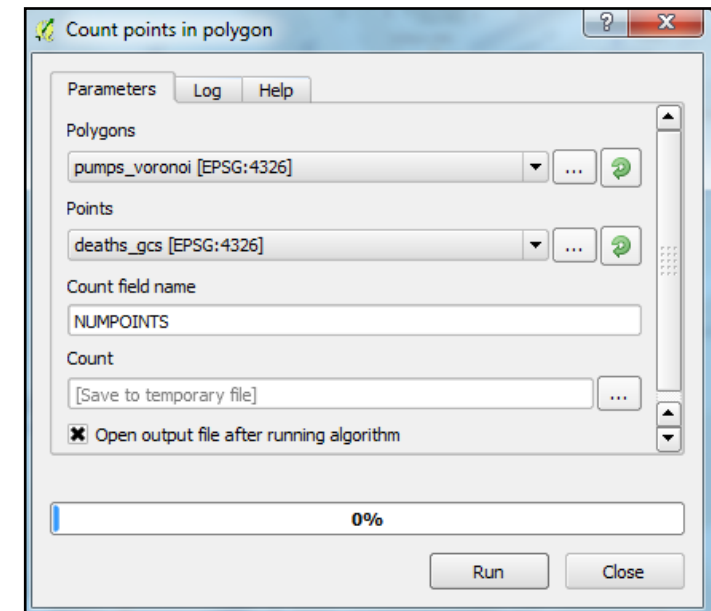


3. QGIS software training: Tutorial 4 (the basic geometry tools)

- Count the number of deaths associated with each polygon. On the “Count points in polygon” box, set “pumps_voronoi” as the polygon layer and “deaths_gc” as the point layer. Let “Count field name” and “Count” as default.



6



Let's practise:

1. Load the "WaterBasin" and the "Temp_Stations" layers. Use the Voronoi polygons to estimate the mean temperature in the water basin.

Steps:

- *Create the Voronoi polygons' layer associated with the temperature stations;*
- *Intersect the Voronoi Polygons with the water basin;*
- *Add a field to the attribute table of the Voronoi polygons and calculate the respective area of each polygon;*
- *Use the field calculator to obtain the product between the mean temperature and the area;*
- *Export the table to a CSV file and obtain the mean temperature.*



Tutorial 5

Exercise: Create a shapefile from a CSV file and join some attributes to the respective layer. Filter the layer and obtain the villages with more than 10.000 habitants and generate the respective KML file.

- Create a shapefile from a CSV file;
- Join attributes to an existing layer;
 - Filter some data;
- Generate a Google KML file.

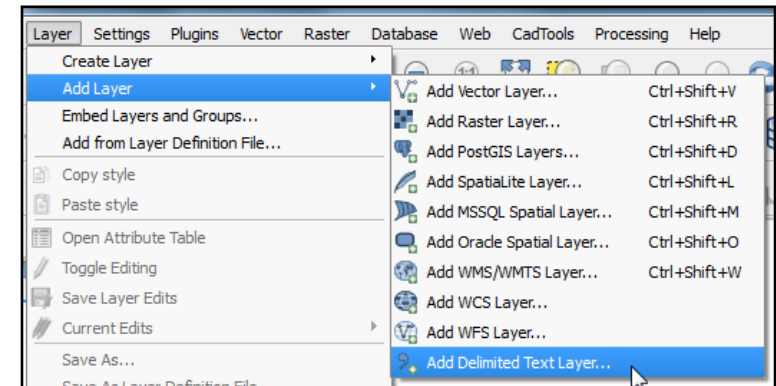
INPUT TABLE			JOIN TABLE			OUTPUT TABLE			
ID	NUM	CHAR	ID	NUM	COLOR	ID	NUM	CHAR	COLOR
1	10	A	1	5	blue	1	10	A	green
2	15	B	2	10	green	2	15	B	yellow
3	20	C	3	15	yellow	3	20	C	red
4	25	D	4	20	red	4	25	D	
5	30	E	5	30	black	5	30	E	black
6	35	F	6	35	grey	6	35	F	grey

Related Fields

3. QGIS software training: Tutorial 5 (the basic data management tools)

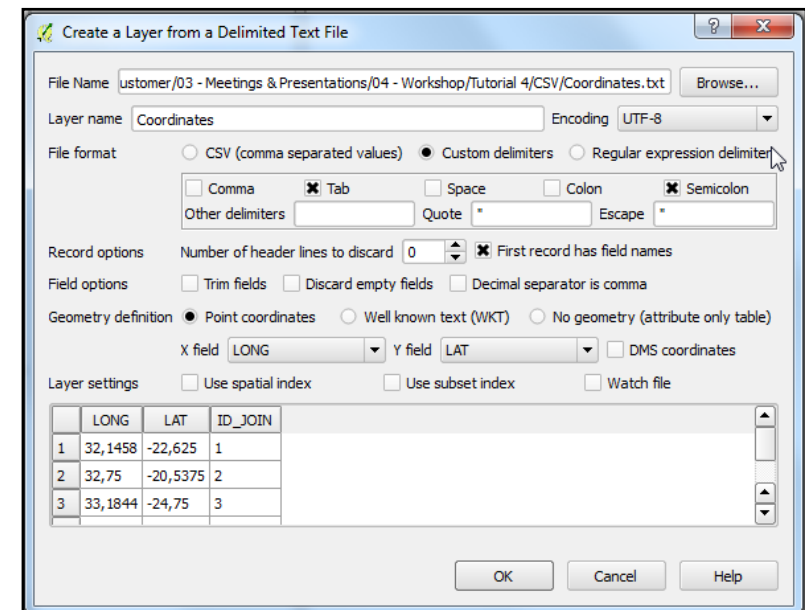
1. Create a shapefile from a TXT file. Go to “Layer” on the “Menu Bar”, followed by “Add Layer” and “Add Delimited Text Layer...”.

1



2. On the dialog box popping-up browse the file “.../tutorial 4/Coordinates.txt”. On “File format” select “Cutom Delimiters” and select “Tab”. On “Geometry Definition” select “Point coordinates”, set the X field as “Long” and the Y field as “Lat”.

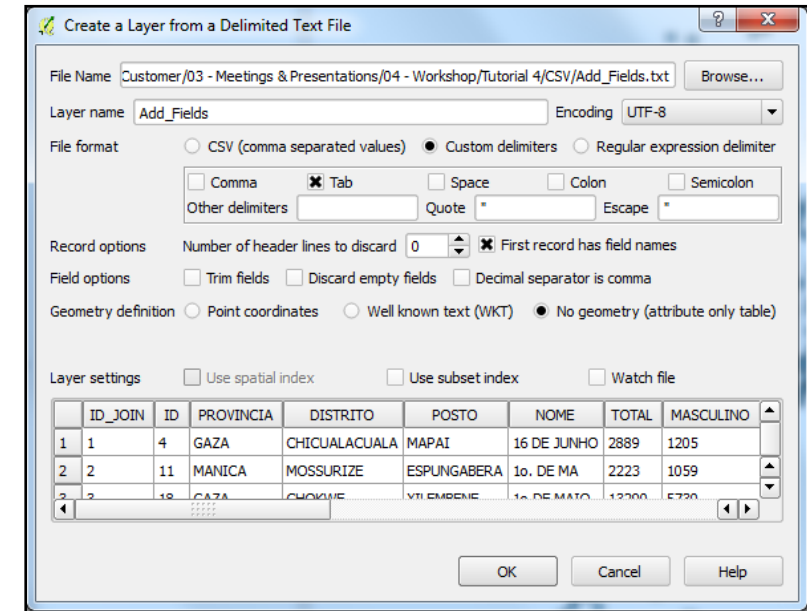
2



3. QGIS software training: Tutorial 5 (the basic data management tools)

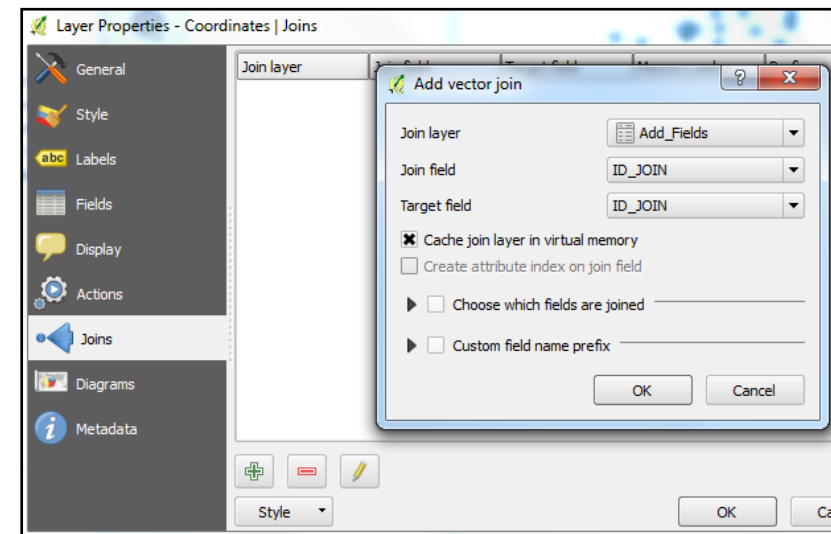
3. Now add a table with no geometry to the “Layers’ Manager”. Go to “Layer” on the “Menu Bar”, followed by “Add Layer” and “Add Delimited Text Layer...”. Browse the file .../tutorial 4/CSV/Add_fields.txt”. Set the delimiter as “Tab” and select “no geometry” on geometry definition.

3



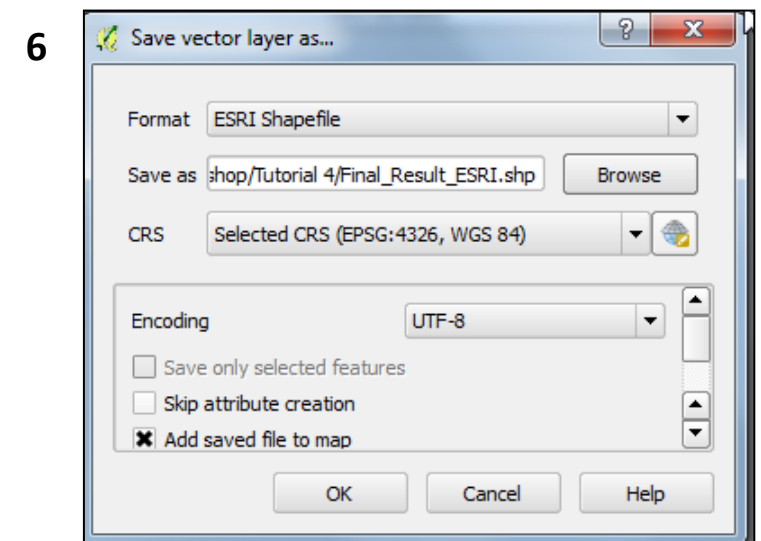
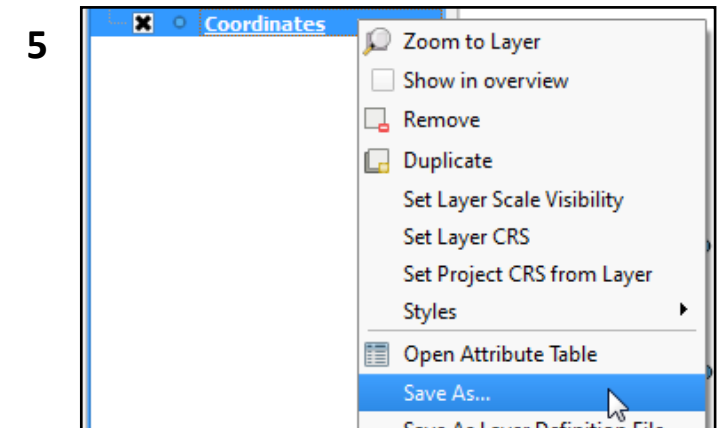
4. Now, right click on the “Coordinates” layer , followed by “Properties” and go to the “Join” tab. Set the “Join layer” as “Add_Fields”, the “Join Field” as “ID_Join” and the “Target field” also as “ID_Join”.

4



3. QGIS software training: Tutorial 5 (the basic data management tools)

5. Now save the join as a new layer. Right click on the “Coordinates layer” and “Save as...”.
6. Browse the “...\tutorial 4” folder and choose a name for the file. Set the “Format” as “ESRI Shapefile”.
7. Repeat the last two steps saving the “Coordinates” layer as “Keyhole Markup Language” type.





DATABASES EDITING AND OPERATION



PostgreSQL

- PostgreSQL is an object-relational database management system (ORDBMS) based on POSTGRES, Version 4.2, developed at the University of California at Berkeley Computer Science Department. POSTGRES pioneered many concepts that only became available in some commercial database systems much later.
- PostgreSQL is a powerful, open source ORDBMS. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness.
- PostgreSQL runs on all major operating systems, including Linux, UNIX (AIX, BSD, HP-UX, SGI IRIX, Mac OS X, Solaris, Tru64), and Windows.
- Due to the liberal license, PostgreSQL can be used, modified, and distributed by anyone free of charge for any purpose, be it private, commercial, or academic.

4. DATABASES EDITING AND OPERATION: WHAT IS POSTGRESQL?




PostgreSQL is an open-source descendant of this original Berkeley code. It supports a large part of the SQL standard and offers many modern features:

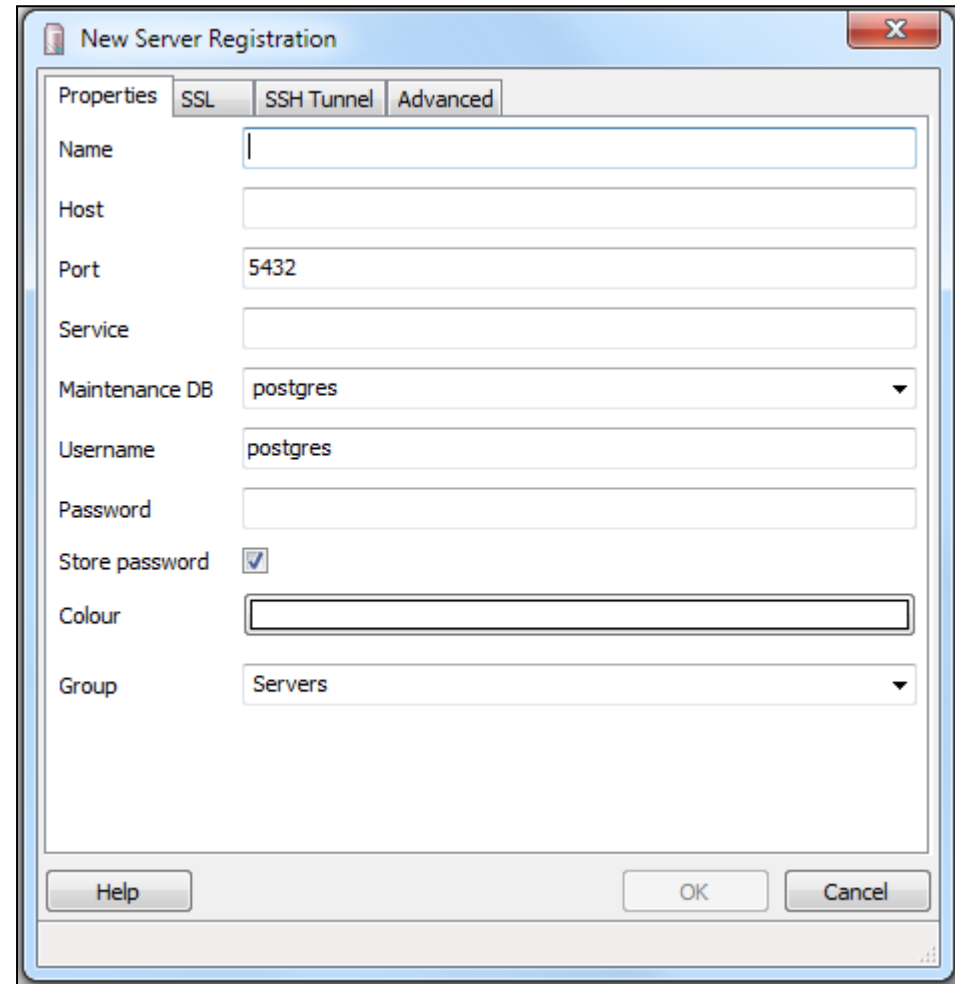
- Foreign keys;
- Triggers;
- Updatable views;
- Transactional integrity;
- Multiversion concurrency control.

Also, PostgreSQL can be extended by the user in many ways, for example by adding new:

- Data types;
- Functions;
- Operators;
- Aggregate functions;
- Index methods;
- Procedural languages.

4. DATABASES EDITING AND OPERATION: BASICS OF POSTGRESQL

1. Open the pgAdmin III software, and add a connection by pressing 
2. *Name*: Define the name you want for your server connection;
3. *Host*: Write down the Server Internet Protocol address (IP address);
4. *Port*: Select the Server Port number;
5. *Service*: Don't need to fill;
6. *Maintenance DB*: Keep the default username;
7. *Username*: Write down your username in the Server;
8. *Password*: Write down your password in the Server and unselect *Store password*.
9. Press OK to add the Server connection.



The screenshot shows the 'New Server Registration' dialog box in pgAdmin III. The 'Properties' tab is selected, and the following fields are visible:

- Name: [Empty text box]
- Host: [Empty text box]
- Port: 5432
- Service: [Empty text box]
- Maintenance DB: postgres (dropdown menu)
- Username: postgres
- Password: [Empty text box]
- Store password:
- Colour: [Empty text box]
- Group: Servers (dropdown menu)

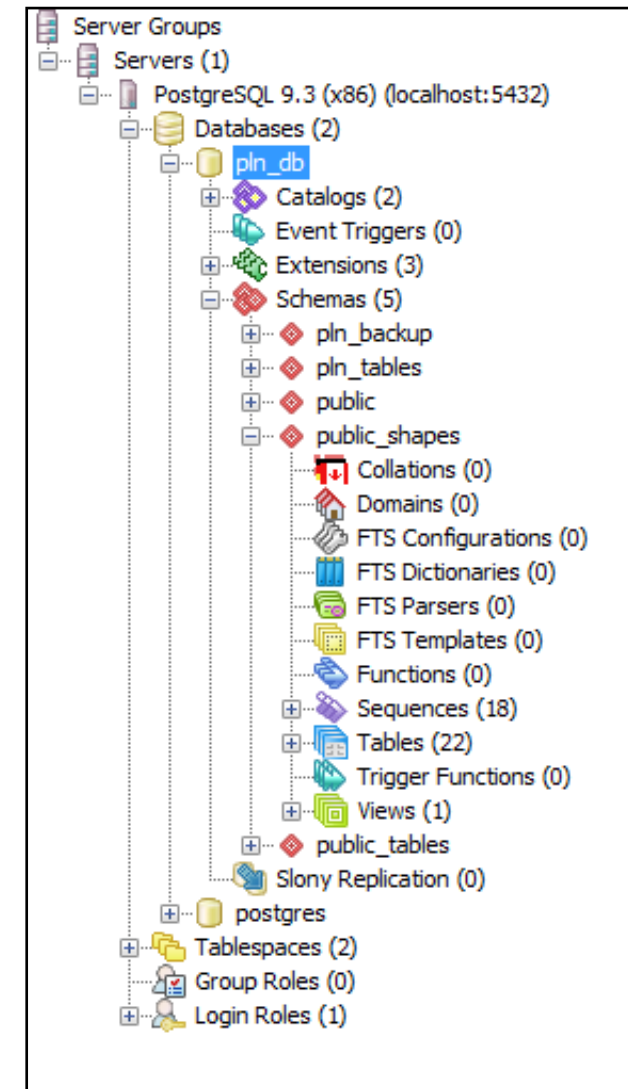
Buttons at the bottom: Help, OK, Cancel.

Schema: Contain tables, including data types, functions, and operators. The same object name can be used in different schemas without conflict.

Unlike databases, schemas are not rigidly separated: a user can access objects in any of the schemas in the database he is connected to, if he has privileges to do so.

There are several reasons why one might want to use schemas:

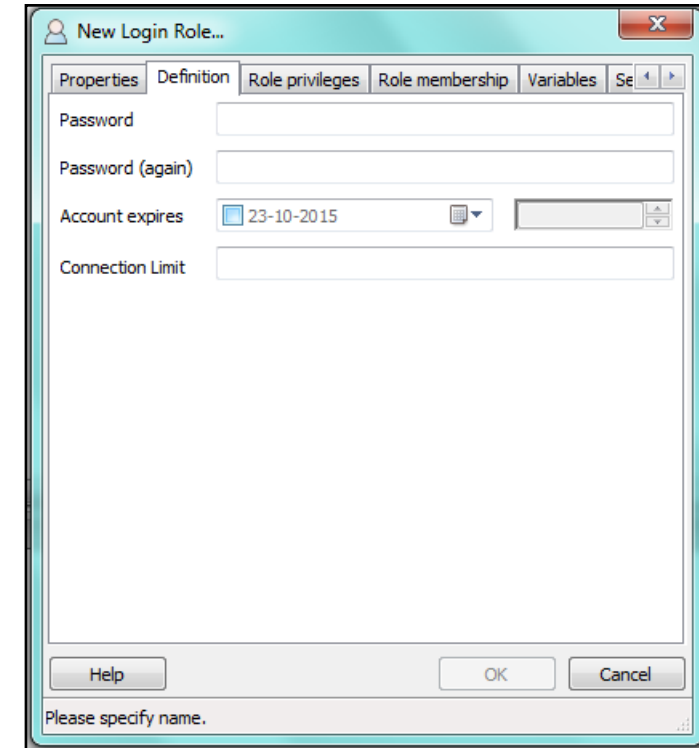
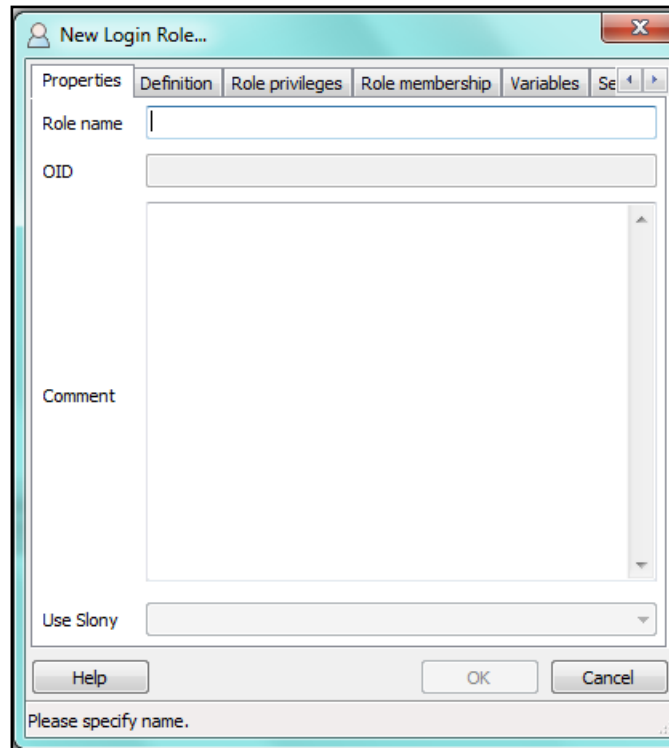
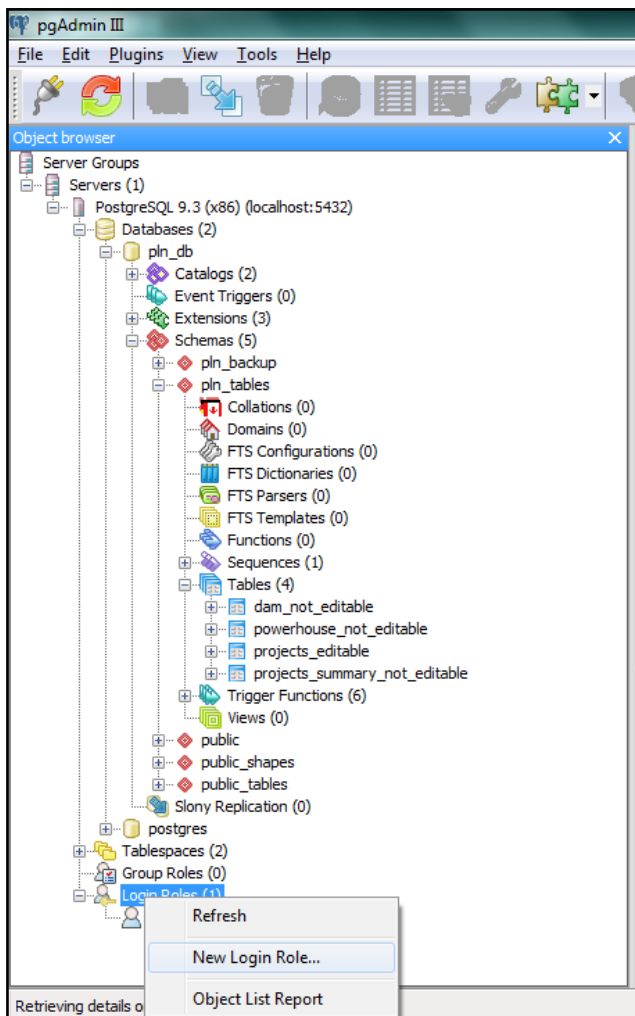
- To allow many users to use one database without interfering with each other.
- To organize database objects into logical groups to make them more manageable.
- Third-party applications can be put into separate schemas so they do not collide with the names of other objects.
- Schemas are analogous to directories at the operating system level, except that schemas cannot be nested.



4. DATABASES EDITING AND OPERATION: Login Roles

1. Right click on the Login Role;
2. Select *New Login Role...*;

3. On the *Properties* tab define the Role name (Username);
4. On the *Definition* tab define the *Password*, the account expiration date (*Account expires*) and the number of possible connections to the server with that username (*Connection limit*).

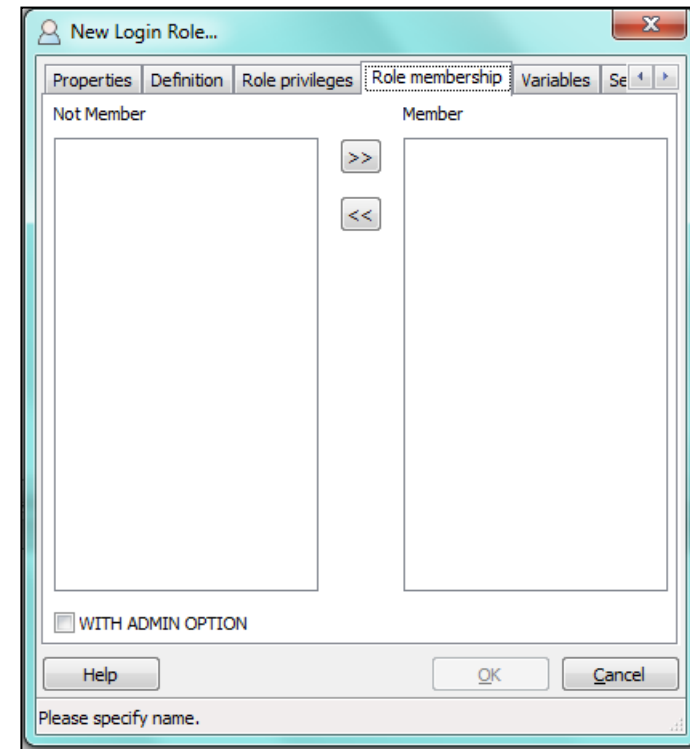
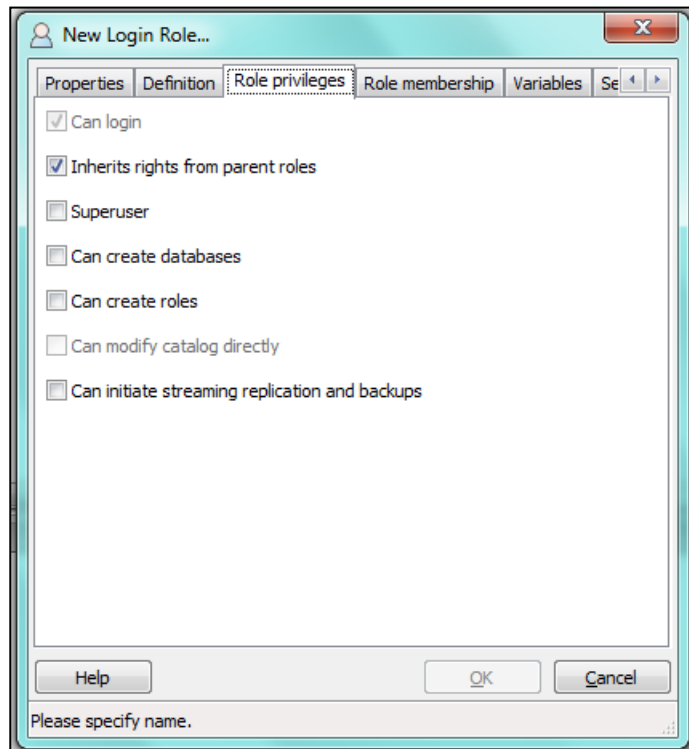


4. DATABASES EDITING AND OPERATION: Login Roles

5. On the *Role privileges* tab define the new login role privileges;

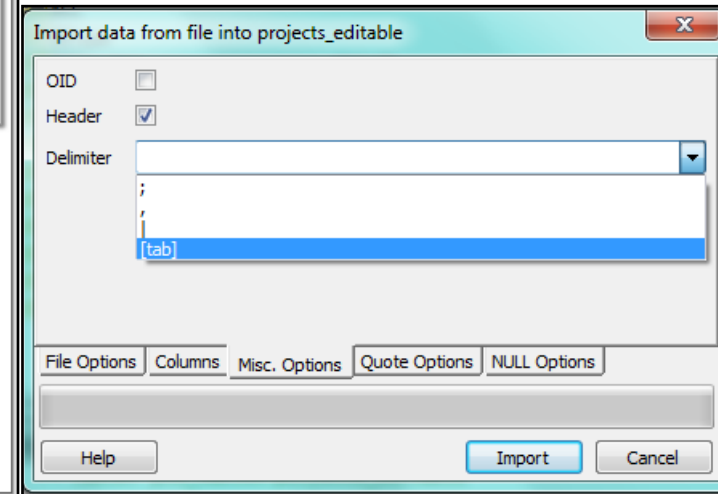
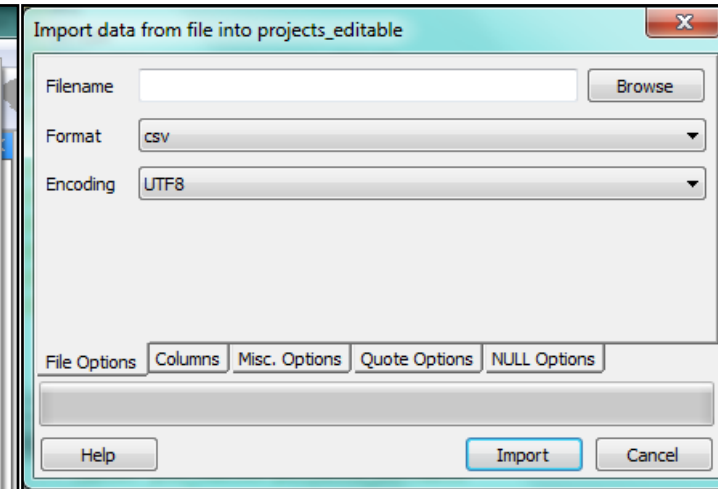
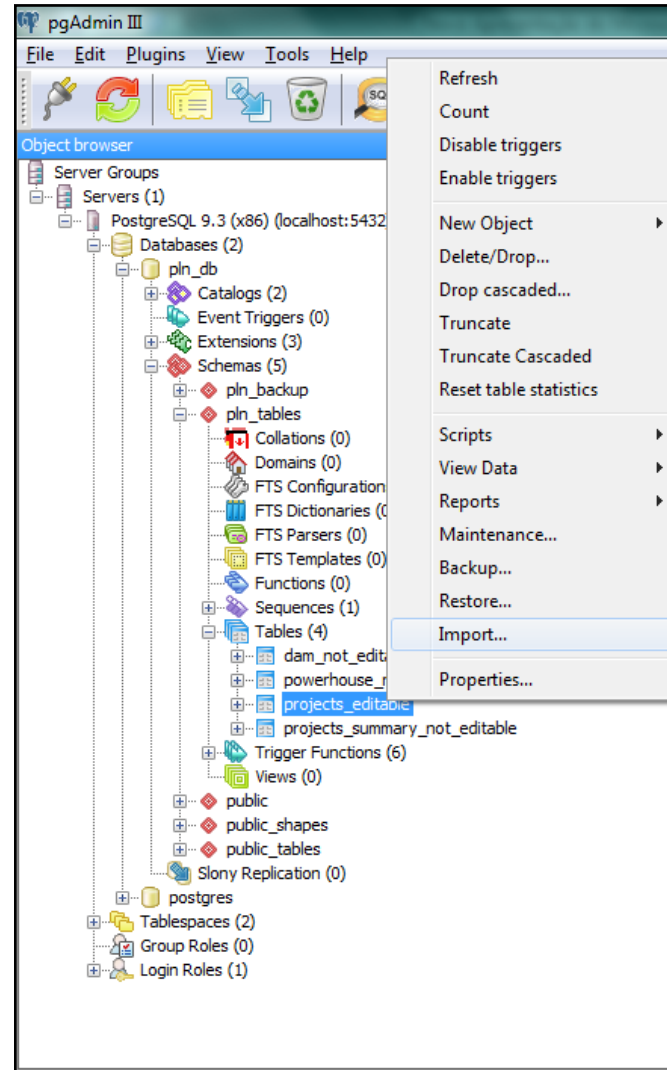
6. On the *Role membership* tab select the group roles that the new login role will be a member of;

7. Finally, create the new login role by pressing the *OK* button.



4. DATABASES EDITING AND OPERATION: IMPORTING DATA INTO POSTGRE

1. Right click on the table where you want to import the data;
2. Select *Import...*;
3. On the *File Options* tab define filename path, format (preferable csv) and the Encoding (preferable UTF8);
4. On the *Misc. Options* tab select the *Header* option if your file has a header, and chose the file delimiter;
5. Press *Import* button.



PostGIS is a spatial database extender for PostgreSQL object-relational database. It adds support for geographic objects allowing location queries to be run in SQL.

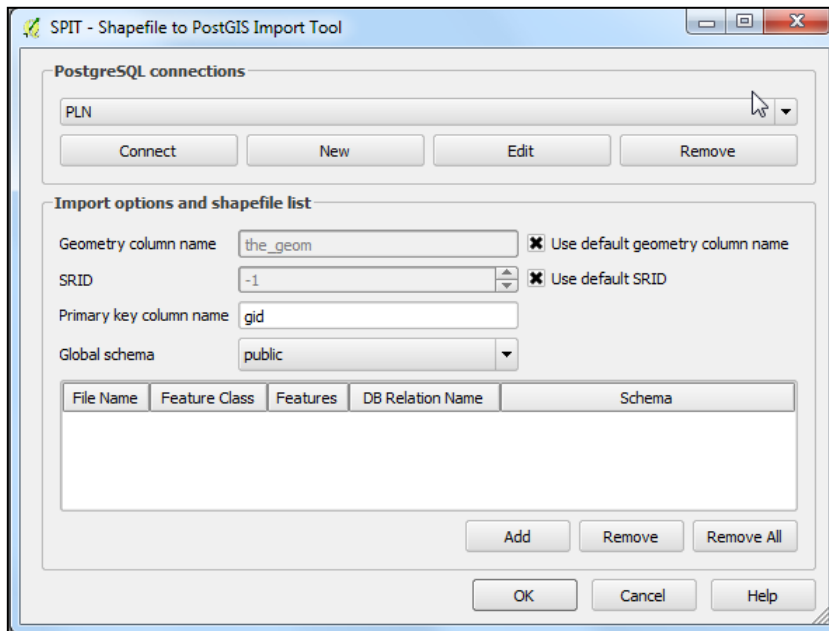
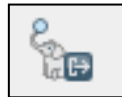


```
SELECT superhero.name
FROM city, superhero
WHERE ST_Contains(city.geom, superhero.geom)
AND city.name = 'Gotham';
```

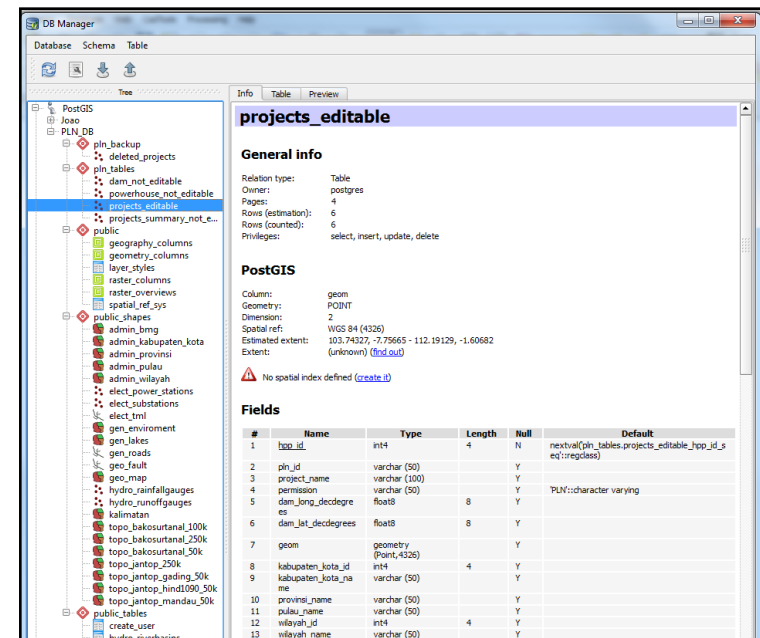
3. DATABASE EDITING AND OPERATION: THE POSTGIS EXTENSION

QGIS allows the interaction with PostGreSQL through two different plugins:

The SPIT tool:

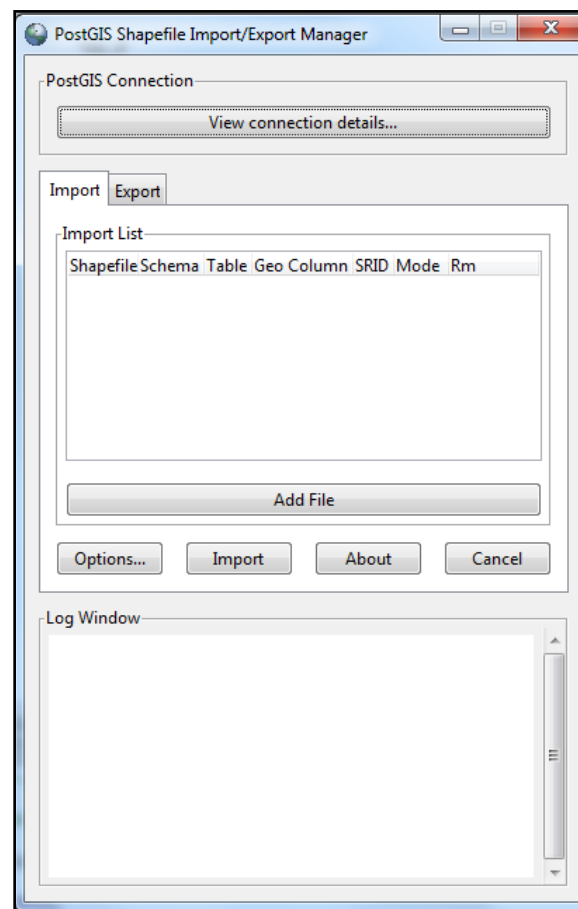


The Database Manager plugin:



3. DATABASE EDITING AND OPERATION: THE POSTGIS EXTENSION

PostgreSQL also allows to import/export shapefiles from/to QGIS, through the POSTGIS extension:



However Gesto offers a more user friendly solution and specifically directed to the PLN's database, in comparison with both Database Manager and SPIT plugin.

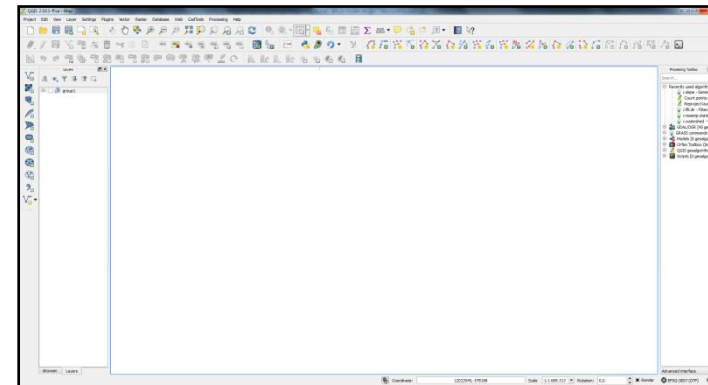
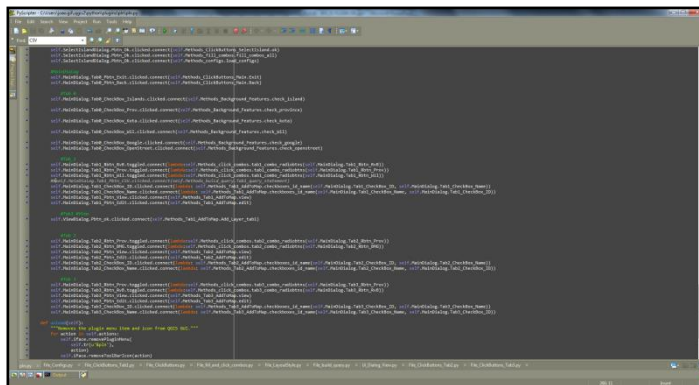
...

The PLN plugin



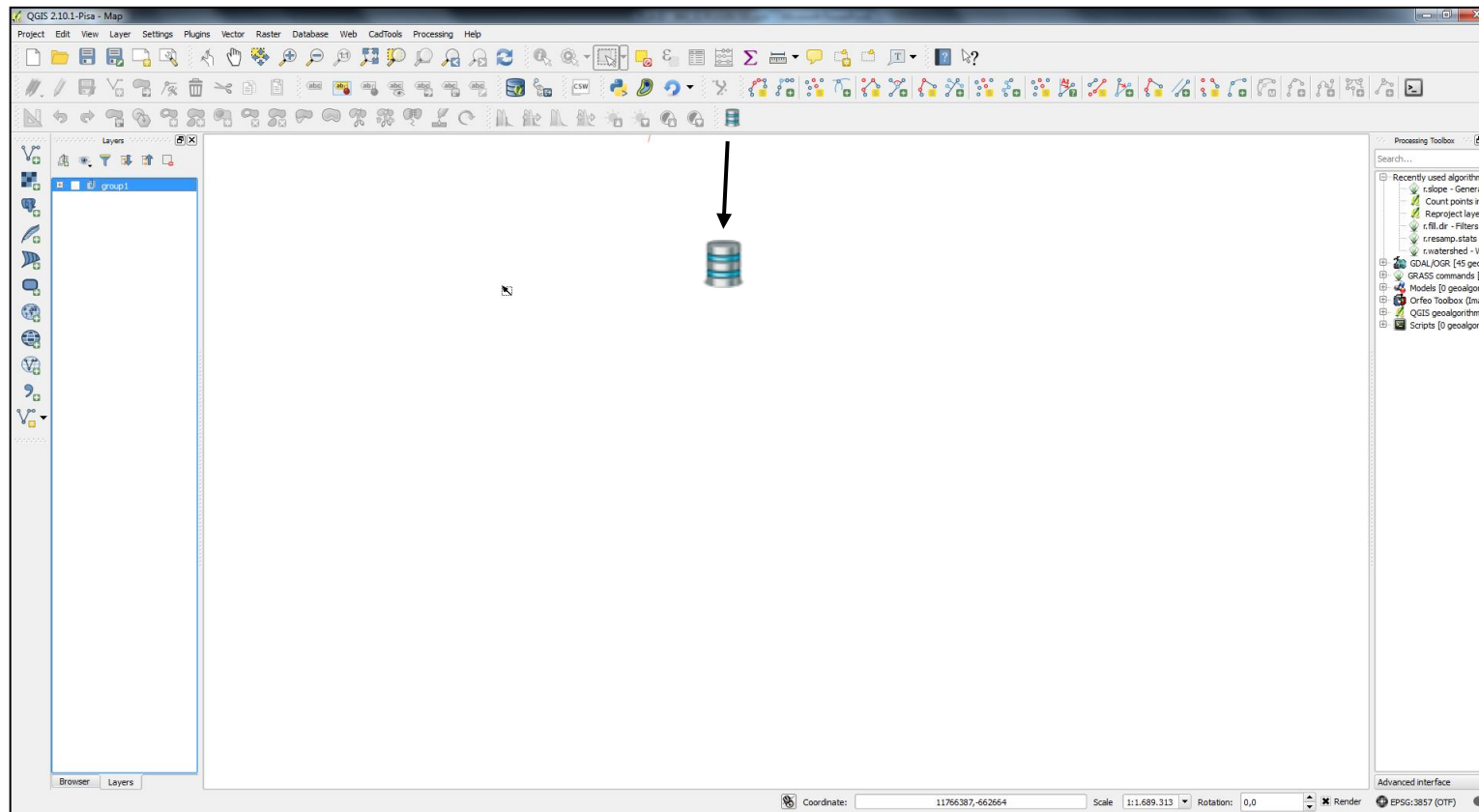
Developed in a Python environment...

Loadable into QGIS...



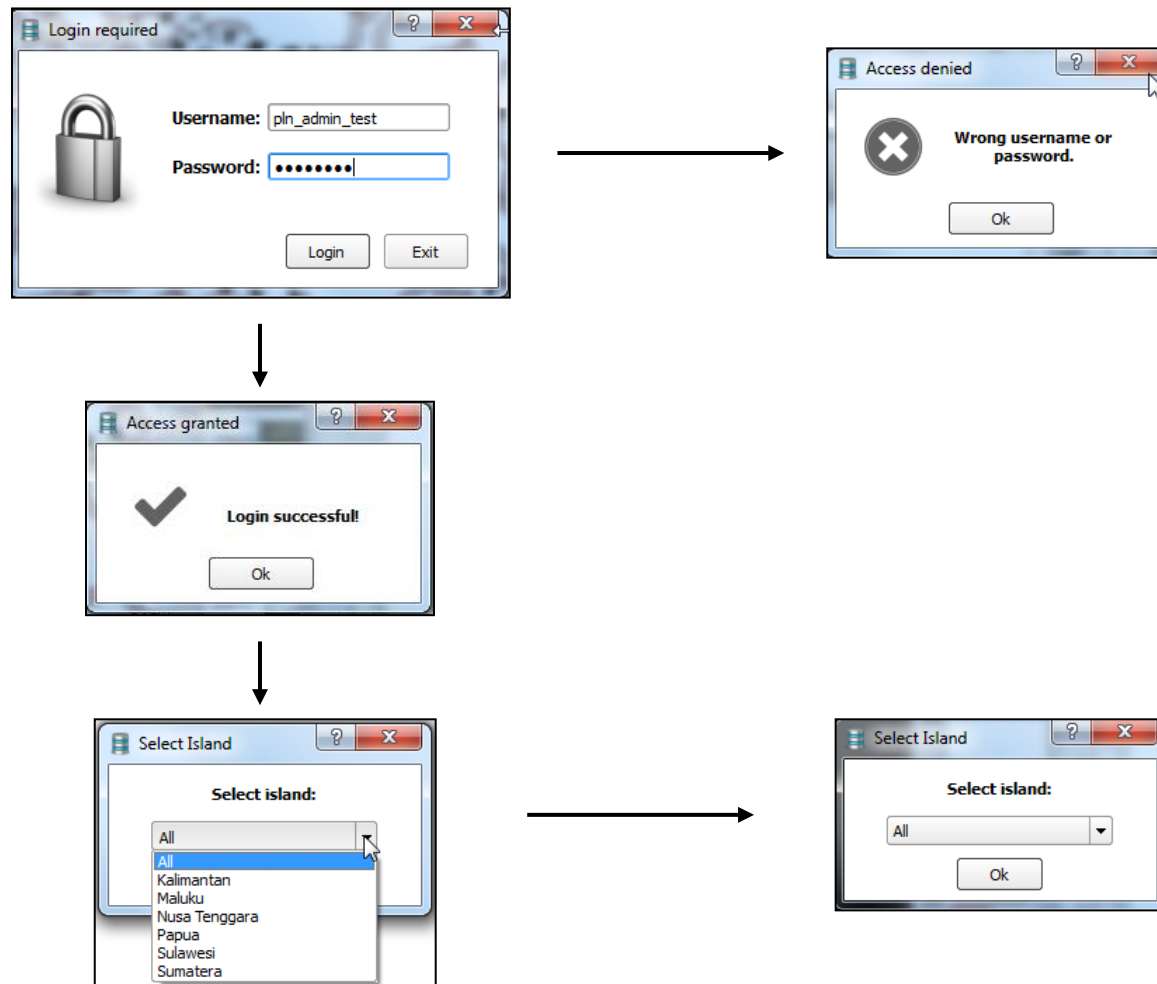
3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

The PLN plugin (developed in Python) is loadable into QGIS and may be accessed by pressing an icon on the QGIS's "Menu Bar".



3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

Log in to the database:



3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

The background features/maps:

The screenshot shows the 'PLN hydropower database v1.0' application window. On the left, there is a sidebar with the 'INDONESIA POWER' logo and two sections: 'Admin. boundaries:' and 'Basemaps:'. The 'Admin. boundaries:' section includes checkboxes for 'Islands', 'Provinces', 'Regencies and Cities', and 'PLN Wilayah'. The 'Basemaps:' section includes checkboxes for 'Sattelite' and 'Street Map'. A bracket on the left side of the sidebar is labeled 'The background features'. In the center, a 'Projects' dialog box is open, showing filters for 'ID', 'Name', and 'Current phase:'. The 'Current phase:' section has checkboxes for 'Identified', 'Pre-feasibility', 'Feasibility', 'Under construction', 'Detailed Design', and 'In operation'. To the right of the dialog, there are radio buttons for 'Province', 'River Basin', and 'PLN Wilayah', each with a corresponding dropdown menu. The 'Province' radio button is selected. At the bottom of the dialog are 'Edit' and 'View' buttons. Below the dialog are 'Back' and 'Exit' buttons. An arrow points from the text 'Administrative boundaries' to the 'Admin. boundaries:' section. Another arrow points from the text 'Maps loadable from the OpenLayers plugin' to the 'Basemaps:' section.

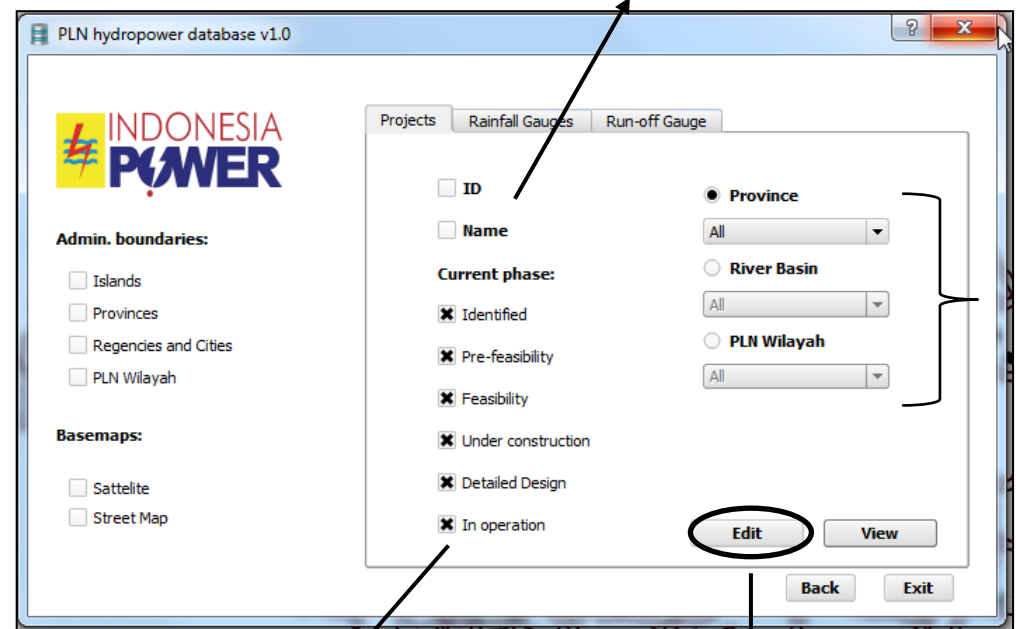
Administrative boundaries

The background features

Maps loadable from the OpenLayers plugin

3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

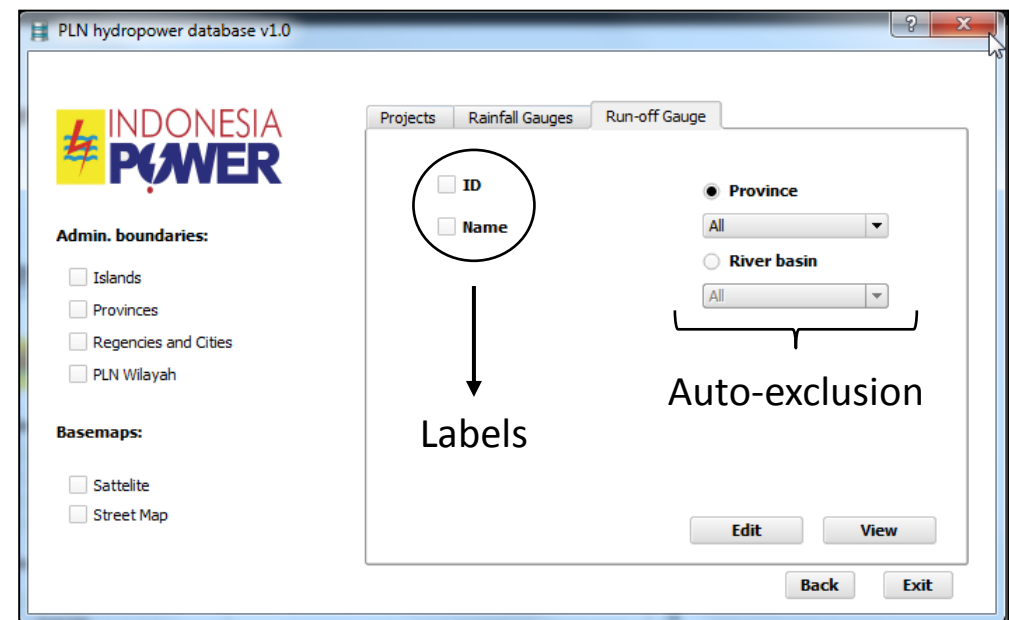
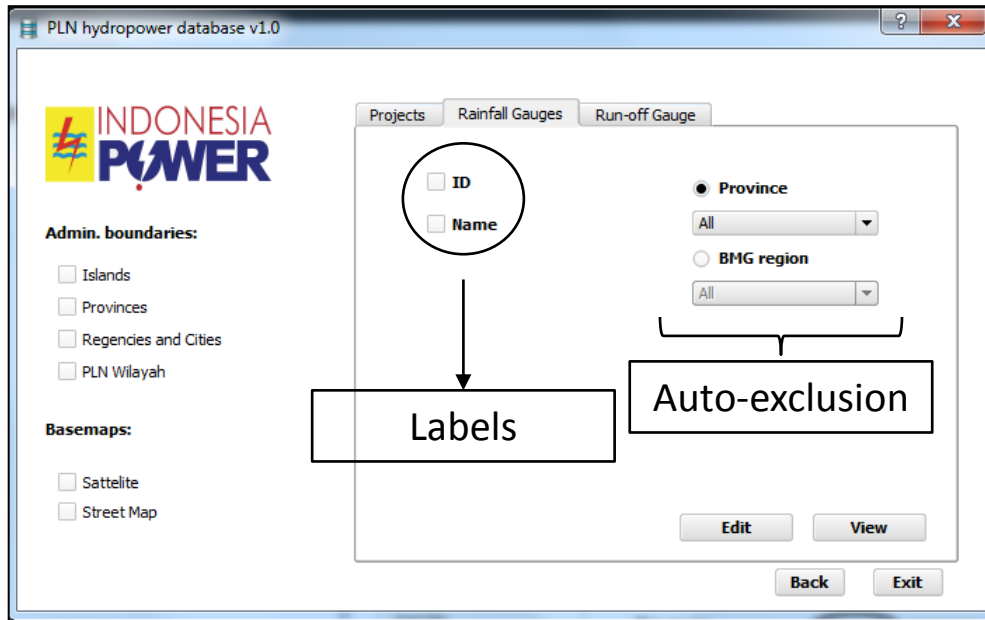
The projects' tab:



The screenshot shows the 'PLN hydropower database v1.0' application window. On the left, there is a sidebar with the 'INDONESIA POWER' logo and two sections: 'Admin. boundaries' (with checkboxes for Islands, Provinces, Regencies and Cities, and PLN Wilayah) and 'Basemaps' (with checkboxes for Sattelite and Street Map). The main area has three tabs: 'Projects', 'Rainfall Gauges', and 'Run-off Gauge'. The 'Projects' tab is active and contains several filter sections: 'Labels' (with checkboxes for ID and Name), 'Current phase' (with checkboxes for Identified, Pre-feasibility, Feasibility, Under construction, Detailed Design, and In operation), and 'Province' (with radio buttons for Province, River Basin, and PLN Wilayah, each followed by a dropdown menu set to 'All'). A bracket on the right side of these three sections is labeled 'Auto-exclusion'. At the bottom of the 'Projects' tab, there are buttons for 'Edit', 'View', 'Back', and 'Exit'. The 'Edit' button is circled in red. Arrows point from external text labels to these elements: 'Labels' points to the 'ID' and 'Name' checkboxes; 'Phase of the project' points to the 'Current phase' section; 'Admin vs PLN staff/public' points to the circled 'Edit' button; and 'Auto-exclusion' points to the bracketed filter sections.

3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

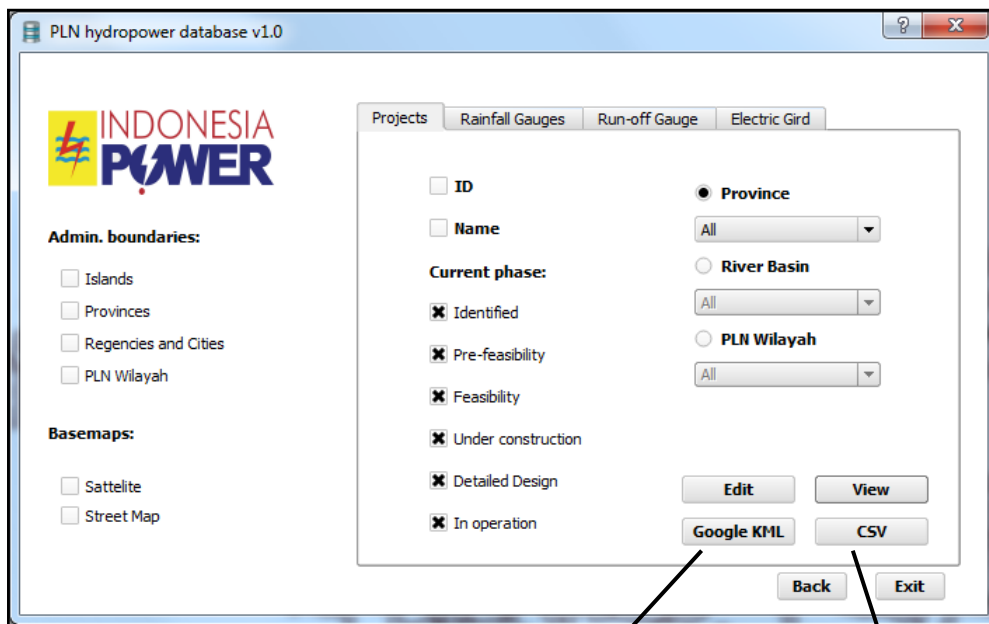
The rainfall and run-off gauges' tab:



3. DATABASE EDITING AND OPERATION: THE PLN PLUGIN

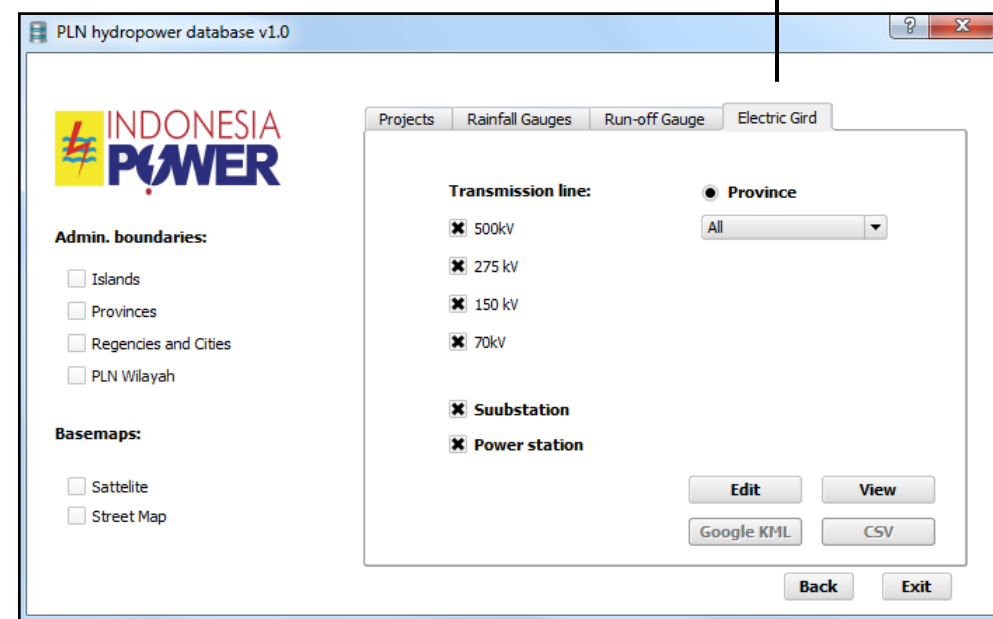
Future improvements:

A fourth tab: the electric grid



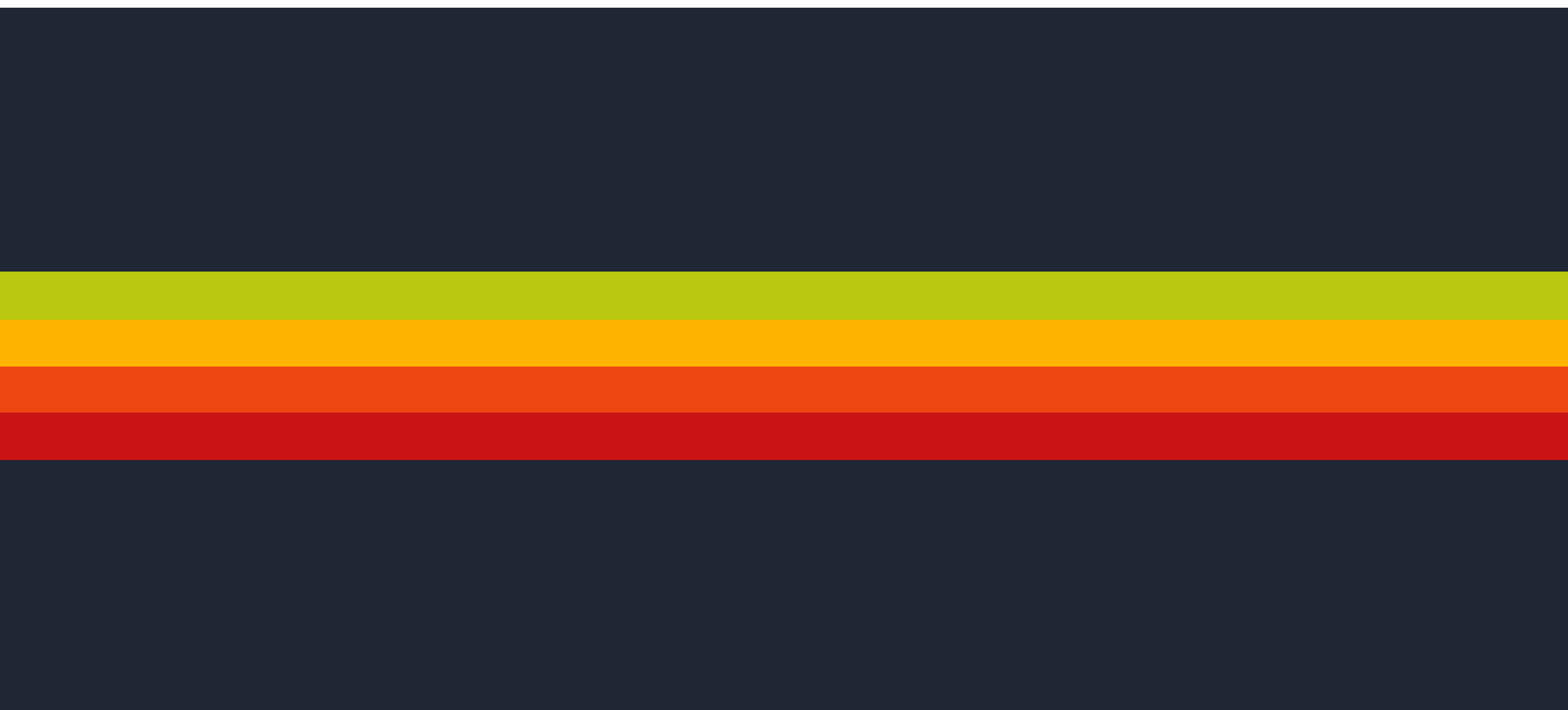
Export to Google KML

Export to a CSV file





Gesto
ENERGY CONSULTING





Energy Sector Management Assistance Program (ESMAP)

Small Hydropower Mapping in Indonesia

Database Management Training



INTRODUCTION

SOFTWARE INSTALLATION

DATABASE ADMINISTRATION

PLUG-IN OPERATION



INTRODUCTION

INTRODUCTION

USER'S MANUAL

SOFTWARE INSTALLATION

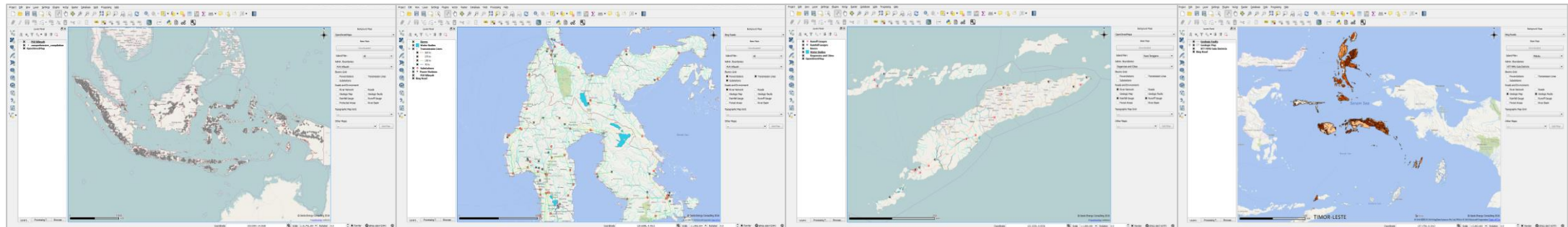
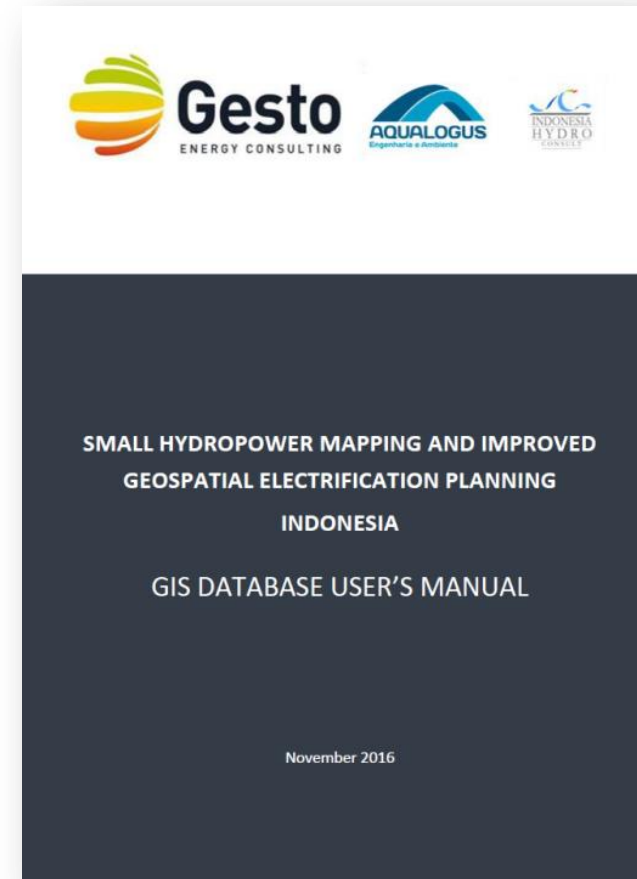
- INSTALLATION REQUIREMENTS
- AUTHORIZATION

DATABASE ADMINISTRATION

- CONNECTION SETTINGS
- USERS MANAGEMENT
- DATA MANAGEMENT
- BACKUP AND RESTORE

PLUG-IN OPERATION

- BASE MAPS
- SHP DATA
- USER'S SUPPORT





SOFTWARE INSTALLATION

SOFTWARE INSTALLATION REQUIREMENTS

QGIS doesn't have a formal system requirement *per se*. However we recommend the following installation requirements for proper use and installation of the software:

- Processor: Intel I3 2 cores @2GHz (or superior)
- RAM: 4 GB (or superior)
- Hard Disk: 320 GB or superior (2GB minimum of free space)
- Operation System: Windows 7 or Windows 8
- Access to PLN server

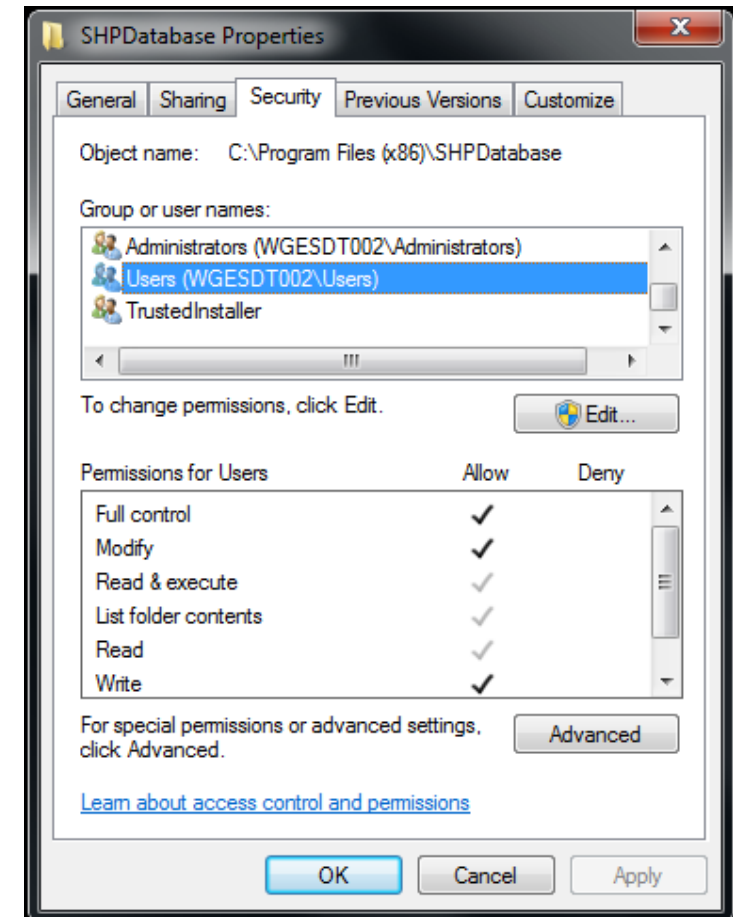
To start the installation process, run **SHPDatabase.exe**.

SOFTWARE INSTALLATION AUTHORIZATION

For security reasons it is recommended that the software is installed by the System Administrator.

If that's not the case, after software installation:

1. Go to your installation folder;
2. Right click on the folder "SHPDatabase" and then go to "Properties";
3. Choose "Security" tab;
4. Select your PC group of users on the first part of the window "Group and user names";
5. Click "Edit" (it will require the PC Administrator credentials);
6. Select the option "Full Control";
7. Press "OK".





GIS DATABASE

DATABASE ADMINISTRATION

CONNECTION SETTINGS

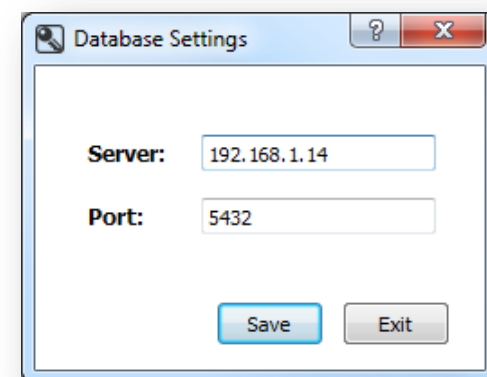


LOGIN

The **Login** tool allows the user to login and logout to the GIS Database and to define connection settings.

Server and Port default values are the ones specified by PLN.

It should be reminder that the database user must have a VPN connection set by PLN.



DATABASE ADMINISTRATION

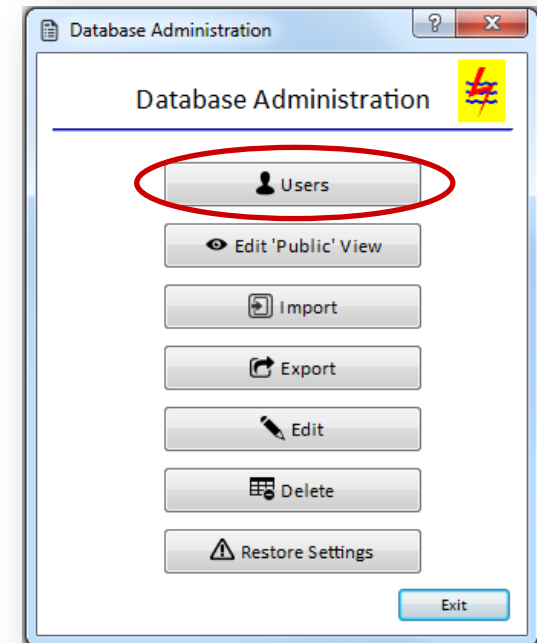
USERS MANAGEMENT



Database Administration

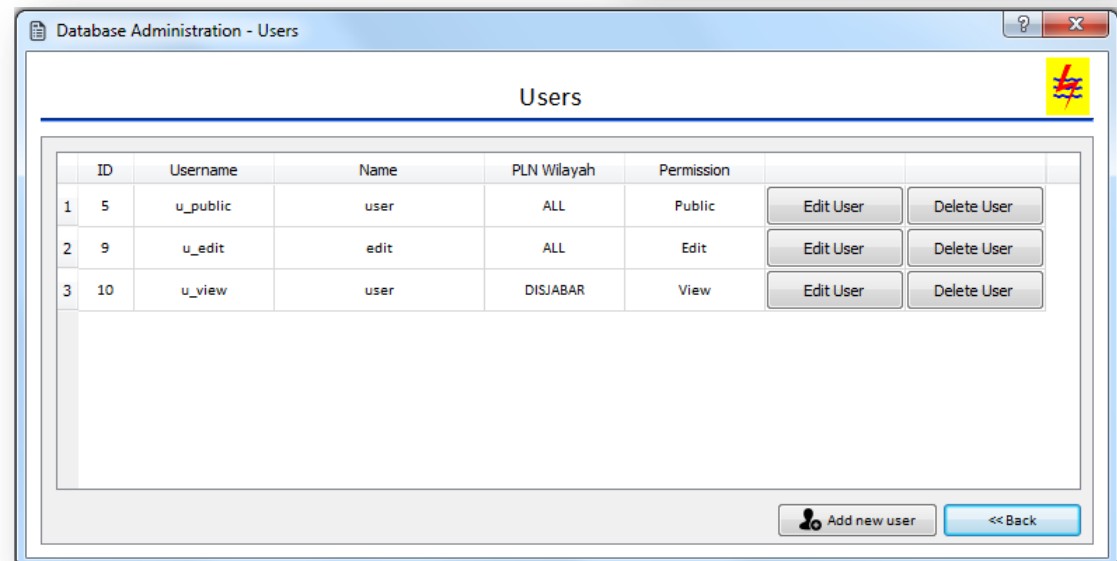
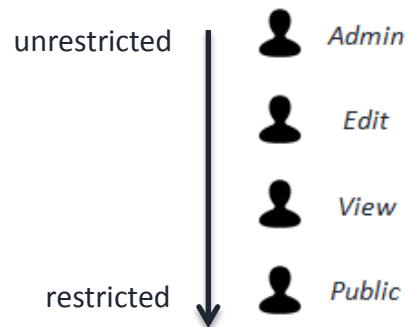
Note:

This tool will only be unlocked to Admin users therefore only this group of users will be able to manage the GIS Database for national information on Small Hydropower Planning.



Users

- Permission





Database Administration

Edit 'Public' view

- In this option you can define which columns can be displayed from the projects table to the users with 'Public' permission.

Import

- In this option you can import data to the GIS Database by creating new tables or by adding data to existing tables. This allows you to import in two different file formats, CSV or Shapefile.

Export

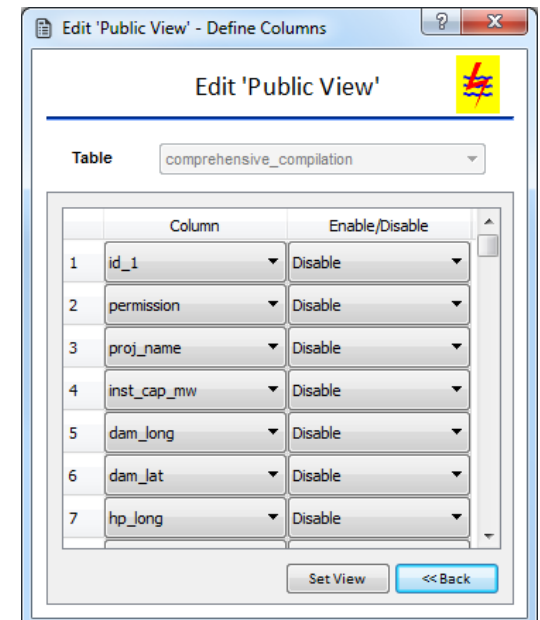
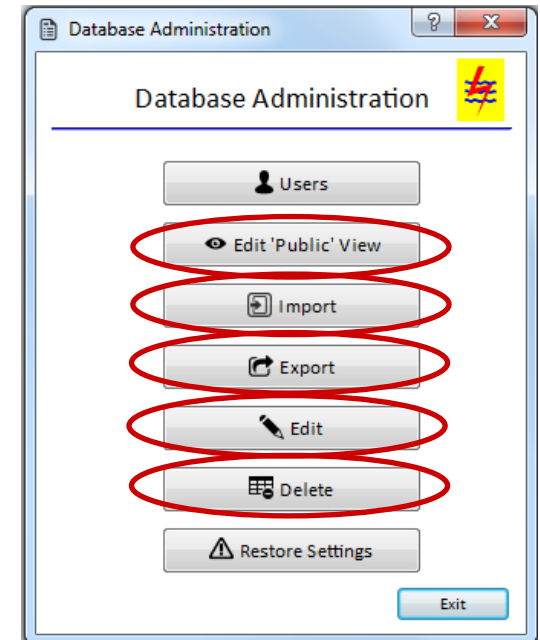
- In this option you can export any existing table in three different formats, CSV, Shapefile or KML.

Edit

- In this option you can add, edit and delete features of any existing table with or without geospatial information.

Delete

- In this option you can delete any existing table from the GIS Database.



DATABASE ADMINISTRATION

BACKUP AND RESTORE



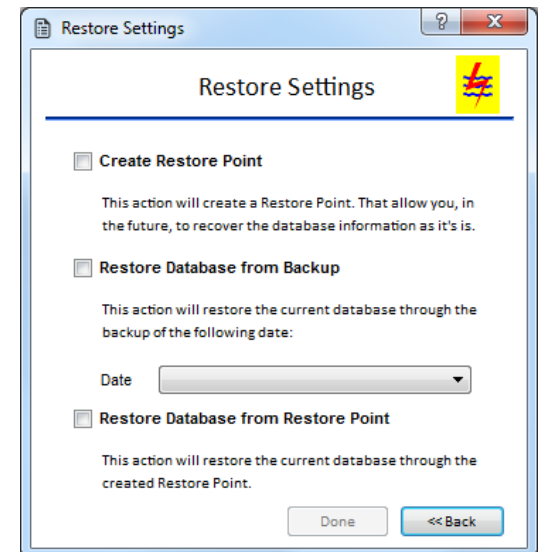
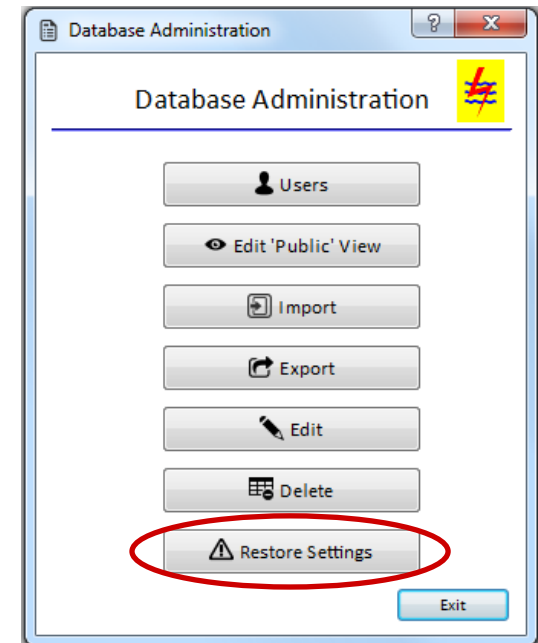
Database Administration

Backup System

- For assure the security and integrity of all data in the GIS database, it is scheduled an automatic backup system. Therefore every week it is created a backup file that will be stored in the server during a period of three months (sixty days), after that the files will be automatically deleted.

Restore point

- Restore points are created to allow users a choice of previous system states and usually these restore points are created before key changes are made to the system. So in this option you can create a restore point whenever it seems necessary, nevertheless there is only one restore point, thus if you create a new restore point, this will replace the previously created restore point.





PLUG-IN OPERATION

PLUG-IN OPERATION

SHP DATA



PLN Small Hydro Database

The PLN Small Hydro Database tool provides you access to the existing projects on your GIS Database.

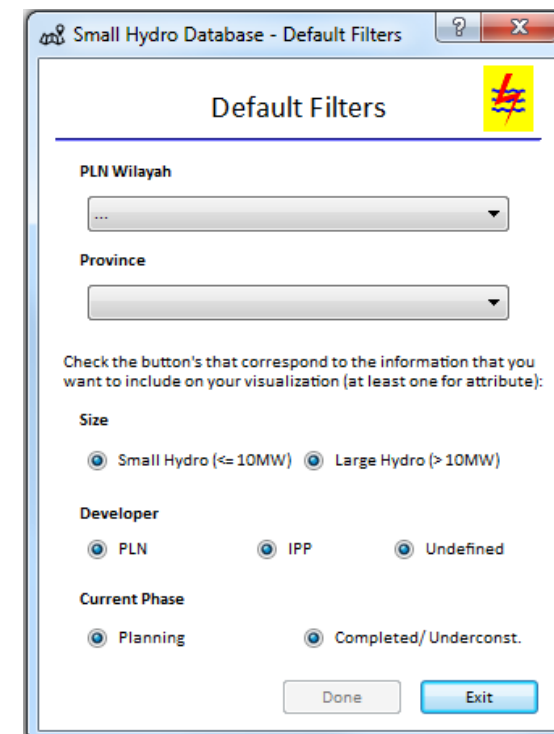
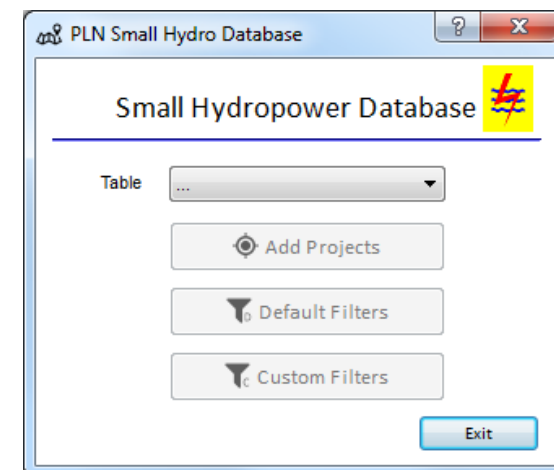
The [Default Filters] and [Custom Filters] buttons will be locked in three different scenarios:

- the logged in user has *Public* permission,
- the selected table do not have any project at all or do not have any project in the user PLN Wilayah;
- the selected table do not have the mandatory fields (status, ipp_pln, inst_cap_mw, province).

Default filters

This option allows you to set some default filters in your Projects layer that will facilitate the visualization of your data, based on:

- Location filter
 - PLN Wilayah
 - Province
- Attribute filter
 - Size
 - Developer
 - Current Phase



PLUG-IN OPERATION

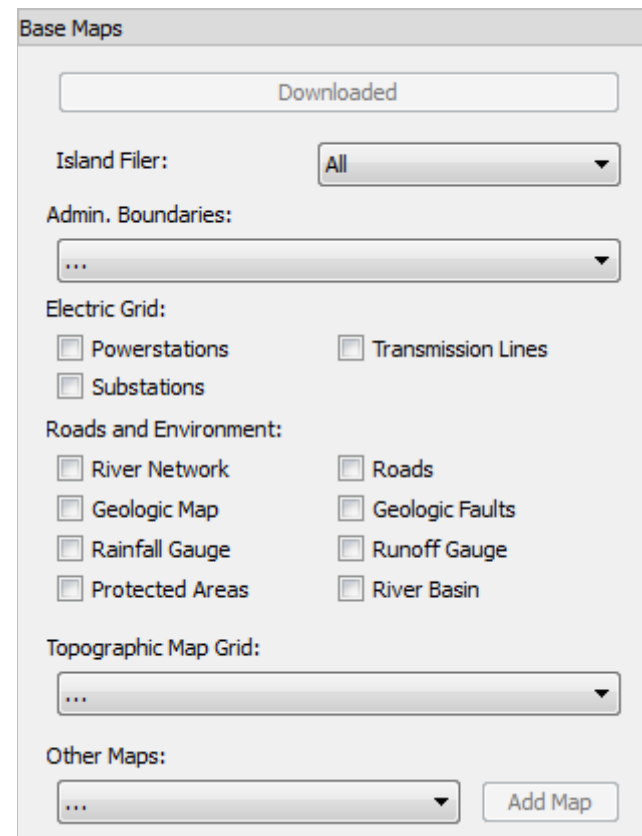
BASE MAPS

Base Maps highlights

This Plug-in structure is meant to ease the SHP data analysis throughout the display of basic info.

The necessary download of the base layers to your PC has the ultimate goal of data visualization performance improvement.

All new tables imported to the *public_shapes* scheme of the GIS Database will be exposed on the *Other Maps* combo box to allow map display.



The screenshot shows a 'Base Maps' configuration window with the following elements:

- A 'Downloaded' button at the top.
- 'Island Filer:' dropdown menu set to 'All'.
- 'Admin. Boundaries:' dropdown menu with '...'.
- 'Electric Grid:' section with checkboxes for:
 - Powerstations
 - Substations
 - Transmission Lines
- 'Roads and Environment:' section with checkboxes for:
 - River Network
 - Geologic Map
 - Rainfall Gauge
 - Protected Areas
 - Roads
 - Geologic Faults
 - Runoff Gauge
 - River Basin
- 'Topographic Map Grid:' dropdown menu with '...'.
- 'Other Maps:' dropdown menu with '...' and an 'Add Map' button.

PLUG-IN OPERATION

USER'S SUPPORT

GIS TRAINING FROM OCTOBER, 2015

- Introduction to GIS
- QGIS software training with exercises and tutorials
- Database editing and operation: Basics of PostgreSQL



CONSULTANT CONTACTS:



www.gestoenergy.com | hydro@gestoenergy.com

ONLINE SUPPORT:

[QGIS Users Guide](https://docs.qgis.org/2.14/en/docs/user_manual) | https://docs.qgis.org/2.14/en/docs/user_manual

[QGIS Home site](http://www.qgis.org) | <http://www.qgis.org>

[QGIS Tutorials](http://www.qgistutorials.com) | <http://www.qgistutorials.com>



THANK YOU FOR YOUR ATTENTION

ANNEX IV – IPP’S SHP LIST

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
JAWA	Perum Jasa Tirta 1	PLTM Lodagung	Unknown	1.3
	PT. Adhisatya Energy	PLTM Damar	Under Construction	2.1
	PT. Adi Banuwa	PLTM Kunci Putih	Unknown	1.0
	PT. Alsera Sinergi	PLTM Cikaengan	Unknown	3.0
	PT. Arkora Hydro	PLTM Cikopo 2	Unknown	5.6
	PT. Bangun Bumi Bersatu	PLTM Karang ropong	Unknown	6.0
	PT. Banyu Cipta Energi	PLTM Nagajaya	Unknown	6.0
	PT. Banyu Daya Perkasa	PLTM Lebak Tundun	Unknown	8.0
	PT. Berkah Tirta Energi	PLTM Ciasem	Unknown	3.0
	PT. Bias Petrasia Persada	PLTM Cicatih	Unknown	6.4
	PT. Bioenergi Inti Guna	PLTM Kanzy 5	Unknown	5.0
	PT. Bumi Powerindo	PLTM Kalapa Nunggal	Unknown	3.0
	PT. Cahaya Semesta Energi	PLTM Pageruyung	Unknown	4.4
	PT. Central Asia Invesment	PLTM Pandan Laras 2	Unknown	7.4
		PLTM Pandan Laras 3	Unknown	2.2
	PT. Chiron Energy	PLTM Cikawung Atas	Unknown	5.6
		PLTM Cikawung Bawah	Unknown	2.5
	PT. Cikaengan Tirta Energi	PLTM Cikaengan 2	Unknown	7.2
	PT. Cisungsang Hydro	PLTM Cisungsang 2	Unknown	3.0
	PT. Daya Anugerah Nusantara	PLTM Sukamaju	Unknown	7.5
	PT. Emuri Indoenergi Pratama	PLTM Serayu	Unknown	8.6
	PT. Energy Puritama	PLTM Semawung	Unknown	0.6
	PT. Euro Hydro Power Persada Indonesia	PLTM Balelo	Unknown	4.4
		PLTM Jompo 1	Unknown	2.1
		PLTM Jompo 2	Unknown	3.2
		PLTM Ketajek	Unknown	3.3
	PT. GE Strategic	PLTM Binangun	Unknown	3.8
	PT. Hidro Rizki Ilahi	PLTM Lebak Barang	Unknown	7.0
	PT. Impha Nusantara Mandiri	PLTM Cisiih Cimandiri	Unknown	8.0
	PT. Inti Cipta Energi	PLTM Cilaki	Unknown	5.4
	PT. Inti Jaka Laksana	PLTM Jatisari	Unknown	5.0
	PT. Jascleans Hydro Power	PLTM Bulakan	Unknown	7.0
	PT. Jaya Dinamika Geohidroenergi	PLTM Cianten 1	Unknown	2.0
		PLTM Cianten 2	Unknown	5.0
		PLTM Cianten 3	Unknown	5.8
	PT. Kanz Capital	PLTM Kanzy 1	Unknown	2.3
	PT. Kreasi Mini Hidro	PLTM Cileat	Unknown	5.2
	PT. Lima Energi Lestari	PLTM Pesantren 1	Unknown	1.8
	PT. Mahija Kastara Hita	PLTM Caringin	Unknown	4.3
	PT. Mandala Pratama Energi	PLTM Rakit	Unknown	0.5
	PT. Manha Daya Mandiri	PLTM Cibuni Mandiri	Unknown	2.0
	PT. Mega Indo Energy	PLTM Banyumlayu	Unknown	0.5
	PT. Metaphora Andalan Utama	PLTM Kerta Mukti	Unknown	6.3
	PT. Naluri Energi Utama	PLTM Kincang	Completed	0.3
		PLTM Logawa - Sunyalangu	Completed	2.0
		PLTM Singgi	Unknown	0.2
	PT. Pembangkitan Pusaka Parahiangan	PLTM Pusaka 1	Under Construction	8.8
PLTM Pusaka 3		Under Construction	3.0	

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
	PT. Pengada Listrik Tirta Anugrah	PLTM Bendosari	Under Construction	4.0
	PT. Perkebunan Nusantara XII	PLTM Zeelandia	Unknown	2.1
	PT. Persada Karya Tama	PLTM Danawarih	Unknown	0.3
		PLTM Timbangreja	Unknown	0.4
	PT. Putra Karya Cahaya Terang	PLTM Ciarinem	Unknown	3.0
	PT. Putra Tirta Nusantara	PLTM Karekan	Unknown	6.1
	PT. Renerpha Energi Utama	PLTM Ciharang	Unknown	1.8
	PT. Republika Mandiri Energi	PLTM Cikandang	Unknown	6.0
	PT. Rumeksa Power	PLTM Banjaran Kebonmanis	Completed	2.2
		PLTM Logawa - Baseh Karangpelem	Under Construction	1.9
		PLTM Logawa Babakan	Completed	1.3
	PT. Saksama Cipta Daya	PLTMH Kombongan	Unknown	1.9
		PLTMH Sindang Cai	Unknown	0.9
	PT. Sangsaka Hidro Barat	PLTM Cibalapulang 3	Unknown	9.0
	PT. Sangsaka Hidro Lestari	PLTM Cibareno	Completed	3.0
		PLTM Cisimeut	Completed	2.0
	PT. Sumarah Energi	PLTM Logawa	Unknown	2.9
	PT. Sumber Agung Wibowo Kusumo	PLTM Jimat	Unknown	0.5
	PT. Tekindo Kerja Lestari	PLTM Pagerpelah	Unknown	3.1
	PT. Tirta Energindo	PLTM Cibatarua Panyairan	Unknown	8.2
	PT. Tirta Gemah Ripah	PLTM Cirompang	Unknown	8.0
	PT. Tirtamukti Lestari	PLTM Cibuni	Unknown	3.2
	PT. Tjahaja Elektrik	PLTM Cilayu Kulon	Unknown	5.2
	PT. Toblong Hydro Power	PLTM Toblong	Unknown	6.0
	PT. Tridegra Power	PLTM Bojong Cisono	Unknown	1.5
	PT. Wahana Cipta Energi	PLTM Cidano	Unknown	1.5
	Wiratman & Associates	PLTM Dadapayam	Unknown	2.9
MALUKU	PT. Gistec Prima Energindo	PLTM Sapalewa	Unknown	8.0
	PT. Goal Bangun Energy	PLTM Goal	Unknown	2.0
NUSA TENGGERA	PT. Arena Hidro Energi	PLTM Wanokaka 2	Unknown	0.7
	PT. Arena Maju Bersama	PLTM Lapopu-Wanakaka	Completed	1.6
	PT. Gistec Prima Energindo	PLTM Tukad Daya	Unknown	2.1
		PLTM Wae Lega	Unknown	1.8
	PT. Henindo Harunda	PLTM Harunda	Unknown	1.5
	PT. Henindo Power Waeroa	PLTM Waeroa	Unknown	0.4
	PT. Panji Muara Raya	PLTM Muara	Unknown	1.4
	PT. Pilar Informasi	PLTM Sita	Unknown	1.0
	PT. Sapta Bali Energi	PLTM Sambangan	Unknown	1.9
	PT. Suar Investindo Capital	PLTM Brang Rea 1	Unknown	2.5
		PLTM Brang Rea 2	Unknown	3.8
		PLTM Segara 1	Under Construction	2.6
		PLTM Segara 2	Under Construction	4.1
	PT. Sumber Daya Investasi	PLTM Koko babak	Unknown	2.3
		PLTM Sedau	Unknown	1.3
PT. Tirta Daya Mandalika	PLTM Pringgarata	Unknown	0.3	
PT. Tirta Daya Rinjani	PLTM Sesaot	Unknown	1.0	
PT. Tirta Daya Rinjani Lingsar	PLTM Lingsar	Unknown	4.0	

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
	PT. Tirtadaya Lombok	PLTM Karang Bayan	Unknown	1.3
	PT. Tirtadaya Rijani	PLTM Batu Bedil	Unknown	0.6
SULAWESI	Perusahaan Daerah Kota Palopo	PLTM Bambalu	Unknown	0.3
	PT ARKORA SULAWESI SELATAN	PLTM Tomasa	PPA	10.0
	PT BUMINATA CITA BANGGAI ENERGI	Hanga-hanga	Completed	2.0
		Kalumpang	Unknown	1.3
	PT CIPTA DAYA NUSANTARA	Mobuya	Unknown	3.0
	PT Fajar Futura Energi Luwu	Ranteballa	Unknown	2.4
	PT LAMBANGAN ENERGI UTAMA	Lambangan	Unknown	3.0
	PT Malea Energy	Malea (Excess Power)	Unknown	6.7
	PT MAPPING Hydropower	Mapping	Unknown	0.3
	PT Nagata Dinamika Hidro Madong	Madong	PPA	10.0
	PT SAKITA HYDROPOWER	Sakita (Mampueno)	Unknown	2.0
	PT Sangsaka Hidro Kasmar	Baliase	Completed	9.0
	PT Simbuang Hydro Power	Simbuang	Unknown	3.0
	PT Siteba Energy	Siteba	Unknown	7.5
	PT Sulawesi Indo Energy	Belajen	Under Construction	8.3
	PT Sulawesi Mini Hydro Power	Tangka/Manippi	Unknown	10.0
	PT Ussu Hydro Power	Ussu Malili	Under Construction	3.0
	PT. Alani Energi Utama	PLTM Alani	PPA	7.0
	PT. Anoa Hydro Power	PLTM Saluanoa	Completed	2.0
	PT. Ario Bintang Energi	PLTM Pidung	Unknown	2.0
	PT. Arkora	PLTM Yaentu	Unknown	10.0
	PT. Arkora Hydro	PLTM Tomoni	Unknown	10.0
	PT. Bambalo Energi Niaga	PLTM Bambalo 2	Unknown	1.8
	PT. Bangun Cahaya Lestari	PLTM Lobu	Unknown	5.0
	PT. Benteng Malewang	PLTM Benteng Malewang	Unknown	5.2
	PT. Bone Bolango Energi	PLTM Bone	Unknown	7.4
	PT. Brantas Energi	PLTM Kadundung	Unknown	3.2
	PT. Brantas Prospek Energi	PLTM Maiting Hulu 2	Unknown	8.0
	PT. Bukit Tinoring Raya	PLTM Bengkoli	Unknown	2.5
		PT. Bumi Gemilang Prima	PLTM Bongkasoa-Simpoyo	Unknown
			PLTM Sabuku	Unknown
	PT. Bumi Sinar Energi	PLTM Paranonge	Unknown	5.0
	PT. Buminata Energi Perkasa	PLTM Tomata	Unknown	10.0
	PT. Central Power Indonesia	PLTM Dako	Unknown	1.4
	PT. Citacontrac	PLTM Bontotene	Unknown	1.0
	PT. Energi Powerindo Jaya	PLTM Tabong	Unknown	7.0
	PT. Energy Persada Bersama	PLTM Patikala	Unknown	6.0
	PT. Eremerasa Makmur	PLTMH Eremerasa	Unknown	1.3
	PT. Erlangga Sinergi Utama	PLTM Batu No Botak	Unknown	5.0
	PT. Fajar Futura Energi Luwu	PLTM Kondongan	Unknown	3.5
PLTM Pongbatik		Under Construction	3.0	
PT. Ganesha Kencana Sakti	PLTM Biak	PPA	4.0	
PT. Globalindo Energi Indonesia	PLTM Sampaga	Unknown	1.2	
PT. Great Colour Energy	PLTM Bungin 3	Under Construction	5.0	
PT. Hadji Kalla	PLTM Siteba 2	Unknown	9.8	
PT. Haji La Tunrung L & K	Bungin	Unknown	3.0	

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
		PLTM Bungin 2	Unknown	10.0
	PT. Hentraco Indoperkasa	PLTM Wawopada	Completed	3.0
	PT. Kabil Citra Power	PLTM Kindang	Unknown	3.5
		PLTM Kindang 2	Unknown	3.0
	PT. Karya Graha Unggul	PLTM Bontomantene	Unknown	2.2
	PT. Kilotrans Energi	Kuala Kilo	Unknown	10.0
	PT. Limbong Hidro Energi	PLTM Rongkong 3	Unknown	7.6
	PT. Mahayasa	PLTM Ponju	Unknown	3.0
	PT. Mahintuvu Patria Energy	PLTM Pono	Unknown	6.1
	PT. Mallawa Hydro	PLTM Mallawa	Unknown	5.0
	PT. Mandiri Putra Abadi	PLTM Tincep 1	Unknown	0.6
		PLTM Tincep 2	Unknown	1.2
		PLTM Tincep 3	Unknown	2.2
		PLTM Tincep 4	Unknown	0.4
	PT. Mapahi Masagena Energy	PLTM Mapahi	Unknown	7.0
	PT. Masewo Mareso Energy	PLTM Masewo	Unknown	8.0
	PT. Mega Karya Energi	PLTM Malua	Unknown	4.6
		PLTM Pasui 2	Unknown	6.4
	PT. Megapower Makmur	PLTM Bantaeng 1	Under Construction	4.2
	PT. Nagata Dinamika Hidro Ma'dong	PLTM Ma'dong	Unknown	10.0
	PT. Nagata Dinamika Hidro Punggawa	PLTM Sapaya	Unknown	5.2
	PT. Nusantara Banyu Aji	PLTM Sinombulung	Unknown	4.0
		PLTM Siyuntoyo	Unknown	3.0
	PT. Perambu Boro	PLTM Batukede	Unknown	8.9
	PT. Potensia Tomini Energi	PLTM Palasa	Completed	7.4
		PLTM Tinombo	Completed	1.7
	PT. Punggawa Datara Energi	PLTM Datara	Completed	9.5
	PT. Safari Utama Energi Sinjai	PLTM Dusun Palantieng	Unknown	4.0
		PLTM Kahaya	Unknown	3.0
	PT. Sulawesi Hydro Energy	PLTM Dominanga	PPA	3.5
	PT. Sulbar Energi Aralle	PLTM Aralle	Unknown	8.7
	PT. Sulbar Energi Mambi	PLTM Pamoseang	Unknown	6.0
	PT. Sumber Energi Lestari	PLTM Iya	PPA	2.0
		PLTM Taludaa 2	Completed	2.0
		Taludaa	Unknown	3.0
	PT. Surya Mitra Nugraha	PLTM Paun	Unknown	9.2
	PT. TGP Energy Indonesia	PLTM Karangana I	Unknown	9.0
		PLTM Karangana II	Unknown	10.0
		PLTM Karangana III	Unknown	8.5
	PT. Tombolo Energy	PLTM Tombolo Pao	Completed	2.0
	PT. Tunas Minahasa Energi Listrik Tenaga air (PT. TMELT)	PLTM Ranowano Minahasa	Unknown	2.4
	PT. Adis Putra Pratama	Hek	Unknown	2.5
SUMATERA	PT. Aek Simonggo Energy	PLTM Aek Simonggo	Unknown	9.0
		PLTM Sei Wampu 1	Unknown	9.0
	PT. Alam Sutera Karya Energi	PLTM Subulussalam	Unknown	7.5
	PT. Bakara Energi Lestari	PLTM Aek Silang 2	Unknown	10.0
	PT. Berkah Alam Lestari Energi	PLTM Batang Toru 3	Unknown	10.0

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
	PT. Bho Mitratama Engineering	PLTM Ketahun 1	Unknown	4.2
		PLTM Ketaun 2	Unknown	2.1
	PT. Bumi Andalan Energi	PLTM Simare	Unknown	2.9
	PT. Bumiloka Tegar Perkasa	PLTM Komerling	Unknown	1.4
	PT. Charma Paluta Energy	PLTM Sisira Simandame	Unknown	4.6
	PT. Dairi Clean Energy	PLTM Tanah Pinem	Unknown	10.0
	PT. Dalima Putra Perdana	PLTM Air Dikit	Unknown	6.0
	PT. Demarko Energi Sejati	PLTM Aek Simadoras	Unknown	5.1
	PT. Dwijaya Makmur	PLTM Semendo	Unknown	9.5
	PT. ECO Power Engineering	PLTM Lawe Mamas	Unknown	10.0
	PT. Energi Alam Sentosa	PLTM Sisira	Unknown	9.8
	PT. Exabenar Cipta Karya	PLTM Batang Tuik	Unknown	6.3
	PT. Fortius Green Energy	PLTM Lae Luhung	Unknown	10.0
	PT. G5 Power	PLTM Laruang Gosan	Unknown	4.1
	PT. Gema Elektrik Nusantara	PLTM Nakai 1	Unknown	3.2
		PLTM Nakai 2	Unknown	5.0
	PT. Geohidro Utama Energi	PLTM Silinda	Unknown	6.5
	PT. Global Green Energy	PLTM Bingai	Unknown	7.0
	PT. Global Hidro Energi	PLTM Karai 13	Unknown	8.3
	PT. Hayyan Jaya Internasional	PLTMH Aek Tulas	Unknown	1.3
	PT. Ilthabi Energia	PLTM Mangku	Unknown	6.0
	PT. Indo Energi Cubadak	PLTM Bukit Cubadak	Unknown	9.2
	PT. Inpola Mitra Elektrindo	PLTM Kombih 3	Unknown	8.0
		PLTM Parluasan	Unknown	10.0
	PT. Jaya Dinamika Geohidroenergi	PLTM Pagaringan	Unknown	8.4
		PLTM Poring 1	Unknown	9.0
	PT. Kamigayo Kerpap Energi	PLTM Kerpap	Completed	2.2
	PT. LAPI ITB	PLTM Siamang Bunyi	Unknown	1.8
	PT. Lhok Pineung Hidro Energi	PLTM Lhok Pineung	Unknown	5.4
	PT. Limaco Energie	PLTM Pinti Kayu	Unknown	10.0
	PT. Manggala Gita Karya	PLTM Lahat	Unknown	10.0
	PT. Martahi Bara Energy	PLTM Aek Godang	Unknown	4.4
	PT. Mega Daya Energi	PLTM Tunggang	Unknown	10.0
	PT. Mega Energi Karyatama	PLTM Babatan	Unknown	5.0
		PLTM Karyanyata	Unknown	4.0
		PLTM Rabi Jonggor	Under Construction	4.5
	PT. Mega Power Mandiri	PLTM Parlilitan	Unknown	10.0
	PT. Mitra Arana Sinergi	PLTM Manna	Unknown	7.4
	PT. Napal Melintang Energy	PLTM Napal Melintang	Unknown	0.5
	PT. Narumonda Energy	PLTM Aek Rambe	Unknown	6.7
	PT. Nawakara Energi Patimah	PLTM Batang Patimah	Under Construction	2.8
	PT. Northsum Hydro	PLTM Simonggo Tornaulli	Completed	8.0
PT. Nusantara Indah Energindo	PLTM Niagara	Unknown	1.7	
PT. Nusantara Powerindo Perkasa	PLTM Kamangin Nagori	Unknown	2.0	
PT. Pandu Lembang Jaya Energi	PLTM Bukit Sileh	Unknown	0.7	
	PLTM Muaro	Unknown	0.2	
PT. Pasific Artha Nusantara	PLTM Ketol A	Unknown	10.0	
PT. Pembangkit Listrik Induring	PLTM Induring	Unknown	1.2	

ISLAND	SMALL HYDRO IPP	PROJECT NAME	STATUS	CAPACITY (MW)
	PT. Pembangkit Listrik Muara Sako	PLTM Muara Sako	Unknown	3.0
	PT. Pesisir Hidro Energi	PLTM Guntung	Unknown	4.0
	PT. Rakata Karya Sakti	PLTM Sianok Duku	Unknown	6.6
	PT. Sahung Brantas Energi	PLTM Padang Guci	Unknown	6.0
	PT. Stupa Meka Energi	PLTM Kombih 4	Unknown	10.0
	PT. Sumber Energi Hidro	PLTMH Raisan Naga Timbul	Unknown	7.0
	PT. Teknopreneur Surya Energi	PLTM Sikarbau	Unknown	2.0
	PT. Terra Management Group	PLTM Besay	Unknown	9.2
	PT. Thong Langkat Alam Energi	PLTM Tanjung Lenggang	Unknown	10.0
	PT. Unitera Internusa	PLTM Lawe Gurah	Unknown	4.5
	PT. Uway Energy Perdana	PLTM Besai Kemu	Unknown	7.1
	PT. Wahana Adya	PLTM Muara Sahung	Unknown	10.0



GESTO ENERGIA S.A.

Av. Cáceres Monteiro, nº 10, 1º Sul

1495-131 Algés, Portugal

T. +351 211 579 899

F. +351 211 540 900

www.gestoenergy.com