

Enhancing Risk Analysis Capacities for Flood, Tropical Cyclone Severe Wind and Earthquake for the Greater Metro Manila Area

Component 2 – Exposure Information Development

PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY
GEOSCIENCE AUSTRALIA

Maria Leonia P. Bautista¹, Bartolome Bautista¹, Ishmael C. Narag¹, Analyn D Aquino¹, Kathleen Papiona¹, Anne Lorraine Delos Santos¹, Jayvie Nadua¹, Johnlery P. Deximo¹, Matthew Jakab², Mark A. Dunford²



-
1. Philippine Institute of Volcanology and Seismology
 2. Geoscience Australia

Contents

Executive Summary.....	vii
Description of overall outputs of component.....	vii
Participating Agencies	viii
Glossary and Abbreviations.....	ix
1 Introduction.....	1
1.1 What is exposure?	1
1.2 What is exposure data and information?	1
1.3 Flowchart of exposure data development.....	2
1.4 How exposure information underpins risk analysis	2
1.4.1 Suitability of data for risk analysis	2
1.4.2 Participation of key stakeholders	3
2 Background and Previous Work.....	4
2.1 Metropolitan Manila Earthquake Impact Reduction Study (MMEIRS) – Exposure Information	4
2.2 Pilot Earthquake Study for Iloilo City	4
2.3 Lessons learnt from previous work	5
3 Data	6
3.1 Overview of exposure data development	6
3.1.1 Spatial data	6
3.1.2 Non-Spatial Data	7
3.2 Description of supporting information	7
3.3 Data provided by National Government agencies	8
3.3.1 National Mapping and Resource Information Authority (NAMRIA)	8
3.3.2 Philippine Institute of Volcanology and Seismology (PHIVOLCS)	9
3.3.3 National Statistics Office (NSO)	9
3.3.4 Department of Education (DepEd)	9
3.3.5 Environmental Management Bureau (EMB)	9
3.3.6 National Telecommunications Corporation (NTC)	9
3.4 Data provided by Regional/Provincial Governments	10
3.4.1 Metropolitan Manila Development Authority (MMDA)	10
3.5 Data provided by Local Government Units	11
3.6 Data sourced from other donor projects	12
3.6.1 MMEIRS – spatial data.....	12
3.6.2 Resilience Project.....	13
3.6.3 READY Project.....	13
3.7 Open Source Data and Information	13
3.7.1 OpenStreetMap	13
3.7.2 WikiMapia	14
3.7.3 Panoramio	15
3.8 Data available via Geoscience Australia	15
3.8.1 Landsat time-series	15

3.9 Data collected by exposure project team.....	15
3.9.1 Interpretation of Panoramio images	16
4 Methods.....	17
4.1 Framework for Exposure Information Development	17
4.1.1 Area-Based Approach option	17
4.1.2 Feature-Based Approach option	17
4.2 Area Based Approach - spatial data processes.....	17
4.2.1 Area of Interest definition	17
4.2.2 Barangay Boundary definition	18
4.2.3 Non-Developable Land Area definition	19
4.2.4 Developable Land Areas definition	19
4.2.5 Land Use Classification.....	19
4.2.6 Building Geometry modelling	21
4.2.7 Era of Construction classification	31
4.3 Area-Based Approach – non-spatial data processes	35
4.3.1 Structural characteristics - Formal Settlements	35
4.3.2 Structural Characteristics - Informal Settlements.....	43
4.3.3 Structural Characteristics - Non-Residential Land Uses	44
4.3.4 Interpretation of Building Types from Imagery	47
4.3.5 Residential population	50
4.3.6 Area-Based Approach – Compilation.....	53
4.4 Feature-Based Approach - Spatial Data Processes.....	66
4.4.1 Definition of features for inclusion	66
4.4.2 Advantages of stereo-imagery	67
4.4.3 Data capture from stereo-imagery	67
4.4.4 Post-processing of captured data	67
5 Results.....	73
5.1 Exposure Information Development – Taguig City (Phase 1)	73
5.1.1 Area of Interest	73
5.1.2 Barangay Boundaries	73
5.1.3 Non-Developable Areas and Developable Land Areas	73
5.1.4 Land Use Mapping	73
5.1.5 Data package	73
5.2 Exposure information development – remaining areas (Phase 2)	75
5.2.1 Area of Interest	76
5.2.2 Non-Developable Areas and Developable Land Areas	76
5.2.3 Land Use Mapping	76
5.2.4 LGU Name and Barangay Boundaries.....	76
5.2.5 Building Geometry Model outputs	76
5.2.6 Era of Construction mapping.....	77
5.2.7 Look Up Table for Formal Settlements	77
5.2.8 Look Up Table for Informal Settlements.....	77
5.2.9 Look Up Table for Non-Residential Uses.....	77
5.2.10 Look Up Table for population estimate calculations	77
5.2.11 Area-Based Approach data compilation.....	77
5.2.12 Potentially Wind Sensitive Structure data compilation	78

6 Discussion	79
6.1 Limitations of available exposure information.....	79
6.1.1 Area-Based Approach.....	79
6.1.2 Feature-Based Approach	86
7 Acknowledgements	87
8 References	88
Appendix A – Thematic maps of exposure.....	89
Appendix B – Dictionary of building types	96
Appendix C – Processes for 2000 Census data.....	104
Appendix D – Key exposure statistics	105
Appendix E – Inter-Storey Height Values.....	107
Appendix F – Look Up Tables for Structural Multipliers	109
Attachments.....	Error! Bookmark not defined.

Executive Summary

The Philippines experiences some of the world's worst natural hazards, being exposed to frequent earthquakes, floods, tsunami, landslides, volcanic eruptions, cyclones and annual monsoons. The Greater Metro Manila Area (GMMA), which includes Metro Manila, is particularly vulnerable to the devastating effects of natural disasters, with a population of over 20 million residing on land that is cut by active earthquake faults and subject to intense riverine flooding. The GMMA is also frequently affected by typhoons, which can result in severe wind damage, storm surge and intense flooding. Landslides, tsunamis and volcanic eruptions also pose a risk to residents within the GMMA. The risk from these natural hazards is further exacerbated as poverty often results in populations residing in buildings that are not built to withstand these hazards or in areas that are frequently affected by flooding, such as along flood drainages.

This report summarised the activities and outputs of Component 2 of the 'Enhancing Risk Analysis Capacities for Flood, Tropical Cyclone Severe Wind and Earthquake for the Greater Metro Manila Area' Project. The goal of this project is to analyse the risk from flood, severe wind and earthquake in the GMMA through the development of fundamental datasets and information on hazard, exposure and vulnerability. Component 2 focussed on the development of exposure information for GMMA. The overarching goal of this Activity is to contribute to making the Philippines population better prepared for and protected from natural disasters by informing the reduction of flood, severe wind and earthquake risks in vulnerable communities within GMMA.

Separate reports have been prepared for Component 1 (High Resolution Elevation Data and Imagery), Component 3 (Flood Risk Analysis), Component 4 (Tropical Cyclone Severe Wind Risk Analysis) and Component 5 (Earthquake Risk Analysis).

Description of overall outputs of component

The Exposure component of the project produced two primary datasets:

1. Exposure of buildings and population, which records key exposure attributes needed to undertake natural hazard risk analysis for flood, tropical cyclone severe wind and earthquake across Metro Manila and western parts of Rizal Province adjacent to Metro Manila; and
2. Exposure of billboards, which records the location and geometric properties of major billboard structures across Metro Manila and western parts of Rizal Province adjacent to Metro Manila. These structures are included in a larger group of Potentially Wind Sensitive Structures, which may be of interest in the conduct of severe wind risk analysis.

The component also produced documentation to assist with the development of exposure information:

- Metadata for final datasets;
- Exposure Database Development Framework;
- Exposure Database Development Manual; and
- Options for a File and Data Management Structure.

Participating Agencies

The development of exposure information for the Greater Metro Manila Area was led by the Philippine Institute of Volcanology and Seismology (PHIVOLCS), with technical assistance provided by Geoscience Australia (GA). A number of national and regional governments also assisted with its development, including all the participating agencies of CSCAND, the Metropolitan Manila Development Authority (MMDA), National Statistics Office (NSO), Housing and Land Use Regulatory Board (HLURB) and the Department of Local Government and Interior (DILG). The various offices of the Local Government Units (LGUs) of Metro Manila and Rizal Province contributed to data development through provision of data, local knowledge and technical resources. The Institute of Civil Engineering at the University of the Philippines Diliman (UPD-ICE) also provided advice on the engineering aspects of the database development.

Glossary and Abbreviations

AOI:	Area of Interest
Barangay:	The smallest administrative division in the Philippines, which may occupy an areas of a few city blocks in urban areas, to tens of square kilometres in rural areas. Each barangay has an administrative headquarters (barangay hall) and an elected leader (barangay captain).
DRR:	Disaster Risk Reduction
DOST:	Department of Science and Technology
GA:	Geoscience Australia
GMMA:	Greater Metro Manila Area
JICA:	Japan International Cooperation Agency
LGU:	Local Government Unit
LiDAR:	Light Detection and Ranging
MMDA:	Metropolitan Manila Development Authority
MMEIRS:	Metropolitan Manila Earthquake Impact Reduction Study
NAMRIA:	National Mapping and Resource Information Authority
NDRRMC:	National Disaster Risk Reduction and Management Council
NDVI:	Normalised Difference Vegetation Index
NSO:	National Statistics Office
OCD:	Office of Civil Defense
PHIVOLCS:	Philippine Institute of Volcanology and Seismology
QuiveR:	Quick Inventory of Vulnerability and Exposure for REDAS
REDAS:	Rapid Earthquake Damage Assessment System
UPD-ICE:	University of the Philippines, Diliman – Institute of Civil Engineering

1 Introduction

1.1 What is exposure?

In the context of natural hazard risk analysis, exposure relates to the ‘elements at risk’ from natural hazards. The elements at risk that are usually of most interest in a risk analysis are those that are part of the human geography that are of value and are critical for the functioning of society, such as buildings, structures, facilities, network infrastructure and utilities, people and communities, primary sources of food and potable water, and natural resources.

1.2 What is exposure data and information?

Exposure information can be regarded as a ‘single point of truth’ or a central repository of information describing the characteristics of the elements at risk. Risk analysis demands that all inputs are organised and described in a consistent way, and exposure information is developed to consistently describe the characteristics. A data product, such as a spatial dataset of exposed elements, or a data table summarising the exposure in a defined area, is the output of exposure information development.

On the other hand, exposure data can be regarded as the inputs to exposure information development. Exposure data can be spatial or non-spatial, and may be useful for describing one or a few of the characteristics of the elements at risk. Exposure data can be categorised into one of the following themes:

- Location, size and shape of exposed features;
- Size, shape and extent of exposed areas;
- Administrative or political areas;
- Land ownership;
- Land use;
- Construction period;
- Structural characteristics;
- Economic characteristics; and
- Demographic/social characteristics.

Input exposure data often requires some reorganisation, reclassification or combining with other input datasets before it can be incorporated in the output exposure information.

An exposure database is a spatially-enabled platform that permits the storage and management of input data, the analysis and reorganisation of input datasets and production of exposure information.

1.3 Flowchart of exposure data development

Figure 1.1 shows a simplified representation of spatial and non-spatial data used in exposure information development and its use in risk analysis. A more detailed flowchart detailing the sequence of data development and compilation of final exposure information is shown in Chapter 5.2.

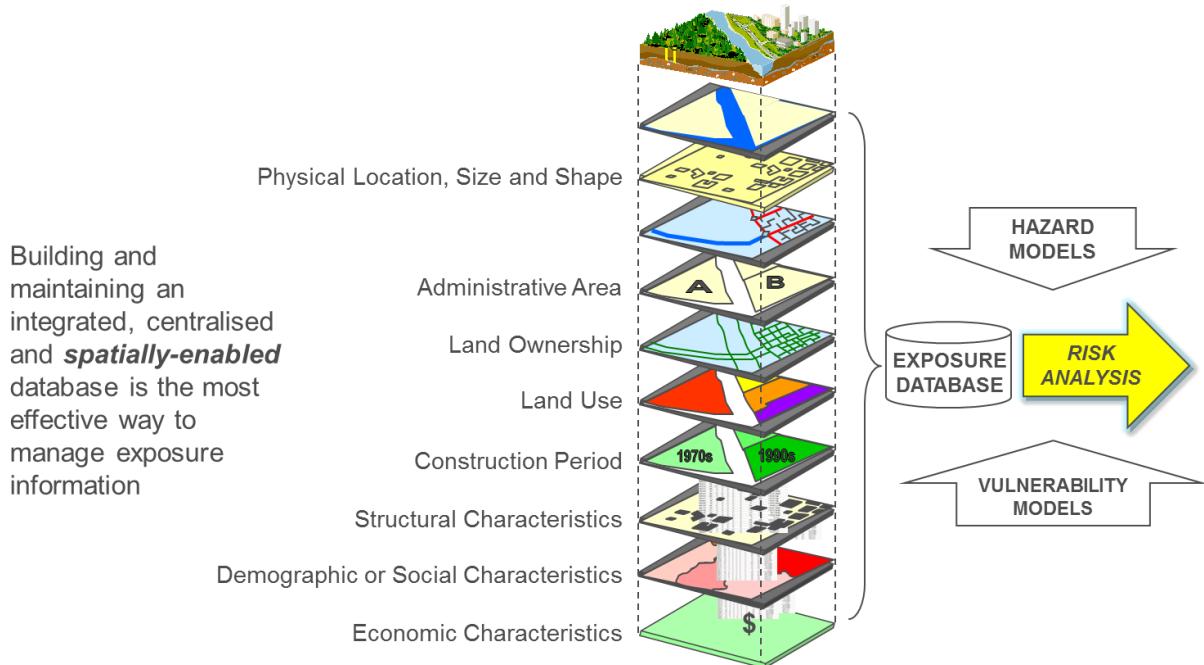


Figure 1.1. Flowchart of data inputs for exposure information development.

1.4 How exposure information underpins risk analysis

Exposure information provides a single source of information that risk analysts can use to calculate the quantity of physical damage, economic loss and potential casualties caused by one or more hazard events. By recording the key attributes in a single source, risk analysts need not pursue and handle multiple datasets, thus increasing the efficiency of the risk analysis process. It enables the analysis by storing information in a single dataset with a well-defined schema, which ensures that information is consistent, topologically correct and compatible with models of vulnerability.

1.4.1 Suitability of data for risk analysis

Exposure information forms one of the three information inputs to risk analysis, the others being hazard modelling outputs and vulnerability models. For risk analysis to be possible and meaningful, exposure information must satisfy several criteria:

- The spatial expression of the elements at risk must be compatible with the scale of the hazard modelling;
- The description or classification of the elements at risk must be compatible with models of vulnerability (e.g. structural classification of buildings);

- The exposure information should, as much as possible, reflect the current quantity and spatial distribution of the elements at risk in the area(s) of interest.

Exposure information should also be fit for purpose. Risk analysis tends to be most valuable when it communicates the physical damage, economic loss and quantity of casualties over a broad area of interest. It may not be necessary to account for every single element at risk within the area of interest, as this effort may consume valuable time and resources. Instead, a statistical expression of the exposure within an area of interest may be more achievable to develop and more practical to maintain into the future.

1.4.2 Participation of key stakeholders

Stakeholders in the development of exposure information can be categorised as either developers of the information, or end users of the information. End users need to be engaged throughout the development process to ensure the outputs are fit for purpose and suit the risk analysis needs. Ongoing engagement with end users is vital if exposure information is to be augmented in the future (e.g. to incorporate new types of exposure information or to support changes in risk analysis).

Development of exposure information requires a strong understanding of both the risk analysis requirements and the sources of data needed to develop the exposure information products. Exposure information is typically developed using a range of thematic data that the leading organisation does not develop and manage themselves. Expertise in each of the disciplines producing the input data may not be present in the leading organisation. Therefore, it is vital that the lead organisation:

- Develops a capability to understand and effectively apply each theme of information; and/or
- Engages the advice and guidance of the custodian or producer of data for each of the themes.

2 Background and Previous Work

2.1 Metropolitan Manila Earthquake Impact Reduction Study (MMEIRS) – Exposure Information

The Metro Manila Earthquake Impact Reduction Study (MMEIRS) was a project conducted in 2002-2004 by the Philippine Institute of Volcanology and Seismology (PHIVOLCS), the Metropolitan Manila Development Authority (MMDA) and the Japan International Cooperation Agency (JICA). Its objectives were:

1. To formulate a master plan for earthquake impact reduction for Metropolitan Manila; and
2. To carry out technology transfer to Philippine counterpart personnel of MMDA and PHIVOLCS in the course of the study.

A major output of the project is the generation and development of several important datasets. The data can be categorized as those derived from existing sources and new data which consists mainly of the generation of 1:5,000 scale mapping. Data derived from various sources included natural condition data, social condition data, buildings, public facilities, infrastructure and hazardous stocks. Natural conditions include rivers, contours and local geology. Road data included centerlines and attributes such as the road width. River data were also represented in terms of polygons and centerlines. Social conditions include administrative boundary data, census data, vacant land, informal settlers, existing land use classification and residential subdivision boundaries. Existing land use data were derived from LGUs or were derived from scenes of satellite imagery.

Meanwhile, building data including building footprints and building heights for those with four-stories and above were also developed. Building typology using basic National Statistics Office (NSO) wall and roof combinations were derived from the 2000 Census of Population and Housing. Landmarks were also included in the database. Infrastructure data included roads, water utility, power utility, sewer utility, telecommunications utility, railroads, bridges and flyovers. Hazardous stocks were also located, including gas stations, factories, laboratories and oil and gas depots. Public facilities data included hospitals, schools, police stations and fire stations.

Another main output of the MMEIRS project is topographic mapping which involved aerial photography, ground control leveling and digital mapping and orthophoto generation. This activity produced a 1:5000 scale base map for Metro Manila.

2.2 Pilot Earthquake Study for Iloilo City

The second attempt to produce earthquake risk maps was through the Earthquake Impact Pilot Study for Iloilo City. This project, also known as the QuiveR Project (Quick Inventory and Vulnerability Evaluation in REDAS) was a joint undertaking between PHIVOLCS and Geoscience Australia, with participation from the University of the Philippines Diliman Institute of Civil Engineering (UPD-ICE) and the regional offices of OCD, the Department of Science and Technology (DOST) and the LGU pilot site of Iloilo City.

In the Philippines, the smallest political unit is known as a barangay (or village). Statistical information is commonly reported at the barangay level, including population and housing information from the NSO. In the QuiveR Project the approach was to select three representative barangays representing purely residential, purely commercial and half commercial-half residential. Buildings in those three barangays were then surveyed as a means to elicit the statistical distribution of the building types. Statistical information from the 2000 Census of Population and Housing, along with tax assessment data from the Assessor's Office of Iloilo City were compared to the information from the building survey. A building typology of typical buildings constructed in the Philippines was developed by the UPD-ICE, using the HAZUS building typology as a starting point (Pacheco, et al., 2013).

The building typology study was the first attempt to categorize buildings in the Philippines. From the typology, the fragility curves were developed by the same group for the key building types found in Iloilo City. Most of the general concepts and strategies used in RAP were borne out of the QuiveR methodology.

2.3 Lessons learnt from previous work

In the previous work under MMEIRS, themes of exposure information were developed as separate datasets. In order to meet risk analysis requirements, these need to be harmonised into a single dataset containing all the required exposure attributes. Other issues arising from the MMEIRS data include:

1. The need to update and enhance the decade-old exposure database of Metro Manila derived using the MMEIRS data, which records a limited range of building types.
2. The spatial extent of the available data, wherein the LGUs adjacent to Metro Manila in Rizal Province require exposure information of the same standard as Metro Manila LGUs.

In the Iloilo earthquake pilot impact study, exposure information was generated at the barangay-level. In doing this, it is assumed that the exposure is evenly distributed across the barangay, and that the intensity of ground shaking is largely constant across the barangay. In reality, exposure may be distributed unevenly through the barangay, particularly if it is large in size, has a mixture of land uses or contains large areas where buildings are absent or uncommon (road corridors, waterways, water bodies, parks, reserves etc.).

The introduction of flood risk analysis requires a more detailed expression of exposure, as barangay level exposure is incompatible with the horizontal extent of inundation. The approach to use typical barangay types to elicit statistical information requires further enhancement using an approach that realistically distributes exposure to areas where development has occurred or is underway.

A further issue is the need to provide a database framework that support hazards other than earthquake and can be upscaled to incorporate new elements at risk in the future.

3 Data

3.1 Overview of exposure data development

3.1.1 Spatial data

Spatial data, also known as geospatial data or geographic information is the data or information that identifies the geographic location of features and boundaries on Earth. Features include natural, constructed/built and proposed or planning information that may or may not be visible on the earth. Spatial data is usually stored as coordinates and topology (shape), and is data that can be mapped and displayed in Geographic Information Systems (GIS). Spatial data consist predominately of two types, vector data (Figure 3.1) and raster data (Figure 3.2).

Vector data consist of points, line and polygons representing features.



Figure 3.1. Point, line and polygon representation of features.

Raster data uses a grid to cover the space and the value assigned to each cell (pixel) in the grid relates to generalised characteristic of the geographic feature at that cell location. A grid is a matrix of cells. Raster data could come from many sources such as aerial photographs, satellite imagery, digital pictures, scanned maps, or from the results of raster analyses tools/software.

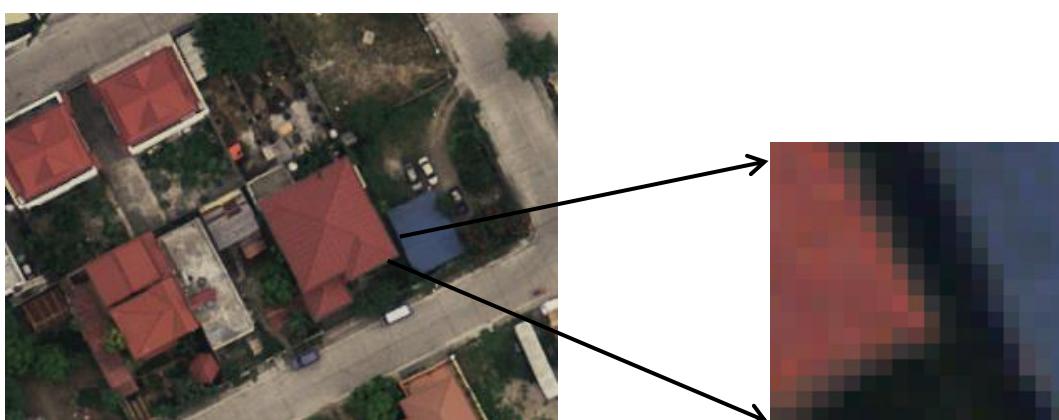


Figure 3.2. Raster representation of features.

3.1.1.1 Use of existing spatial data

A large majority of local and national agencies, industries and individuals capture and manage information needed for their day-to-day operations and business needs spatially.

The aim of the exposure database development project was to establish relationships and access to existing spatial datasets managed by data custodians. Numerous spatial datasets were made available by National Government agencies, Regional/ provincial government, Local Government Units and donor projects including MMEIRS, Resilience Project and READY Project.

The data made available was not necessarily usable in its existing form; datasets had to be assessed to determine their utility in the exposure database development.

3.1.1.2 Development of new spatial data

Where spatial data was not available for particular LGU's, new spatial data was captured and or derived from field surveys, aerial photography or utilising existing data to capture or derive required features or attributes. For example era of construction information was limited for most of the GMMA area. A remote sensing approach was used to capture a building development era period, from a series of temporal images.

3.1.2 Non-Spatial Data

The project was also able to make use of non-spatial data including survey/census and local building classification information. Non spatial data included survey tabular data, hard copy maps, household population and building statistics, and textual information which was either directly or indirectly used to develop spatial exposure information.

3.1.2.1 Use of existing non-spatial data

NSO provided information on household, population and structural information. UPD-ICE also provided building structural and classification information. In some cases non-spatial data could be made spatial by associating or linking the information to geographical area such as LGU boundaries. The non-spatial information could also be used to derive lookup tables to statistically apply particular attributes to spatial features.

3.2 Description of supporting information

Additional supporting information was also provided by a number of national and local government entities. This information was provided as either hard copy prints or soft copy scans sourced from documents detailing:

- Local planning and policy documentation;
- City profiles and historical information;
- Reports on quantities of:
 - Businesses;
 - Households;
 - Land use areas (such as subdivisions);

- Construction and development projects etc.

This information contained in this documentation is not easily harvested, largely due to the format in which the information is provided and the time and effort required to translate it to a digital format. However, the information can be helpful for developing an understanding of the exposure characteristics of specific areas or facility types. Some context of the urban landscape of an area may be derived from this information, which may be helpful for those involved in the exposure database development.

3.3 Data provided by National Government agencies

3.3.1 National Mapping and Resource Information Authority (NAMRIA)

3.3.1.1 *LiDAR derivatives*

Component 1 of the project involved the development of high resolution elevation data for GMMA. Following the collection of data from LiDAR (Light Detection and Ranging), numerous data derivatives were produced and made available. Two key outputs of relevance to exposure are the Digital Elevation Model (DEM) and Digital Surface Model (DSM). These datasets are available at 1 metre resolution across the coverage area. The DSM contains the heights above mean sea level derived from the ‘first surface return’ of the LiDAR (e.g. tops of buildings and trees), whilst the DEM depicts the height above sea level of the terrain minus the surface features (sometime referred to as the ‘bare Earth’ model). Other products are detailed in the report for Component 1.

3.3.1.2 *Aerial Imagery*

Around the same time as the collection of LiDAR data, 4 band aerial imagery (colour plus Infra-Red) was captured across the same coverage area. This imagery was made available in tiles of GeoTIFF (Georeferenced Tagged Image File Format) imagery and a seamless mosaic in ECW (Enhanced Compression Wavelet) image format.

3.3.1.3 *Features from Stereo-imager*

NAMRIA was also provided with the original images captured from the aerial survey mentioned in Chapter 3.3.1.2. This imagery was used to capture the three dimensional geometry of Potentially Wind Sensitive Structures, such as billboards, power transmission towers, broadcasting towers and other structures within the GMMA coverage area. This data was provided in the ESRI shapefile (.shp) format with Z (vertical) geometry.

3.3.1.4 *Historical aerial photography*

NAMRIA maintains an archive of aerial photography captured to support topographic mapping in the Philippines. From this archive, scanned copies of the aerial photography positives from missions over Metro Manila and surrounding areas in 1982 and 1992 were provided.

3.3.1.5 *Barangay Boundary data*

NAMRIA provided a number of versions of the barangay boundaries for LGUs in Metro Manila, Rizal Province and Laguna Province.

3.3.2 Philippine Institute of Volcanology and Seismology (PHIVOLCS)

3.3.2.1 Historical aerial photography

PHIVOLCS have access to an archive of aerial photography captured along the West Valley Fault since the 1960s. Photography captured in 1966 and 1982 was scanned and made available.

3.3.3 National Statistics Office (NSO)

3.3.3.1 Census of Population and Housing – 2000

The NSO provided PHIVOLCS with a copy of the Public User Files (PUFs) collated from the Philippines Census of Population and Housing in 2000. The PUFs contain demographic information for every household as well as descriptions of the construction material of the dwellings. A copy of the barangay boundaries for the whole of the Philippines, developed and maintained by NSO, was supplied with that data. A copy of the Enumerator's Manual, which is used to guide the collection of the information in the Census questionnaire, was also provided.

3.3.3.2 Census of Population and Housing – 2010

During the conduct of the project, the NSO was processing the data collected during the 2010 Census of Population and Housing. In April 2012, population totals for every barangay in the Philippines from the 2010 Census were released by the NSO.

3.3.4 Department of Education (DepEd)

From the Department of Education (DepEd), data on school enrolments and facilities available at schools in Taguig City for 2011 was provided to the project. Master lists of public elementary and secondary schools across the Philippines were also accessed from the Department's website.

3.3.5 Environmental Management Bureau (EMB)

A List of Registered Treatment/Storage/Disposal Facilities for Hazardous Wastes was sourced from the website of the Environmental Management Bureau (an agency under the Department of Environment and Natural Resources).

3.3.6 National Telecommunications Corporation (NTC)

The location of cellular phone base stations, or cell sites, was made available by the National Telecommunications Corporation (NTC). A table of locations, indicating the operator name and street address, was supplied.

3.4 Data provided by Regional/Provincial Governments

3.4.1 Metropolitan Manila Development Authority (MMDA)

3.4.1.1 Air Quality Study 2006

In 2006, MMDA conducted a study about air quality in Metro Manila. One of the outputs of the study was a very comprehensive set of spatial data for all LGUs in Metro Manila, covering a variety of themes and recording some rich attribution of the built environment. This data was made available to the project as a set of datasets organised by clusters of LGUs. Table 3.1 details the clustering of the data and the types of datasets provided by MMDA.

Table 3.1. Digital spatial data provided by MMDA from the 2006 Air Quality Study.

City/Municipality	Data provided	Description of data
Metropolitan Manila *	Building Footprint	Building footprint as of 2005 including the type of building, status, street etc.
CAMANAVA	Clustering of cities data for: Pasig City, Mandaluyong City, Marikina City and San Juan	A series of GIS shape files with bank, building footprints, barangay boundaries/hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, police stations, post office, river, road, school and traffic signals.
MAPA	Clustering of cities data for: Manila City, Pasay City	A series of GIS shape files with bank, building footprints, barangay boundaries/hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, pier ports police stations, post office, river, road, school and traffic signals
MATAPAT	Clustering of cities data for: Makati City, Taguig City, Pateros	A series of GIS shape files with bank, building footprints, barangay boundaries/hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, police stations, post office, river, road, school and traffic signals.
MUNTIPARLAS	Clustering of cities data for: Muntinlupa City, Parañaque City, Las Piñas City	A series of GIS shape files with bank, building footprints, barangay boundaries/hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, police stations, post office, river, road, school and traffic signals.
PAMAMARISAN	Clustering of cities data for: Pasig City, Mandaluyong City, Marikina City, San Juan.	A series of GIS shape files with bank, building footprints, barangay boundaries/hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, police stations, post office, river, road, school and traffic signals.
QUEZON CITY	Clustering of cities data for: Quezon City	A series of GIS shape files with bank, building footprints, barangay boundaries/

		hall/outposts, bridges, bus stations, cemetery, church, contours, fire station, foot bridge, gas stations, hospital, police stations, post office, river, road, school and traffic signals.
Metropolitan Manila	Land use	Land use as of 2006
Metropolitan Manila	Rivers	Consists of the major rivers and water bodies as polygon shape files
*Area of Interest as defined by MMDA		

3.5 Data provided by Local Government Units

The data provided by LGU for the project is to inform the development of spatial data inputs for the LGUs and, where possible, provide information on building types that can be used later for statistically representing the mix of buildings in various land uses. Many of these datasets are used as evidence for the table top land use mapping and may require verification through survey. Table 3.2 is a summary of the data and information provided by the LGUs.

Table 3.2. Digital spatial data and soft copy documents provided by LGUs.

City/Municipality	Data provided	Description of data
Taguig City	Barangay boundaries, Taguig City Integrated Survey (TCIS) data, documentation	Barangay boundaries in GIS format (.shp), responses to selected questions in the TCIS, numerous documents profiling the geography of city and range of services provided by the City and national government.
Pasig City	Assessor's Data, Pasig City GIS Files, various maps (soft copy, not georeferenced)	Series of GIS files with barangay boundaries, land use maps, zoning maps, parcel maps and barangay level parcel maps (.shp). Series of soft copy maps with barangay boundaries, land use and zoning map (.jpg).
Marikina City	Barangay boundaries and land use data	Barangay boundaries and existing land use in GIS format (.shp).
Cainta Municipality	Cainta GIS ArcView 2007 Data	Series of GIS data with barangay and municipal boundaries, buildings, subdivisions, contours, landmarks, natural conditions, parcel of lands and transportation network in GIS format (.shp). Series of soft copy maps including Administrative map, Index Map, Barangay Level maps, Elevation Map, River System Map, Road Network Map, Parcel map, barangay level parcel maps, Building Use map, Population Map, Subdivision Maps, and with location of critical facilities (.jpg).
Pateros Municipality	Land parcels	Series of land parcels per barangay in AutoCAD format (.dwg).
Quezon City	Assessor's Data, Land Parcels, Actual Land Use	Copy of assessment database tables for Land and Improvements (including buildings and machinery). Some

		classifications of buildings are found in the attribute table of the QC Land Parcels data (.shp).
Makati City	No data provided	n/a
Mandaluyong City	Series of Maps Land parcels maps	Series of soft copy maps including a base map, land use map, zoning maps, geologic maps, hazard maps, barangay level of actual land use maps and location of critical facilities (all in .jpg format). Land parcels per barangay with actual land use in GIS format (.shp).
San Juan City	San Juan City Zoning Map	Zoning map of San Juan City in AutoCAD format (.dwg).
Caloocan City	No data provided	n/a
Valenzuela City	No data provided	n/a
Malabon City	No data provided	n/a
Navotas City	Navotas Zoning Map	Image files of the Navotas City Zoning Map with 1:10,000 scale (.jpg).
Manila City	No data provided	n/a
Pasay City	No data provided	n/a
Parañaque City	Metes & Bounds of Parañaque Parañaque City 2007 Zoning Map	Textual description of the Metes and Bounds ¹ of the territorial boundary of Parañaque City (in .pdf format) and a soft copy of the Parañaque City Zoning Map in 2007 (.jpg).
Las Piñas City	No data provided	n/a
Muntinlupa City	No data provided	n/a
Antipolo City	No data provided	n/a
Taytay Municipality	No data provided	n/a
Angono Municipality	No data provided	n/a
San Mateo Municipality	No data provided	n/a
Rodriguez Municipality	No data provided	n/a

1. Metes and Bounds are legal descriptions of the size and shape of land.

3.6 Data sourced from other donor projects

3.6.1 MMEIRS – spatial data

Many individual feature classes from the MMEIRS dataset were used for the RAP's exposure database or served as guide in when the land use mapping activity was conducted (as detailed in Chapter 2.1).

3.6.2 Resilience Project

From the three pilot LGUs of the Resilience Project, building survey for select barangays were done in coordination with the pilot LGUs namely Marikina, Pasig and Cainta in Rizal Province. Unfortunately, the data collected had remained incomplete till the end of the project but Marikina, at least, had promised to continue the survey and building classification for enhancement of the exposure database.

3.6.3 READY Project

For all of the LGUs covered by GMMA READY Project, standard data requests, specifically data from the Assessor's Office, were issued early on during the project. By the time the exposure database was being processed, only Quezon City shared the Improvements data from their database for use by the project.

3.7 Open Source Data and Information

3.7.1 OpenStreetMap

OpenStreetMap is an online sourced database of geographic information, with data captured and created by a worldwide community of volunteer contributors. It is an open license (Creative Commons Attribution Share-Alike, or CC-BY-SA), wherein anyone can use the data for any purposes, even for commercial use, provided the contributors are acknowledged and the resulting data is made available with the same licensing conditions. It is also one of the most affordable ways to start creating detailed and up-to-date maps.

Features can be extracted from the OpenStreetMap server and downloaded by a user in the .osm format. Data in this format can be opened immediately by some GIS software applications such as QGIS, or can be converted to other data formats in applications such as FME.



Figure 3.3. The homepage of openstreetmap.org.ph.

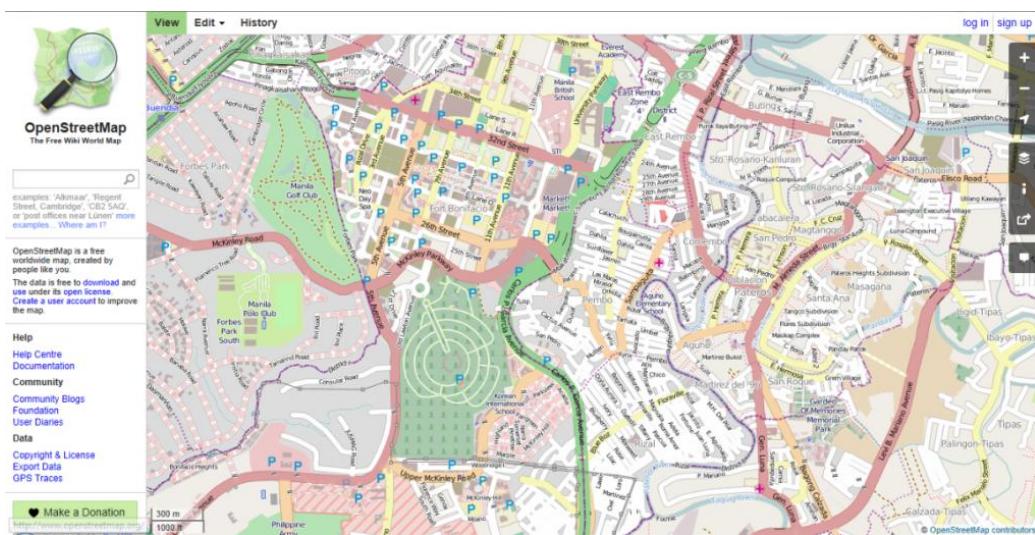


Figure 3.4. The detail of OpenStreetMap features for portions of Taguig, Makati and Pateros.

3.7.2 WikiMapia

As with OpenStreetMap, WikiMapia is an online mapping service wherein users can describe any place on Earth or browse the map to discover places marked by other users. In WikiMapia, users can locate residential houses, office buildings, restaurants, parks, villages and many others. The extent and descriptions captured by users can help to guide the updating of land use mapping for each of the municipalities. Wikimapia has made its data content available in several formats for non-commercial use, though the data is not downloaded for use in a GIS application. Wikimapia claims to offer all of its data for sharing, recasting, transforming or adapting in any form recognizably derived from the original for any use. WikiMapia's geo-located data is largely derived from aerial or satellite imagery available from Google Maps™, though it also allows features to be created and viewed on other backdrops (such as rendered OpenStreetMap data and Bing imagery).

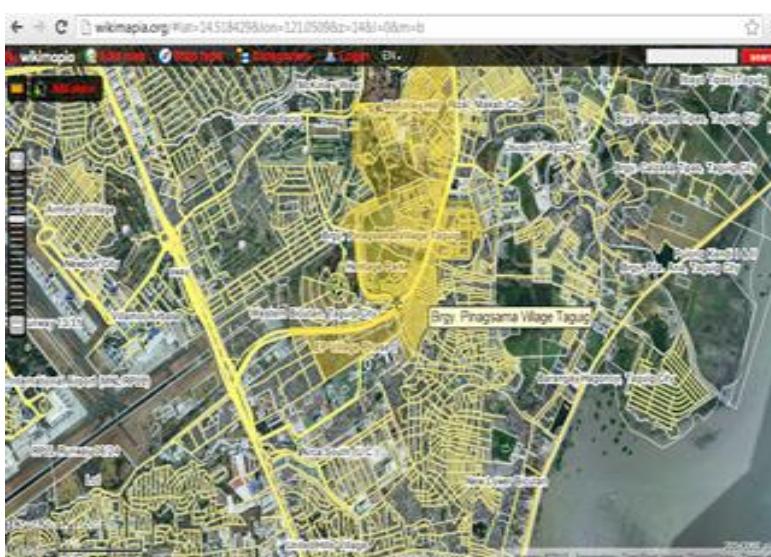


Figure 3.5. Screen capture of Wikimapia, showing the Google Maps™ backdrop and user defined areas (bounded by grey lines).

3.7.3 Panoramio

Panoramio is a photo sharing site with its own goal and identity. Google Earth™ and Google Maps™ are simply showing the photos from Panoramio, and can do so because geo tagging is one of the core features of Panoramio. Usually, the typical photos that are welcome in Panoramio are architectural building structures, city and street photos and landscape photos.

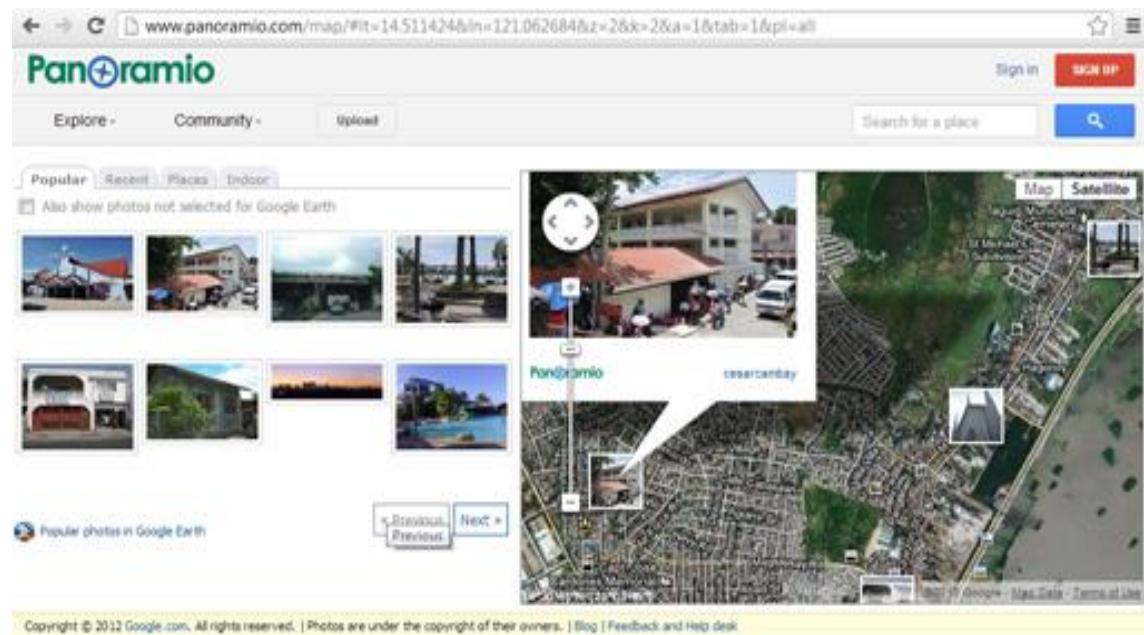


Figure 3.6. Screen capture of a photo query in Panoramio, showing the Google Maps™ backdrop on the right hand side, geotagged photos contributed by users on the left hand side, and an enlargement of a photograph in the centre.

3.8 Data available via Geoscience Australia

3.8.1 Landsat time-series

Through agreements with the US Geological Survey (USGS) under the International Forest Carbon Initiative (IFCI), Geoscience Australia was able access to the Landsat satellite imagery archive. The Landsat program involved the launching of eight earth observation missions, each designed for the study and monitoring of Earth's land masses. Landsat satellites acquire multispectral imagery of the Earth's surface on a repeating polar, sun-synchronous orbit (USGS, 2013). The archive of scenes from the Multi Spectral Scanner (MSS), Thematic Mapper and Enhanced Thematic Mapper were perused for suitable scenes over the Greater Metro Manila Area that would assist with mapping the sequence of development from 1972 onwards.

3.9 Data collected by exposure project team

Geo Tagged Video Capture Tool, or Mio Moov DR03, is a recording device that is available on the commercial market allowing easy installation and can be used as a tool in building assessment. It uses Micro SD card (class 6 or above) with a maximum capacity of 32GB and uses two AAA batteries,

and a car charger with splitter or cigarette lighter. This video capture tool has three color LED lights to indicate the operation mode, and there is also a built-in microphone for recording audio during operation. The system's file size for every video file is 175 MB with a length of 10 minutes. Video imagery is recorded in VGA formation and stored in the AVI file type. Also supplied with the camera is a software application that allows playback of the video data with the GPS location of the camera, which is projected on a window displaying Google Maps™. This allows users to easily and accurately correlate video imagery with geographic location and other travel information.

In conducting a building survey, two video capture tools were attached to the windshield of a car using a mounting frame; one is attached at the left side and the other one is attached at the right side of the car to collect the building characteristics and building location. An adjustment to the camera angle is made to get the best view according to the height of the buildings. Prior to a survey, there is a need to prepare a printed map of the area being survey so that the path can be planned and monitored. At the completion of the survey, the video files were interpreted by engineers.



Figure 3.7. Mio Moov DR03 cameras set up for video capture of building facades. One camera is mounted on the left hand side of the vehicle, positioned to capture facades on the right hand side of the vehicle. Another camera is mounted on the right hand side and positioned to capture facades on the opposite side.

3.9.1 Interpretation of Panoramio images

Imagery from Panoramio was used to develop statistics on the mixture of building types found in selected land uses where imagery was not otherwise available.

4 Methods

4.1 Framework for Exposure Information Development

There are two fundamental approaches to exposure information development, and a framework document for guiding the information development can be developed to guide these activities. Please refer to the Exposure Database Framework document attached to this report for specific details of the framework for the project.

4.1.1 Area-Based Approach option

The Area-Based Approach to exposure information development involves summarising the essential exposure characteristics for a defined polygonal area. Each polygon would be defined by the spatial extent of its land use classification and the typical mix of buildings for that land use would be quantified using either a count of the buildings or the floor area of the buildings. Information on the mix of building types may come from a number of sources, depending on the availability of input data on buildings for that land use. This approach is suitable for areas where there are many exposed elements within a well-defined area (e.g. buildings) for which an aggregated expression of exposure can be recorded.

The Area-Based Approach was selected for development of exposure information of buildings and population in GMMA. Building on the experiences from the Iloilo pilot earthquake impact study, which used a low resolution form of the Area-Based Approach, a framework for classifying land use was developed early in the project. The decisions about management of additional exposure attributes were included this documentation later in the project.

4.1.2 Feature-Based Approach option

In the Feature-Based Approach, individual elements are located as either a point, line or polygon features (depending on the type of feature). Exposure attributes specific to or typical of that feature are also recorded. This approach is suitable for situations requiring accurate feature locations and/or extents of the exposed elements. For this project, the Feature-Based Approach was adopted for managing information about billboards.

4.2 Area Based Approach - spatial data processes

4.2.1 Area of Interest definition

4.2.1.1 Input data

The Area of Interest (AOI) for the project needs to be defined in order to confine the risk analysis to an agreed spatial extent. For this project the AOI was defined by the limits of the LiDAR data and the provinces to be covered in the project. To that end, the Area of Interest became the whole of Metro

Manila and the areas of Rizal Province covered by the LiDAR data. See Figure A.1 in Appendix A for the Area of Interest.

The boundaries of cities and municipalities, which can also be considered to be AOIs, became available from the same sources as the barangay boundaries (see Chapter 4.2.2.1).

4.2.1.2 Assumptions and Issues

The extent of the areas for LiDAR and aerial imagery capture were defined by requirements of the hazard modelling, specifically for earthquake and flood. These requirements have resulted in an extent that does not always follow recognised administrative or political boundaries. The only area in which there is conformance is along part of the northern boundary of Metro Manila (adjacent the boundary with Bulacan Province). Outside of Metro Manila, the boundary is within a distance of the lakeshore or coastline, and in Rizal Province the boundary follows an approximation of the watershed for the flood modelling. This boundary cuts across known LGU and barangay boundaries. This has implications further in the project, when risk analysis results are reported at a barangay level aggregation.

4.2.2 Barangay Boundary definition

4.2.2.1 Input data

The early barangay boundary data available early in the project included the versions supplied by the NSO (for the 2000 Census) and from the MMEIRS spatial data directory. During the focussed work on Taguig City, the barangay boundaries for Taguig were provided by the City's Planning Office. These boundaries were used in the first stage of the data development. Soon after the commencement of Stage 2, MMDA provided another version of barangay boundaries in their datasets from the 2006 Air Quality Study. As individual LGUs were invited to participate in the project and provide data, several LGUs provided a copy (or sometimes several versions) of the boundaries from their repositories. NAMRIA also provided barangay boundary data, developed during the READY Project.

4.2.2.2 Assumptions and Issues

Barangay extents are important for exposure information development in the Philippines, as there are many sets of statistical information that exist at the barangay level. If this statistical information is realistically disaggregated to smaller polygons within the barangay, the quality of the boundary location becomes important.

An assumption made early in the data development phase of the project is that barangay boundaries are fixed and well understood in the National Capital Region and surrounds. As various versions became available, checks against other spatial data and geospatial imagery revealed the boundaries did not always align well to visible landmarks or features (such as road centrelines), and in some instances the boundaries were noticeably distorted.

When compared against one another, barangay boundaries sourced from various data custodians revealed some significant discrepancies between the positions of the boundaries. In many cases, small barangays suffered the least from conflicting boundaries, whereas larger barangays tended to have more conflicting expressions of their extent. It became apparent that some areas of GMMA were disputed by adjacent LGUs and that different barangay datasets reflected different understandings of the boundary. These issues made it difficult to select the most appropriate boundary to use in the data development process.

4.2.3 Non-Developable Land Area definition

4.2.3.1 Public Access Corridors

Public Access Corridors, such as road and street corridors and railway land, are important for defining areas where buildings and residential population not typically found. The spatial data required for this is best sourced from cadastral datasets, where the boundary between the road and titled land is accurately defined. In the absence of cadastral data, a surrogate for the road boundary is the edge of the formed road.

Spatial data for the edge of the formed roads was available as polyline shapefiles from MMEIRS and polygon datasets the MMA Air Quality Study data. Some LGUs also provided this data. Where road corridor data was not available from existing sources, development of the polygons from manual data capture was undertaken.

4.2.3.2 Water Areas

Since water areas, such as waterways (rivers, floodways etc.) and water bodies (dams, lakes, sea etc.) are places with minimal or no habitation and buildings, it is important to define the extent of these areas. Spatial data for the extent of waterways and water bodies was available from several of the sources mentioned earlier.

4.2.3.3 Assumptions and Issues

In using the assumption that the edge of the formed road was similar to the road boundary, there are instances where the Public Access Corridors are quite narrow. The road polygon data sometimes shows the edge of formed roads within titled land, such as an access road traversing a large compound or facility. When compared to recent aerial imagery, the pattern of roads in some areas does not match the imagery. This is often seen where new developments have occurred on vacant land, or where infrastructure has been developed and has required the removal of buildings. These artefacts require the data to be carefully checked and edited before it can be used further in the data development process. These Non-Developable Land Areas also need to extend only to the AOI boundary. The detail of the process for creating these areas is documented in the Exposure Database Development Manual.

4.2.4 Developable Land Areas definition

4.2.4.1 Assumptions and Issues

Developable Land Areas are essentially those areas that are not Public Access Corridors or Water Areas. For the data development for each LGU, the Non-Developable Land Areas were simply erased from the AOI to generate the Developable Land Areas. The process for this is documented in the Exposure Database Development Manual. The process assumes that the Non-Developable Land Areas data is free from topological errors.

4.2.5 Land Use Classification

4.2.5.1 Available Input and Background Data

Once the hierarchy of land use classification had been optimised (see the Exposure Database Framework documentation), it was possible to use the schema to classify the actual use of

Developable Land Areas in each LGU. There are many sources of evidence for the actual land use, and several are readily available from the data provided by various organisations. Table 4.1 explains some of the useful data available to inform land use classification.

Table 4.1. Data and other resources that assisted with land use mapping.

Source	Useful dataset
NAMRIA	Aerial imagery Topographic mapping data
MMDA	Building footprint data – attributes of building occupancy Landmarks Location of critical facilities (hospitals, schools etc.)
MMEIRS	Location of hazardous facilities (gas stations, processing plants etc.) Location of critical facilities (hospitals, schools etc.)
LGUs	Attributes of land parcels Zoning maps Actual land use maps Landmarks
OpenStreetMap	Amenities layer Building layer Land use layer
Wikimapia	Interpretation of places tagged by community users

4.2.5.2 Desktop Capture of Land Use

The process to capture land use on the desktop involves modifying the attributes of the Developable Land Areas dataset to record the operator's interpretation of the actual use of each polygon. Where the polygon contains two or more uses, the polygon is split along the boundaries between the different land uses. Aerial imagery is used as a backdrop for this activity, as it helps to guide the operator on the extent of the different land uses. The operator records both the Level 5 and Level 4 classification of land use in the attribute table, along with the original source of the information used to classify the land. The detailed technical process of capturing the actual land use is documented in the Exposure Database Development Manual.

4.2.5.3 Quality Assurance and Quality Control

At the completion of the land use classification process, a series of quality assurance and quality control (QA/QC) processes are performed. These are done to check the validity of entries and to address data entry errors. The process is also designed to check for data handling errors, such as inadvertent creation of duplicate polygons or other topological errors.

The detailed process of checking the land use mapping is documented in the Exposure Database Development Manual.

4.2.5.4 Validation of mapping

Since land use is the basis for many of the subsequent processes in the exposure information development, accuracy of the mapping is crucial. Whilst the evidence used to classify the land use might be readily available, there is not always certainty about its currency. The validation of the land use mapping was carried to ensure that the data is free of major classification errors.

Much of the validation was carried out with the assistance of LGU officials, who checked the maps against their own information or local knowledge and advised on any corrections to be made. In some cases, validation took place in the field using printed maps and a visual inspection of particular areas.

4.2.5.5 Assumptions and Issues

The interpretation of available information and assigning land use class is subjective, and may be prone to errors of misclassification. The validation of the mapping is an important step, but it does not guarantee that errors will be removed. Errors may persist or be exacerbated if those involved in the validation are not familiar with or have difficulty with interpreting maps, aerial imagery and/or the land use classification schema.

4.2.6 Building Geometry modelling

Reliable and consistent information on buildings is critical for the development of exposure information. In an exposure database, attributes of buildings that are needed to support risk analysis include:

- Building location, expressed as either points or polygons;
- Horizontal extent (footprint shape and area expressed in m²); and
- Vertical extent (number of storeys and floor area expressed in m²).

Building footprint datasets, usually developed and maintained as polygon datasets, immediately provide two of the three components described above. The vertical extent data normally requires knowledge of the height of individual buildings. The lack of reliable data about the floor area of buildings can create a large gap in the ability to develop quality exposure information.

Various building footprint datasets were identified during the development of exposure information, the most significant of these being the data provided from the MMDA 2006 Air Quality Study. However, this data was available for Metro Manila LGUs only. To ensure that the floor area of buildings could be calculated for all buildings within the coverage areas, alternative data would be needed.

4.2.6.1 Opportunities from Component 1 outputs

LiDAR data provides a unique opportunity to understand the characteristics of natural and artificial features on the Earth's surface. Some of the major challenges with utilising LiDAR data are the size of the digital point cloud data (often billions of individual data points), the complexity of the data and the ability (or otherwise) to manage and analyse the data.

As well as the capture and delivery of LiDAR point cloud data, several derivative datasets were produced by Component 1. Key derivative datasets include the Digital Elevation Model (DEM) and the Digital Surface Model (DSM). Both datasets were generated with a horizontal resolution of 1 metre, making them ideal for high resolution spatial analysis. The DEM data records the mean of the ground elevation above sea level within each cell. The DSM generally stores the mean of the highest elevation of first return LiDAR within each cell. When the datasets are spatially coincident, the difference between the cell values for the DSM and DEM will yield the height of features above the ground at any location in the dataset.

The aerial imagery accompanying the LiDAR data from Component 1 was delivered as a 4-band product, consisting of 3 colour bands and one for Infra-Red. This provides a very good opportunity to

calculate the Normalised Difference Vegetation Index (NDVI), an indicator of the health of vegetation. By specifying the range in which vegetation is present in the output of an NDVI calculation, it is possible to isolate vegetated areas. By masking vegetated areas, it is possible to determine artificial elevated areas.

Since the surface data across the top surface of buildings can be isolated, this data can be combined with other spatial data (such as land use) and knowledge about the vertical separation between floors to calculate important attributes that can add value to exposure information.

These opportunities were the basis of developing a Building Geometry Model, which is a series of spatial analysis processes that estimate building footprint and floor area information from LiDAR and aerial imagery data.

4.2.6.2 Building Geometry Model development

The Building Geometry Model evolved through recognition of:

1. Challenges associated with acquiring and using building footprint data that may be inaccurate, incomplete and/or out-of-date or; and
2. Opportunities to combine several spatial datasets that are prepared to support the creation of exposure information. These include:
 - a. LiDAR DEM and DSM derivatives;
 - b. Vegetation extents, estimated from 4-band aerial imagery;
 - c. A bounding Area of Interest (usually a LGU extent);
 - d. Non-Developable Land Areas (road and rail corridors);
 - e. Water Areas (natural and artificial);
 - f. Developable Areas (the removal of Non-Developable Land and Water areas); and
 - g. Land Use (Developable Areas divided into actual land use classifications).

Whilst the spatial analysis processes available in ArcGIS can easily consume and utilise these datasets to estimate the extent and heights across buildings, additional processes are required to convert the heights to an integer number of storeys. This requires information about the vertical distance between floors of buildings, also referred to as the Inter-Storey Height. Figure 4.1 illustrates the Inter-Storey Height of a hypothetical two storey building.

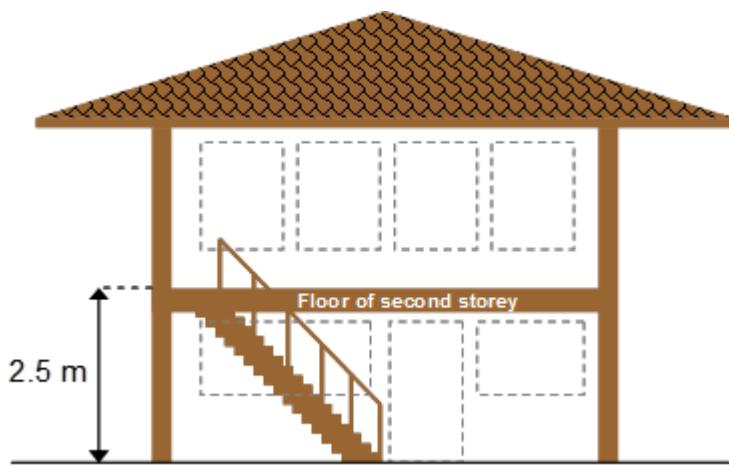


Figure 4.1. A diagram showing the measurement of the Inter-Storey Height of a two storey building.

The construction characteristics of buildings, including the Inter-Storey Height, will vary depending upon the intended usage of the building. Some buildings are designed to have higher ceilings than others, and some buildings will have very high ceilings but will be entirely a one storey building. The land use on which the building is located is a good indicator of the Inter-Storey Heights.

Figure 4.2 illustrates how buildings in different land uses can influence the estimate of the number of storeys.

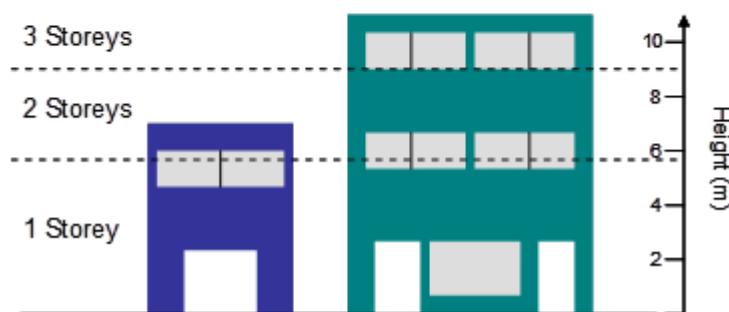
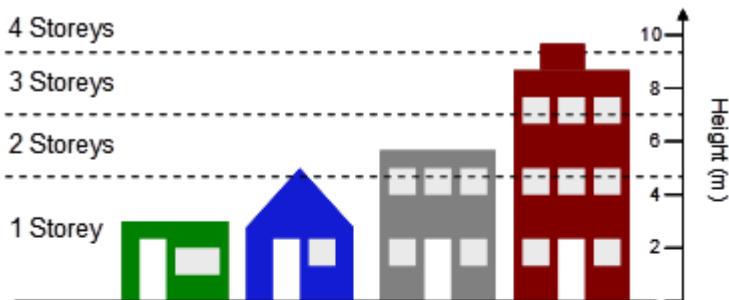


Figure 4.2. Variations in Inter-Storey Heights of buildings in different land use classes. The upper diagram shows the Inter-Storey Heights between floors of buildings in one land use, and the lower diagram shows those heights for a different land use, where the floor to ceiling heights are much larger.

The analysis routine enables the height value of each extracted cell to be assessed against a Lookup Table with the Inter-Storey Height appropriate to the land use in which the building resides. The

lookup table for Inter-Storey Heights was developed through UPD-ICE engineering advice, and values were suggested through knowledge of the construction trends for the various land uses. A table summarising the Inter-Storey Heights used in the analysis of buildings for this project is shown in Appendix E.

Ultimately, the process aims to provide every cell in the dataset with an integer number of storeys. For each cell, the floor area becomes a product of the number of storeys and the size of the cell. By calculating the statistics of the cell values within each land use polygon, it is then possible to estimate the total floor area of the buildings within that same polygon. This floor area information is then used for quantifying the exposure due to building types across the project area.

The model was originally conceived as a stand-alone manual process, using tools in the ESRI ArcGIS Toolbox for performing the calculations. Some calculations would require high performance desktop processing power and large hard drive capacity. These requirements, and limitations of the ArcGIS geoprocessing environment, meant that processing large geographic areas may not be possible.

The process was likely to produce large intermediate datasets that may not be effectively handled in the ArcGIS desktop environment. For these reasons, an approach that utilised loop functions to perform the more complex calculations on individual tiles of raster data (1km x 1km) was developed. The Python programming language was adopted for the sequencing of geoprocessing and data management operations. To simplify the execution of the calculations, particularly for entry-level users of GIS, a Graphic User Interface (GUI) was also developed to control the processing.

4.2.6.3 Process description

The Building Geometry Model process follows these steps:

1. The user defines the location of key input data:
 - a. an Area of Interest (designated from a polygon feature class)
 - b. Digital Elevation Model tiles in ESRI GRID format (directory)
 - c. Digital Surface Model tiles in ESRI GRID format (directory)
 - d. 4-band aerial imagery tiles in GeoTIFF format (directory)
 - e. Non-Developable Land Areas dataset (polygon shapefile)
 - f. Water Areas dataset (polygon shapefile)
 - g. Land Use polygon dataset (polygon shapefile)
 - h. Inter-Storey Height Lookup Table (in Microsoft™ Excel format);
2. User defines parameters for:
 - a. Minimum height of buildings (default is 2 metres);
 - b. Threshold NDVI values (to restrict designation of vegetation);
3. User defines the output location for all intermediate and final datasets;
4. The model then performs the following operations:
 - a. Difference between DEM and DSM is calculated per tile;
 - b. NDVI is calculated per tile;
5. Outputs of Step 4a are mosaicked to a new raster dataset;

6. Outputs of Step 4b are mosaicked to a new raster dataset;
7. Cells representing vegetation from the NDVI mosaic are extracted;
8. Data from Step 7 is reclassified to a constant value of 9999 (mask value);
9. Non-Developable Land Areas and Water Areas are converted to raster;
10. Outputs from Step 9 are reclassified to a constant value of 9999;
11. All raster masks are mosaiced into a single mask raster;
12. Mask areas defined in output from Step 11 are used to eliminate data from output of DSM-DEM mosaic;
13. Result of Step 12 undergoes filtering to remove isolated cells and small clumps of cells;
14. Data representing footprint of buildings and heights across tops of buildings (in metres above ground) is generated;
15. Height data from Step 14 is fused to original DEM mosaic;
16. A hillshading effect is calculated for the result of Step 15;
17. Looping through each land use class present in the Land Use data, cells falling within a particular land use are reclassified from height in metres to an integer number of storeys, using the Inter-Storey Height Lookup Table;
18. Results of each iteration of the loop are mosaiced to a new raster;
19. Output from Step 1 undergoes filtering to ‘smooth’ data and remove isolated cell values; and
20. Statistics for the quantity and distribution of cell values are calculated for each land use polygon.

The result of Step 20 is then used in subsequent processing in the compilation phase of the exposure information development. The images in the following table show examples of the sequence of intermediate and final outputs.

Table 4.3. Intermediate and final outputs from the Building Geometry Model processing.

Example of data	Filename	Description
	No specific file name	Mosaic of tiled 4-band aerial imagery in GeoTIFF format.

Example of data	Filename	Description
 A grayscale mosaic of a residential area showing building footprints and streets. A color bar at the bottom left indicates height values from Low: 1.83 to High: 76.67.	No specific file name	Mosaic of tiled raster datasets derived from LiDAR point cloud (first return surface).
 A grayscale mosaic of a residential area showing a smoother surface compared to the first one. A color bar at the bottom left indicates height values from Low: 1.8 to High: 5.82.	No specific file name	Mosaic of tiled raster datasets derived from LiDAR point cloud ('bare earth' model).
 A grayscale mosaic of a residential area showing the difference between the DSM and DEM mosaics. A color bar at the bottom left indicates height values from Low: -0.12 to High: 72.75.	No specific file name	Subtraction of DEM mosaic from DSM mosaic.
 A color-coded map of the same residential area showing elevation differences. The map uses a color scale from blue (Low: 2) to red (High: 186.61). Specific buildings are highlighted in blue and yellow.	s3_height_ext	Result of applying minimum height threshold on subtraction of DEM from DSM.

Example of data	Filename	Description
	No specific file name	Definition of Non-Developable Land Areas (orange) and Water Areas (blue). These areas are pre-defined polygon features and are converted to raster during processing and set to 9999.
	s3_ndvi_masac	Calculation of Normalised Difference Vegetation Index (NDVI), derived from Red and Infra-Red bands of aerial imagery. In this example, green represents areas of strong vegetation health, and red areas represent poor health or no vegetation.
	s4_veg_mask	Result of applying a threshold to the NDVI to estimate vegetation at any height above ground. All cell values are set to 9999.
	No specific file name	Result of combining all masks into a single raster mask (black areas).

Example of data	Filename	Description
	s8_ht_1000div	Result of eliminating cells that fall within the mask. Cells now represent heights (in metres) across tops of buildings.
	s10_dem_bldg	Result of fusion of buildings extraction (s8_ht_1000div) and the DEM mosaic. The resultant dataset shows the elevation of either the terrain or top surface of buildings.
	s11_bldht_shd	Calculation of hillshade effect on fusion of buildings and DEM (s10_dem_bldg). Example shows area illuminated at an azimuth of 90° and zenith angle of 45° (approximating the mid-morning illumination of the area).
	No specific file name	Land uses, defined as polygon features prior to running of model.

Example of data	Filename	Description
	s12_lu_mosaic	Conversion of cell heights (m) to number of storeys. The integer number of storeys for each cell from s8_ht_1000div is calculated based on the cell's membership to a land use class and the reclassification of the cell value based on a corresponding range in the Inter-Storey Heights Look Up Table.

4.2.6.4 Assumptions and issues

The assumptions that have been made in the development of the Building Geometry Model include:

- All inputs are available in the same projected coordinate system;
- DEM and DSM data have been generated with sufficient vertical accuracy;
- 4-band aerial imagery is available for the same spatial extents as DEM and DSM data;
- Aerial imagery is cloud-free and minimal variations in contrast and illumination;
- Input polygon data accurately defines the extent of developable land and the extent of land uses (e.g. buildings are not bisected by land use boundaries);
- Actual land use has been accurately classified;
- The horizontal extent of the land use has been accurately captured;
- The slope of the DEM within building extents is equal or close to 0 (as per the slope of a building's foundation);
- Detected buildings are all constructed on the ground (i.e. there is little or no elevation of the building's ground floor from the underlying terrain); and
- Inter-storey heights stored in the lookup table are realistic.

In the case of the Greater Metro Manila Area, some artefacts have been encountered with the derivation of building information using the Building Geometry Model. These include:

- Some water areas (particularly large aquaculture ponds) have unusual DSM values and may present as buildings;
- Variations in the illumination of aerial imagery have resulted in some vegetation areas being excluded from masking, and hence being registered as buildings;
- Some buildings with blue or dark green roof cladding have been detected as vegetation and hence included in the vegetation mask;
- Some large structures and items that have not been masked (such as large transmission towers and others) are being detected as buildings and contribute to the floor area statistics;
- Some structures attached to buildings but not actually part of the building (e.g. awnings, verandahs, covered walkways) are being detected as buildings;
- Some mobile features (such as shipping containers and aircraft) are detected as buildings, as these are not currently excluded from the computations;

- Variations in height across the top of buildings may be experienced due to roof-top furniture (e.g. air conditioning units, antennae, awnings) – see examples in Figure 4.4; and
- Unusual classification of land use and occasional geometry errors in some polygon features have resulted in unexpected building statistics.

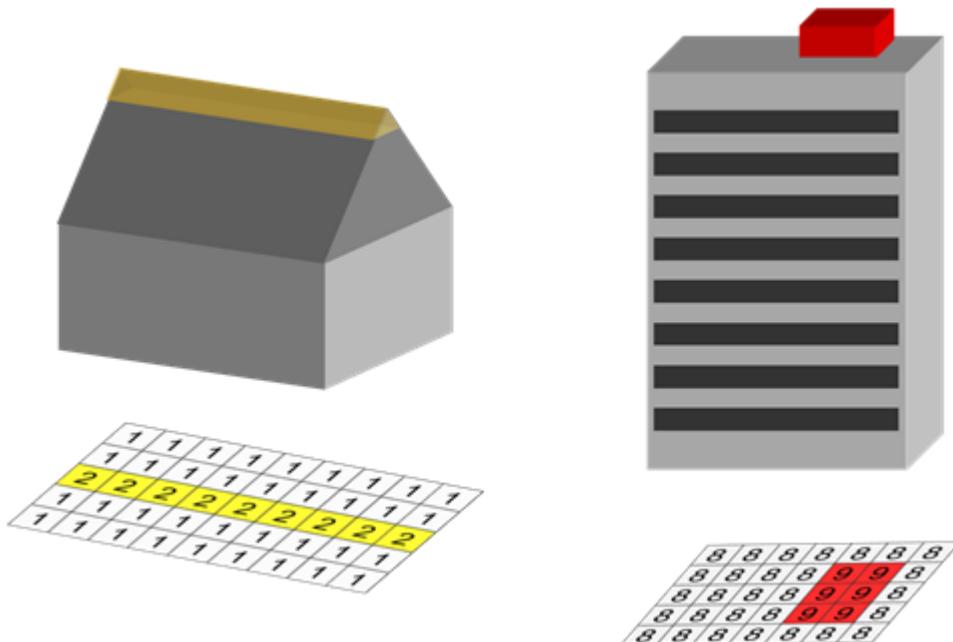


Figure 4.4. Example of increased floor area estimation due to peaks in roofs and rooftop attachments.

Some of these artefacts cannot be controlled, due to the underlying LiDAR derivatives and meteorological conditions at the time of imagery capture. In cases where structures and large items are being included as buildings, these can be treated by creating additional masks for those features or areas. Geometry errors and classification of land use can be attended to in earlier exposure data development processes. Overall, the artefacts should not be contributing to a substantial over-estimate or under-estimate in floor area across the project extents.

In some buildings, such as large commercial establishments, the Inter-Storey Height for the ground floor (and second storey) may be greater than the height for upper levels of the building. There may also be variations within the upper levels, especially if Penthouse floors or service floors are present. This may result in some differences between the estimated total floor area from the Building Geometry Model and the actual floor area for individual buildings.

The Building Geometry Model cannot account for voids in the floor plans of buildings, such as atriums, lift wells, stairwells and others. Thus, the floor area estimates are unlikely to be the same as the Gross Floor Area for individual buildings where internal voids are not included in floor area calculations.

There are some land uses that will contain a variety of building types. For example, a substantial school compound may contain several concrete buildings for classrooms and halls, but may also contain a steel building for a gymnasium or covered court. The separation of individual building types is not possible with this current technique, and the process calculates the total floor area based on a single Inter-Storey Height value. Large buildings with only one storey (such as gyms and

covered courts) will be assumed to have multiple floors, resulting in an increased floor area estimate for such facilities.

For most LGUs in the project area, the running time of the Building Geometry Model processes would be as little as five minutes for a small LGU (e.g. Pateros Municipality) to several hours for a large LGU (e.g. Quezon City). In some cases, the Building Geometry Model revealed artefacts in the input vector datasets (e.g. inconsistent attributes) that would require correction before completion of the processing. This served as an additional source of data quality checking, particularly for the land use datasets.

4.2.7 Era of Construction classification

4.2.7.1 Description of requirements

To understand the response and vulnerability of buildings and infrastructure when exposed to natural hazards, an understanding of the structural characteristics of these features is required. Construction standards vary across building and asset types, but even within a particular type the date of construction can be an important indicator of its vulnerability. It is for this reason that an important element in any exposure database is the Era of Construction dataset. This dataset shows the spatial distribution of the period of construction for (mainly) buildings within an Area of Interest.

Vulnerability models developed for this project classify building types into distinct categories primarily based on their mix of construction materials and frame types. A further subset of classifications is made based on the period or era of construction. Three categories for building vintage were adopted:

- Pre-1972
- 1972-1992; and
- Post-1992.

These milestone years correspond to major transitions in structural engineering practice. Prior to 1972, except for design and zoning requirements for low-rise residential structures adopted in some city or town ordinances, there was a marked absence of laws that regulate the construction of buildings nationwide. The year 1972 ushered the development of the National Building Code of the Philippines (NBP) and, in subsequent years, its referral code, the National Structural Code of the Philippines (NSCP), which started and continued a national policy for the minimum design requirements for vertical and horizontal structures. The NSCP had several editions but it was in 1992 that seismic source factors and adjusted ductility requirements were significantly changed to be consistent with developments in other codes in countries with similar hazard profiles.

Thus, in order to meet the input requirements of these vulnerability models, the exposure information should record attributes about the spatial extent of buildings constructed in each of these periods and determine the dominant vintage of buildings enclosed in land use polygons. While of lesser importance, the actual year of construction, corresponding to the year when the building was completed, is also captured in the database for future reference, especially in the detailed analysis of critical facilities that play crucial roles during and after natural disasters.

4.2.7.2 Potential sources of data

The scale and time frame of the project restrict the conduct of detailed surveys for the entire built environment of GMMA. Efforts to collect and evaluate the reliability of existing data from different

sources will provide a close approximation of the required attributes for the development of the exposure database for hazard and risk assessment.

4.2.7.3 Databases from Local Government

The most likely source of data on the construction date of buildings will be either from databases maintained by the local Assessor's Office or the Engineer's Office. The local Assessor's Office, tasked to evaluate and collect local taxes on assets and real properties within their jurisdiction, may have records of the construction date of buildings, as this would benchmark the depreciating value of a building that comes under the local government's tax ordinances. Similarly, the Engineer's Office may also record this information to regulate and monitor compliance to national and local building and zoning standards. Another source of information within the LGU may be the Planning and Development Office, where knowledge about the release dates of particular estates, subdivisions or other urban developments, is likely to be recorded.

4.2.7.4 Historical Aerial Imagery

Other reliable sources of the detailed sequence of urban development are sets of historical aerial imageries that are recorded over several periods of time which may likely highlight where changes in the land cover have occurred. We used 1966 and 1992 aerial imageries available from NAMRIA and PHIVOLCS. The capture of photography may be limited to a small number of air-photo missions; however the availability of geo-referenced aerial photography (even at low spatial accuracy) may be useful. From this photography, it is possible to capture spatial data in a GIS to show the extent of the urban footprint for each air-photo mission, and data showing the change in the footprint can then be generated by spatial analysis. While this may be a labour-intensive task, it provides another source of data that may otherwise be unavailable.

4.2.7.5 Time-Series Analysis of Multi-Spectral Satellite Imagery and Aerial Imagery

Landsat satellites have been imaging the Earth's surface since the launch of the first satellite, a 4-band Multi Spectral Scanner (MSS), in 1972. Since that time, additional Landsat sensors have been added, including:

- Landsat 5, a 7-band Thematic Mapper (TM)
- Landsat 7, an 8-band Enhanced Thematic Mapper (ETM+); and.
- Landsat 8, a 9-band Operational Land Imager (OLI) and 2-band Thermal Infrared Sensor (TIRS)

Throughout its evolution, the Landsat sensor has always imaged the Earth in the red and infrared parts of the spectrum. This in turn means that the Normalized Difference Vegetation Index (NDVI) can be calculated for all Landsat scenes with a clear view of the surface. NDVI is an important processing tool, not only for measuring the vigour of vegetation, but also useful for classifying areas in the scene as water-covered, vegetated or non-vegetated land. This can be achieved by calculating the NDVI for each pixel in a LANDSAT scene, and then extracting pixel values between 0 and 0.3. These threshold values are chosen because water areas tend to have an NDVI of -1 to around 0, and healthy vegetation areas tend to have NDVI values between 0.3 and 1. In some instances it may be possible to approximate the extent of built up areas using cells that are between 0 and 0.3.

Landsat satellite imagery for the period 1972-2010 was made available to CSCAND agencies via Geoscience Australia's participation in the International Forest Carbon Initiative.

4.2.7.6 Remotely sensed image classification

Another process is to classify the image in terms of the spectral similarity of cells to a known class. By performing Unsupervised Classification on the imagery, that is, allowing the image processing algorithms to automatically group pixels into similar classes, it is possible to interpret those classes and assign a land cover type to each. During this process, many groups can be assigned the same land cover class, if they represent similar environments.

This process was adopted and conducted for a Landsat MSS image from 1972 and a Landsat TM image from 1996. The latter was chosen as other images from around 1992 were degraded by cloud cover, haze or smoke. The images were transformed to the Philippine Transverse Mercator Zone III (PTM3) projection and were then brought into the ILWIS remote sensing software. Within ILWIS, a process for performing an Unsupervised Classification of each image was executed. The process used the following bands:

- Landsat MSS: Bands 4 – 7
- Landsat TM: Bands 3 - 6

The process was run twice to produce 10 class and 15 class outputs.

4.2.7.7 Correlation with aerial imagery

Historical aerial photography from 1966 and 1992 became a useful resource in the process. Once the photographs were scanned and made available as digital images, some cropping and rotation of the images was performed. Each modified image was then georeferenced, using the transformation tools in QGIS and using the 2011 aerial imagery as the reference. Each image underwent polynomial warping using at least 4 control points. This process was performed for as many images as possible.

Once all of these georeferenced images became available, the classified images from Landsat were imported to QGIS. A process of comparing the aerial imagery with the classified imagery was undertaken, with the aim of determining which cells represented Urban, Non-Urban or Water areas. The digital numbers corresponding to those were recorded, and the Urban areas from the 1972 and 1996 classified imagery were extracted and converted to a vector dataset. The result of this process is a polygon dataset that shows the estimated extent of urban development in 1972 and 1992.

Using the land use polygons produced for each LGU, some adjustments were made to the attribute table to enable storage of Era of Construction attributes. A process for assigning the applicable attribute was performed:

1. ‘No_Devt’ where Level 4 land use is ‘Agriculture’, ‘Reserved Areas’ or ‘Vacant Areas’;
2. ‘1972-1992’ where the polygon centroid intersected the 1992 shapefile;
3. ‘Pre-1972’ where the polygon centroid intersected the 1972 shapefile;
4. ‘Post-1992’ for all other areas.

The detailed process for classifying imagery and attributing the polygons is included in the Exposure Database Development Manual.

4.2.7.8 Validation of mapping

The assignment of an Era of Construction value to each land use polygon required validation. As with the land use mapping, officials from the LGUs were best placed to review the mapping and advise on

any changes that are required. Modifications were made to an edited version of the Era of Construction polygon dataset, which was then ready to be used in subsequent compilation processes.

Where carried out, the validation proved to be a useful method for improving the accuracy of the mapping. In several instances, areas were mapped with the Pre-1972 value, as they existing urban development was detected in the 1972 Landsat imagery. Some of these areas had undergone significant redevelopment in recent years, and since the buildings had been constructed more recently, the Era of Construction values were changed.

The final validated Era of Construction mapping for the GMMA project area is show in Figure 4.5.

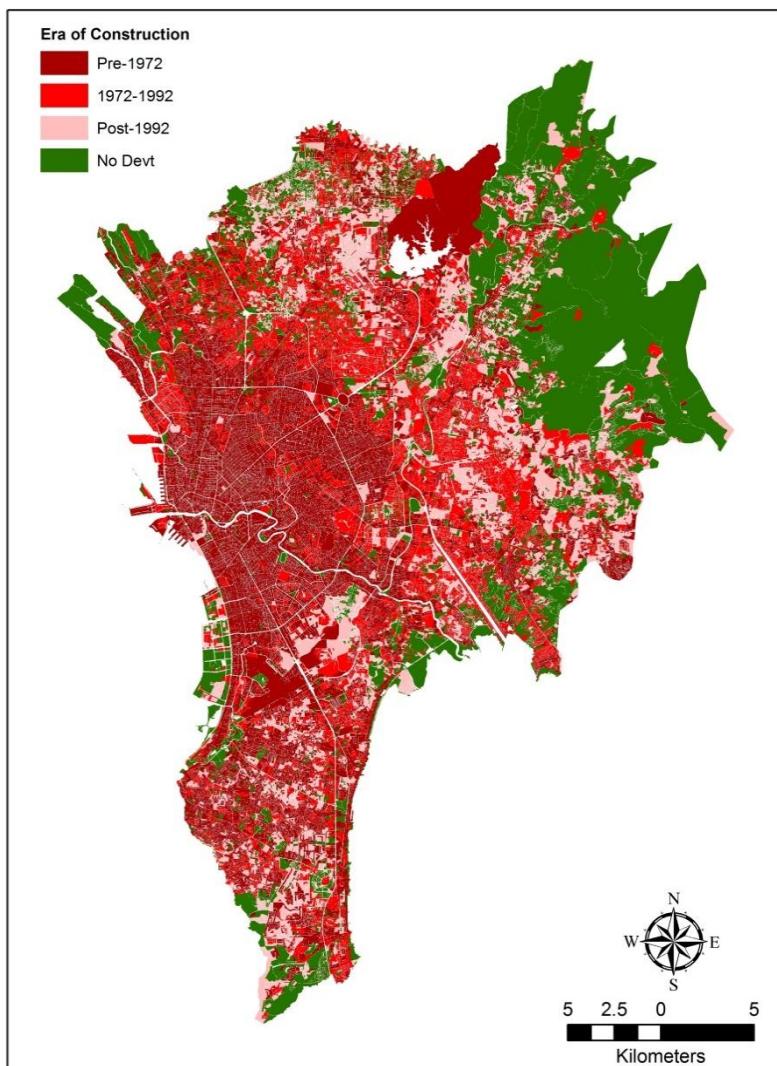


Figure 4.5. The final Era of Construction estimation from Landsat imagery classification.

4.2.7.9 Assumptions and issues

The use of imagery classification from Landsat imagery provides an opportunity to rapidly estimate the Era of Construction. This process is suitable in the absence of more detailed local information, but it is done with some assumptions:

- Land use mapping has accurately classified areas where development has not occurred;
- Areas already designated as Pre-1972 and 1972-1992 have not undergone any redevelopment or new construction;
- Buildings within each polygon have been constructed within the specified period;
- Areas of disturbed earth (e.g. earthworks, land clearing for agriculture) are excluded from the estimated extent of the urban footprint in each classified image;
- The unsupervised classification process has grouped similar cells consistently across each Landsat scene;
- Validation by local officials has been performed.

4.3 Area-Based Approach – non-spatial data processes

4.3.1 Structural characteristics - Formal Settlements

4.3.1.1 Available building data from Census

The GMMA-RAP made use of the Year 2000 NSO Census data which is being shared with the public as Public User Files (PUFs). The PUFs contain demographic information for every household as well as descriptions of the dwellings. The NSO data attributes that are very useful for exposure information development are the population for each household, the floor area size being occupied by each household, the construction materials of the dwelling (roof and outer walls), the year built, condition of the building or state of repair, type of housing and lot tenure status. The NSO statistical data is distributed in DVDs together with the software (CSPro) for reading the PUFs.

The following steps were followed in the data preparation and processing:

1. Installation and configuration of CSPro software;
2. Extraction of the required information from PUF and saving them into a comma delimited text file;
3. Installation of MySQL and essential database analysis tools (e.g. MySQL Query Browser);
4. Generation of the NSO MySQL schema and uploading of the extracted text file into the NSO MySQL Tables;
5. Addition of construction material combination column (Roof and wall combination) into the MySQL NSO tables;
6. Determination of the dominant building material combination using SQL scripts;
7. Generation of SQL scripts to create the Floor Area-Material Combination summary tables aggregated to barangay level for dominant material combinations;
8. Exporting of Floor area material combination summary tables as comma delimited text files.

4.3.1.2 Examination of data from NSO

The NSO data attributes that are very useful for this study are the population for each household, the floor area size being occupied by each household, the construction materials of the dwelling (roof and outer walls), the year built, condition of the building or state of repair, type of housing and Lot tenure status. The NSO statistical data is being distributed in DVDs together with the software (CSPro) for reading the PUFs.

The PUFs used for the project are detailed in Appendix C.

Table 4.4 lists the attributes that were chosen and extracted from the PUF. A more detailed description of these attributes and their corresponding ranges in values can be found in the Data Dictionary shown in Appendix A of the Exposure Database Development Manual.

Table 4.4. Census questionnaire columns and data specifications.

Column Name	Data Type	Description	Question Ref	Number of Questions
REGN	Numeric	Region Sequence as of May 2000	1-2	2
PRRCD	Numeric	Province Recode	5-7	3
MUN	Numeric	Municipality	8-9	2
BGY	Numeric	Barangay	10-12	3
HHQSN	Numeric	Household Questionnaire Sequence Number	13-17	5
R1HH-SIZE	Numeric	Household Size	19-20	2
FHSNHUSN	Numeric	First Household within the Housing Unit	21	1
B1-BUILDING-TYPE	Numeric	Type of Building/House	22	1
B2-ROOF	Numeric	Construction Materials of the Roof	23	1
B3-WALLS	Numeric	Construction Materials of the Outer Walls	24-25	2
B4-REPAIR	Numeric	State of Repair	26	1
B5-YR-BUILT	Numeric	Year Building/House was Built	27-28	2
D1-FLOOR-AREA	Numeric	Floor Area of the Housing Unit	29-30	2
H8-LOT-TENURE	Numeric	Tenure Status of the Lot	31	1
R2YEAR	Numeric	Census Year	46-49	4
R2MONTH	Numeric	Census Month	50-51	2

The “M_1_1” value in the “MATERIALS” combination column means that the dwelling has galvanized iron/aluminium roofing which is indicated by the number “1” and concrete/brick/stone outer walls which is also indicated by number “1”. Tables 4.5 and 4.6 show the number codes and the corresponding material values for roof materials and outer wall materials.

Table 4.5. Codes for the roof material of household buildings.

Roof Material Code	Roof Material Description
1	Galvanized Iron/Aluminum
2	Tile Concrete/Clay Tile
3	Half Galvanized Iron and Half Concrete
4	Wood
5	Cogon/Nipa/Anahaw
6	Asbestos
7	Makeshift/Salvaged/Improvised Materials
8	Others
9	Not Reported

Table 4.6. Codes for the wall material of household buildings.

Wall Material Code	Wall Material Description
1	Concrete/Brick/Stone
2	Wood
3	Half Concrete/Brick/Stone/and Half Wood
4	Galvanized Iron/Aluminum
5	Bamboo/Sawali/Cogon/Nipa
6	Asbestos
7	Glass
8	Makeshift/Salvaged/Improvised Materials
9	Others
10	No walls
99	Not Reported

4.3.1.3 Analysis of barangay-level floor areas

After creating the material combination column “MATERIALS”, the number of material combinations are then counted and results are displayed in descending order.

The results from running the above script showed that there are about 86 combinations in the Metro Manila data set with “M_1-1” having the maximum number of 852,110 and corresponding population of 3.97 million. In order to simplify succeeding data analysis, we selected only dominant combinations, which in this case are from line 1 (“M_1-1”) up to line 18 (“M_7-2”). The remaining combinations below line 18 were considered small in number and were expected to have a minimal effect on the succeeding analysis.

Since the created table contains only the number codes for the ranges in values for the floor area, it is necessary to create another table that will contain the total floor area for each household which we will

call in the succeeding script as “laguna_nso_temp”. In the same SQL scripts, a lookup table called “area_lookup” was left joined to temp2 to generate the desired table. The “area_lookup” is a table that contains the number code and the corresponding label values for the floor area. The tabulation shows the number code and corresponding range in Area Values as indicated in the data dictionary. In this case, the number code and average values are used in the “area_lookup” table.

Table 4.7. Codes for the floor area range of household buildings and corresponding area average values.

Floor Area Code	Floor Area Range	Average Value
01	Less than 10 m ²	10
02	10 – 19 m ²	15
03	20 – 29 m ²	25
04	30 – 49 m ²	40
05	50 – 69 m ²	60
06	70 – 89 m ²	80
07	90 – 119 m ²	105
08	120 – 149 m ²	135
09	150 – 199 m ²	175
10	200 m ² and over	200
99	Not reported	0

4.3.1.4 Conversion to building types

The GMMA-RAP project covers the Metro Manila and bordering towns of Rizal and Laguna provinces. Hence, corresponding NSO tables were also created for the provinces of Rizal and Laguna. Aside from the three NSO tables, an area name table called “bgy_names” and an updated population data for 2007 called “barangay_population” table were also created using the same procedures for creating the NSO tables. The area name table is the same area name file (c2k2phil.anm) provided in the NSO CD.

The generated CSV file will have the table headers as listed below. “M_1_1” to “M_7_2” headers represent the number for each material combination while the “M_1_1_area” to “M_7_2_area” represent the sum of the floor area for each material combination. The “Total_Floor_area” header represents the total floor area for all the combination in a given barangay.

Table 4.8. Column headers in the final CSV file.

DATA_ID	BGY_CODE	MUN_CODE	PROV_CODE
MUNICIPALITY_CITY	PROVINCE	Bgy_LONGITUDE	Bgy_LATITUDE
Bgy_NAME	Total_Floor_area	POP_2000	POP_2007
M_1_1	M_1_3	M_1_2	M_3_3
M_4_2	M_2_1	M_9_99	M_7_8

M_3_1	M_3_2	M_1_8	M_1_4
M_1_99	M_4_3	M_2_3	M_3_4
M_4_1	M_7_2	M_1_1_area	M_1_3_area
M_1_2_area	M_3_3_area	M_4_2_area	M_2_1_area
M_9_99_area	M_7_8_area	M_3_1_area	M_3_2_area
M_1_8_area	M_1_4_area	M_1_99_area	M_4_3_area
M_2_3_area	M_3_4_area	M_4_1_area	M_7_2_area

The material floor area summary tables for other towns and cities can be generated using the same process and scripts.

A full description of these processes can be found in the Exposure Database Development Manual.

4.3.1.5 Compilation of Look Up Table

The conversion of NSO Roof/Wall Combinations to UPD-ICE types was mapped out by PHIVOLCS and UPD-ICE in August 2012. In some cases there is a one-to-one relationship between the two schemas, but in many cases the mapping features a one-to-many relationship. Where there are two or more UPD-ICE types for a single NSO Roof/Wall type, the percentage of each UPD-ICE type is specified. Figure 4.6 shows the mapping as developed in August 2012.

NSO COMBINATION	NSO ROOF	NSO WALL	UPD-ICE CLASSIFICATION	UPD-ICE PERCENTAGE
M_1_1	Galvanised Iron/aluminum	Concrete/brick/stone	CHB	35
M_1_1	Galvanised Iron/aluminum	Concrete/brick/stone	C1	65
M_1_3	Galvanised Iron/aluminum	Half concrete/brick/stone and half wood	CWS	65
M_1_3	Galvanised Iron/aluminum	Half concrete/brick/stone and half wood	MWS	35
M_1_2	Galvanised Iron/aluminum	Wood	W1	100
M_3_3	Half galvanised iron and half concrete	Half concrete/brick/stone and half wood	CWS	100
M_4_2	Wood	Wood	W1	100
M_2_1	Tile concrete/clay tile	Concrete/brick/stone	C1	95
M_2_1	Tile concrete/clay tile	Concrete/brick/stone	S1	5
M_9_99	Others	Others	N	100
M_7_8	Makeshift/salvaged/improvised materials	Makeshift/salvaged/improvised materials	N	100
M_3_1	Half galvanised iron and half concrete	Concrete/brick/stone	C1	90
M_3_1	Half galvanised iron and half concrete	Concrete/brick/stone	S1	5
M_3_1	Half galvanised iron and half concrete	Concrete/brick/stone	URM	3
M_3_1	Half galvanised iron and half concrete	Concrete/brick/stone	URA	2
M_3_2	Half galvanised iron and half concrete	Wood	C1	30
M_3_2	Half galvanised iron and half concrete	Wood	CWS	70
M_1_8	Galvanised Iron/aluminum	Makeshift/salvaged/improvised materials	N	100
M_1_4	Galvanised Iron/aluminum	Galvanised Iron/aluminum	S3	20
M_1_4	Galvanised Iron/aluminum	Galvanised Iron/aluminum	N	80
M_1_99	Galvanised Iron/aluminum	Others	N	100
M_4_3	Wood	Half concrete/brick/stone and half wood	CWS	65
M_4_3	Wood	Half concrete/brick/stone and half wood	MWS	34
M_4_3	Wood	Half concrete/brick/stone and half wood	URA	1
M_2_3	Tile concrete/clay tile	Half concrete/brick/stone and half wood	CWS	15
M_2_3	Tile concrete/clay tile	Half concrete/brick/stone and half wood	C1	60
M_2_3	Tile concrete/clay tile	Half concrete/brick/stone and half wood	MWS	15
M_2_3	Tile concrete/clay tile	Half concrete/brick/stone and half wood	URA	10
M_2_4	Tile concrete/clay tile	Galvanised Iron/aluminum	S1	10
M_2_4	Tile concrete/clay tile	Galvanised Iron/aluminum	C1	90
M_4_1	Wood	Concrete/brick/stone	C1	90
M_4_1	Wood	Concrete/brick/stone	S1	2
M_4_1	Wood	Concrete/brick/stone	URM	4
M_4_1	Wood	Concrete/brick/stone	URA	4
M_7_2	Makeshift/salvaged/improvised materials	Wood	N	90
M_7_2	Makeshift/salvaged/improvised materials	Wood	W1	10

Figure 4.6: Conversion of NSO 2000 Census Roof/Wall combinations to UPD-ICE types

Once the NSO wall and roof type combinations have been collated for each barangay of each LGU, it is necessary to perform additional manipulation of the data tables. This process involved the following steps:

- For each NSO roof/wall combination, an additional column or columns were added to the right of each column containing data, and each column was assigned a header with the appropriate UPD-ICE type;
- Using the NSO to UPD-ICE type proportions, a formula to multiply the total floor area by the appropriate multiplier(s) for the NSO roof/wall combination(s) were inserted into the new columns;
- All calculated values from Step 2 were copied and pasted within the same worksheet, with spaces removed between the columns;
- A new worksheet entitled “UPD-ICE TYPE SUMMARY” was created;
- Columns of identifying information for each barangay were copied and pasted into the new worksheet twice (vertically);
- Column headers and values from Step 3 were copied and pasted alongside of the information pasted in Step 5 (upper set);
- Headers for the 10 possible UPD-ICE types were inserted to the right of the lower set of information pasted from Step 5;
- For each row, the sum of each UPD-ICE type was calculated for each barangay, and further divided by the total floor area to determine the final floor area multiplier;
- A new worksheet entitled “XXX LOOKUP TABLE” was created, where XXX is the LGU name;
- A text-only copy of the information and calculations made in Step 7 were copied and pasted into the new worksheet.

The multiplier calculated through this process is the fraction of the floor area of buildings at a particular location that is assumed to belong to the specified building type. The multipliers are used to distribute the sum of the floor area within an exposure polygon to the various types expected in that polygon.

An example the output of Step 10 is shown in Figure 4.7 (for Taguig City barangays).

Bgy_Name	Total_Floor_Area	C1	CHB	CWS	MWS	N	S1	S3	URA	URM	WI	OTHER
Bagong Tanyag	244345	0.322419579	0.141259376	0.2686569397	0.0841696	0.021310662	0.005313806	0.00205131	0.00638586	0.005782312	0.139945561	0.007930156
Barangay Taytay	226995	0.50303641	0.252851178	0.088514064	0.034200533	0.034210004	0.001575933	0.00132602	0.00281239	0.00118262	0.078017071	0.0082316067
Bantahang	46615	0.358650045	0.180872482	0.222463239	0.167946238	0.0151619754	0.001579884	0	0.002549693	0.000177301	0.107983462	0.008019627
Calatagan	108012	0.398244807	0.146534968	0.356422276	0.095106635	0.02795112	0.021939835	0.000625967	0.00073862	0.000509876	0.145356611	0.009006469
Hagonoy	166651	0.528133918	0.246835407	0.079423817	0.0379711678	0.047035868	0.003865965	0.003329499	0.002015361	0.0580174872	0.008972434	
Ilaya-Tipas	173945	0.306127444	0.152440324	0.232861182	0.104494227	0.014860245	0.001241329	0.001378537	0.000461862	0.000698371	0.154798583	0.030587723
Ligid-Tipas	67595	0.385439565	0.200054707	0.179543868	0.039384621	0.013084995	0.000370524	0.0017178492	2.398278-05	3.55348-05	0.131680149	0.007924218
Lower Bicutan	537775	0.48918198	0.25941994	0.134582312	0.048813681	0.018531257	0.001891239	0.00030137	0.000342831	0.000154962	0.094815849	0.006702301
Mahabang Village	126785	0.370742397	0.19693739	0.197466772	0.073429397	0.021054706	0.00285835	0.000765195	0.000178239	0	0.189946299	0.002839901
Napindan	91675	0.448526515	0.222697357	0.077851051	0.0338807132	0.075142004	0.001843559	0.000823601	0.000329988	0.000394340	0.151602487	0.018326009
Paltingon	92684	0.244852658	0.136321951	0.279565589	0.138187611	0.021675568	0.001364546	0.000469305	0.000485515	0.000129471	0.128277728	0.008359567
Santa Ana	127185	0.372030433	0.183887728	0.184853796	0.053711014	0.014021154	0.001233114	0.001077394	0.00044883	0.000460478	0.177559583	0.013407777
Signal Village	740105	0.476617685	0.223785142	0.1681711969	0.033113139	0.01270583	0.002539873	0.00188711	0.000724019	0.000673148	0.046384635	0.008054461
Tuktukan	80870	0.259800014	0.141869466	0.365468578	0.036080329	0.00656874	0.000680934	0.001031682	0.000680934	0	0.124826652	0.00688179
Upper Bicutan	415485	0.524375129	0.24179669	0.134642296	0.036584206	0.016215003	0.003072681	0.000781038	0.000217938	0.000670260	0.004361815	
Ususan	151615	0.446306051	0.158772388	0.200263894	0.031965387	0.015212854	0.006148569	0.0010059189	0.001680193	0.001620521	0.071350584	0.023184487
Wawa	88462	0.158463712	0.062692177	0.4868577608	0.130374749	0.053802454	0.005498532	0.002747004	0.002636828	0.00021198	0.069575949	0.014187203
Western Bicutan	741755	0.434721053	0.162055360	0.134012241	0.037152695	0.034829001	0.00483084	0.000760333	0.00197572	0.000672154	0.15795	0.010623025

Figure 4.7. Example of multipliers for floor area in residential land use areas in Taguig City.

This process was completed for all LGUs in Metro Manila and all applicable LGUs in Rizal Province (24 LGUs in total). Upon completion of the table, a check of the count of barangays showed that data for 45 barangays had not been calculated. In most cases, this was due to data being unavailable in the original NSO tables. To ensure that a set of multipliers is available for all barangays, a further process was followed. Working iteratively through the missing barangays:

- Aerial imagery for a subject barangay was visually examined;

- Neighbouring barangays were examined for their similarity in appearance to the subject barangay;
- A neighbouring barangay exhibiting the most similar visual appearance to the subject barangay was chosen to act as the ‘surrogate’ for the subject barangay; and
- Multipliers calculated for the surrogate were copied into a new record for the subject barangay.

The list of missing barangays and their surrogate statistics is shown on the Table 4.8.

Table 4.8. Missing barangays and surrogates used for residential building statistics.

Missing Municipality and Barangay	Surrogate Municipality and Barangay
Angono Kalayaan	Angono San Isidro
Antipolo Mayamot	Antipolo City Cupang
Antipolo San Luis	Antipolo City Bagong Nayon
Pasig Dela Paz	Cainta San Isidro
Makati Dasmariñas	Makati City Forbes Park
Malabon Tañong (Pob.)	Malabon San Agustin
Manila Barangay 701	Manila Barangay 699
Manila Barangay 744	Manila Barangay 731
Manila Barangay 818-A	Manila Barangay 820
Manila Barangay 401	Manila Barangay 402
Manila Barangay 501	Manila Barangay 500
Manila Barangay 601	Manila Barangay 598
Manila Barangay 801	Manila Barangay 802
Manila Barangay 875	Manila Barangay 874
Manila Barangay 901	Manila Barangay 904
Marikina Concepcion Uno	Marikina City Concepcion Dos
Marikina Tañong	Marikina City Industrial Valley
Marikina Jesus De La Peña	Marikina City Industrial Valley
Marikina Marikina Heights	Marikina City Concepcion Dos
Marikina Parang	Marikina City Concepcion Dos
Marikina Santo Niño	Marikina City Industrial Valley
Navotas North Bay Blvd., South	Navotas City Longos
Navotas Bangculasi	Navotas City Bagumbayan South
Parañaque Santo Niño	Parañaque City Don Galo
Parañaque San Isidro	Parañaque City B. F. Homes
Parañaque B. F. International Village	Parañaque City B. F. Homes
Pasay Barangay 201	Pasay City Barangay 183
Pasig Manggahan	Pasig City Rosario
Quezon Aurora	Quezon City Don Manuel

Quezon Santo Niño	Quezon City San Isidro Labrador
Quezon Santo Cristo	Quezon City Bagong Pag-Asa
Quezon Bagong Silangan	Quezon City Bagong Silangan
Quezon New Era (Constitution Hills)	Quezon City Commonwealth
Quezon Claro	Quezon City Duyan-Duyan
Quezon Silangan	Quezon City E. Rodriguez
Quezon Doña Josefa	Quezon City Lourdes
Quezon San Jose	Quezon City Manresa
Quezon N.S. Amoranto (Gintong Silahis)	Quezon City Paang Bundok
Quezon Santa Cruz	Quezon City Paligsahan
Quezon Pasong Putik Proper (Pasong Putik)	Quezon City Santa Lucia
Quezon Santa Monica	Quezon City Santa Monica
Quezon Santo Domingo (Matalahib)	Quezon City Sienna
Quezon San Roque	Quezon City Socorro
Quezon Pasong Putik Proper (Pasong Putik)	Quezon City Greater Lagro
San Juan Pasadeña	San Juan City Corazon De Jesus
San Juan Erminato	San Juan City Salapan
San Juan Isabelita	San Juan City Tibagan

A final compilation of all data from each “XXX LOOKUP TABLE” worksheet was made, resulting in a single Lookup Table of floor area proportions for applicable barangays in the project area. This table was then used in the post-processing of the Building Geometry Model outputs to complete a first-pass distribution of floor area across the UPD-ICE building types in Formal Settlements and the Rural Production land uses.

4.3.1.6 Assumptions and issues

The use of NSO 2000 Census of Population and Housing data to derive building type multipliers is constrained by:

- The age of the input data;
- The enumeration methods applied by the NSO;
- The inability to separate NSO floor area data for residential buildings in different land uses;
- The accuracy of the conversion of NSO Census Roof Type and Wall Type combinations to UPD-ICE types; and
- The accuracy of the floor area estimates from the Building Geometry Model.

The use of residential building data collected in the year 2000 introduces a degree of uncertainty in the accuracy of the final output. The Greater Metro Manila Area is dynamic city that is undergoing both urban footprint expansion and infill development. In areas that have experienced either of these developments, it is highly likely that the building type statistics do not reflect the situation in 2011-2012.

The NSO Census of Population and Housing 2000 collected information on residential dwellings of various types, including accommodation and lodging, health and welfare facilities, religious institutional facilities, correctional centres, military facilities, mining camps, certain types of vessels and refugee camps. Enumerators are instructed to mark the location of these types of facilities on maps during the data collection. However, the data available for the project does not easily allow for the disaggregation of building information into these categories (by spatial or non-spatial means). For buildings that contain a mixture of residential and non-residential activities, it is not clear whether the floor area is estimated for the entire building or just the residential portion.

For the calculation of multipliers, the residual value (labelled OTHER in the Lookup Table) is equal to 0 in some cases. However, for a vast majority of barangays, the residual is between 0 and 0.04. When the multipliers are applied to the floor area distribution, the sum of the floor area distributions will be equal to or very close to the FLAREA_SUM value. This creates an inherent lowering of the floor area estimate across the applicable polygons. Given that the Building Geometry Model has a tendency to slightly overestimate the floor area, this reduction in floor area is unlikely to have a major effect.

There are occasional instances when the statistics for a particular barangay result in a larger residual. These will result in an overall lowering of the floor area estimate in applicable polygons.

4.3.2 Structural Characteristics - Informal Settlements

4.3.2.1 Data gaps in Informal Settlements

From the data extracted from the NSO 2000 Census of Population and Housing, it was not possible to separate the records that apply to households residing in Informal Settlements. Accordingly, it was not possible to determine the mix of building types found in these areas from that data. A search of the other datasets supplied by LGUs revealed little or no information that could be used to understand the mix of types.

4.3.2.2 Estimation of typical building types

The engineers of the UPD-ICE provided some estimates of the proportions of structural classifications of buildings in Informal Settlements. Figure 4.8 shows this mix of types, with different proportions for Metro Manila LGUs.

PROVINCE	LGU	N	CHB	CWS	W1	C1
METRO MANILA	CALOOCAN	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	LAS PINAS	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MAKATI	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MALABON	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MANILA	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MANDALUYONG	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MARIKINA	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	MUNTINLUPA	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	NAVOTAS	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	PARANAQUE	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	PASAY	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	PASIG	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	PATEROS	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	QUEZON CITY	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	SAN JUAN	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	TAGUIG	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	VALENZUELA	0.6	0.2	0.066666667	0.066666667	0.066666667
METRO MANILA	RODRIGUEZ	0.4	0.4	0.066666667	0.066666667	0.066666667
RIZAL	SAN MATEO	0.4	0.4	0.066666667	0.066666667	0.066666667
RIZAL	CAINTA	0.4	0.4	0.066666667	0.066666667	0.066666667
RIZAL	ANTIPOLO	0.4	0.4	0.066666667	0.066666667	0.066666667
RIZAL	TAYTAY	0.4	0.4	0.066666667	0.066666667	0.066666667
RIZAL	ANGONO	0.4	0.4	0.066666667	0.066666667	0.066666667
LAGUNA	SAN PEDRO	0.4	0.4	0.066666667	0.066666667	0.066666667

Figure 4.8. Multipliers for the building types expected to be found in Informal Settlements across the project area.

4.3.2.3 Assumptions and Issues

There was no opportunity to validate the proportions provided by UPD-ICE, as a field survey within Informal Settlements would be difficult to conduct.

4.3.3 Structural Characteristics - Non-Residential Land Uses

4.3.3.1 Use of Local Government Unit information

All Local Government Units (LGUs) are required to collect taxes through the assessment of the value of land and improvements on land. This function is managed through the Assessor's Office of each LGU. Every Assessor's Office collects and maintains information about individual parcels and the improvement or improvements (sometimes known as assets) within each land parcel. This information may be maintained by hard copy means or through the management of digital databases. Where digital information is available, and where the information contains some kind of spatial reference, the information can be useful in the exposure data development process.

The project was very fortunate to be granted access to the land and improvement records of the Assessor's Office of Quezon City. This office also granted access to a version of the cadastral database, showing the location and shape of individual land parcels. This was identified as a significant collection of data that could help to inform the development of statistical information for the exposure database. The development of statistics for buildings in non-residential land uses would be boosted significantly by the use of this data. Approximately 263,000 assets, either individual buildings or portions of buildings, are recorded in this large database.

4.3.3.1.1 Analysis of Quezon City Assessor's Data

The analysis of the Quezon City Assessor's data was carried out in the following sequence:

1. Merging of Improvement database records for 143 barangays (in six individual tables) into a single Excel spreadsheet with multiple worksheets;
2. Review of Improvement database metadata to determine the most appropriate fields from the data tables;
3. Selection of most appropriate fields from the merged database table;
4. Removal of surplus fields from the table;
5. Reorganisation of the order of data present in the field storing the unique Property Identification Number;
6. Reformatting of data held in the field to store the building type;
7. Splitting of building type field into primary type, sub-type and usage code;
8. Translation of usage code to usage description (as per metadata);
9. Translation of taxability code for each record;
10. Translation of the land use code to a generalised land use description;
11. Merging of the six cleaned tables into a single database table in a Personal Geodatabase in ArcGIS;
12. Summarising the statistics of the merged data using PivotTables in Excel;
13. Conversion of the Assessor's Office building type and building usage to the appropriate UPD-ICE building type;
14. Calculation of statistical distribution of UPD-ICE building types present in the Level 5 land use categories;
15. Further reorganisation of the Property Identification Number to obtain the building identifier for each record; and
16. Adoption of land use-specific statistics for the Non-Residential Lookup Table.

Of all the steps involved in this process, Step 6 (reformatting of data held in the field to store the building type) was the most time-consuming. Definition of the unique building types was specified in the Improvements metadata document. Buildings are classified by type (indicated by I, II, III or IV) and a sub-type (A, B, C or D). It was noted the usage of the building was also included at the end of most entries (e.g. I-A-8). The field that stores the building type contained numerous artefacts that required attention before the data could be summarised effectively. Examples of these artefacts included:

- Spaces leading, trailing and placed in between characters;
- Numerical characters replacing alphabetical characters (e.g. 1 instead of I, or 2 instead of II);
- Characters not present in the prescribed building type codes (such as &, / and others);
- Duplicated characters (e.g. - - instead of -);
- Separation of adjacent characters (e.g. A1 instead of A-1); and
- Correction of ambiguous entries (e.g. ONE-FAMILY, II-B-1254).

All instances of these artefacts required identification and correction. This was done on a copy of the original field containing the building types and using the Find and Replace function to rapidly modify

incorrect entries. Care was required to avoid the removal of legitimate entries, and accordingly a sequence of corrections was developed. If evidence of building types were embedded in ambiguous entries, assumptions were made about the entry and a correction was made accordingly (e.g. II-B-1254 became II-B-12).

The conversion of other codes, such as those for Tax Status and Adjustment Codes, were performed using Lookup Tables developed inside the Excel document.

Since the versions of Excel being used at the time could not handle more than 65,536 records for a single worksheet, the records for the individual tables were merged into a single table in an ESRI Personal Geodatabase. The database structure of the Personal Geodatabase is equivalent to that of Microsoft Access databases. Storing the merged data in this format enables the data to be read by a PivotTable in Excel, which further enables the data to be summarised in numerous ways. The summarising of data via Pivot Tables was essential for the conversion of building classifications to the UPD-ICE schema.

Further details of the process are included in the Exposure Database Development Manual.

4.3.3.1.2 Conversion to building types

Further work was carried out to assign a land use to each record based on the occupancy type of the building (recorded in the Improvements data table from the Assessor's Office). Once each record contained a Level 5 land use classification, a PivotTable summarising the mix of building types (as classified by Quezon City) was prepared. Engineers from UPD-ICE reviewed the documentation provided by the Assessor's Office of Quezon City and provided a mapping of their building classifications to the UPD-ICE types. An example of this conversion for buildings found in Schools is shown in Table 4.10.

Table 4.9. Example of conversion between Quezon City Assessor's Office building type and the equivalent UPD-ICE type.

Quezon City Type	Count	UPD-ICE Type	Split rule
I-A	42	C1	
I-B	87	C1	
I-C	203	C1	
II-A	129	C1	
II-B	98	C1	
II-C	26	CWS	
III-A	1	W1 or W2	depending on floor area
III-B	1	W1 or W2	depending on floor area

The values from this activity were used in another set of calculations to determine the proportion of various building types per Level 5 Land Use. PivotTables for each mappable Level 5 Land Use in the Assessor's Office data were prepared. Table 4.10 shows the distribution of UPD-ICE building types from the PivotTable for Schools.

Table 4.10. Proportions of UPD-ICE building types found in Schools.

UPD-ICE Type	Percentage
C1	95.23%
CWS	4.43%
W1	0.17%
W2	0.17%
Grand Total	100.00%

4.3.4 Interpretation of Building Types from Imagery

4.3.4.1 Field Surveys

4.3.4.1.1 Planning

Field surveys were planned to sample the building types found in selected barangays of the Greater Metro Manila Area. The intention of the sampling was to collect additional building type information for non-residential land uses and to compare the ‘paintbrushed’ exposure information with actual samples of buildings.

Prior to the field surveys, barangays were selected based on their size, mix of land uses, vintage and density (as interpreted from available aerial imagery). Maps of the street patterns of the selected barangays were prepared before the fieldwork commenced.

4.3.4.1.2 Execution

The field surveys were carried out with teams that included spatial analysts and civil engineers. Each team occupied a vehicle that was fitted with Mio cameras. Each time was assigned a barangay to survey. Progress during the survey was monitored using the maps prepared in the Planning phase. Imagery of the facades of buildings in each street of the barangay was collected by slowly driving down the street. Areas where access was not possible or where safety was a concern were not surveyed.

4.3.4.1.3 Post-survey classification

Once the survey was complete, a desktop classification of the observed buildings was undertaken. This work also served to correlate the building classification with its location on the ground, using a modified version of the building footprint data provided by the MMDA Air Quality Study. The attributes assigned to each building footprint included:

- Level 4 and 5 Land Use
- UPD-ICE type
- Number of storeys
- Estimated Era of Construction
- Estimate of Floor Height of lowest floor from street level
- NSO roof and wall type combination

L5_USE	C1-L	C1-M	CHB-L	CWS-L	MWS-L	N-L	S1-L	S2-L	S3-L	Unknown	W1-L	S1-M	Grand Total
Administration	3	1											4
Cemeteries	6												6
Commercial	7	1			1		1						10
Construction	5												5
Day Care Centers	1												1
Feedlots			1										1
Health Centers	1												1
Indoor Sports										1			1
Manufacturing	4								3				7
Markets	2												2
Mixed Major Commercial	10	8	1										19
Office	2	1											3
Outdoor Sports and Playgrounds	1	1						1					3
Places of Assembly	1												1
Places of Worship	3						1	1					5
Postal Services	1												1
Private Storage							1						1
Residential	515	75	50	21	79	32		2		3	25		802
Retail		1											1
Road Transport	1					1					1		3
Services	1	17											18
Small Commercial	52	6	10	1	4	11		1	1	2	1		89
Tourism Facilities	1												1
Unknown	122	10	1		2	1			2305	1			2442
Vocational Colleges	2												2
Wholesale	5							2		1			8
Mixed Informal Settlements									232				232
Accommodation	1	1											2
Mixed Residential and Small Comm	83	7	7	15	11	4				2			129
Fire and Rescue	1												1
Grand Total	831	129	70	37	97	48	4	6	2	2545	31	1	3801

Figure 4.11. Summary of building classifications for observed Level 5 land uses in Barangay Tuktukan and Santa Ana, Taguig City, interpreted from video camera survey data.

ERA_CONST	C1-L	C1-M	CHB-L	CWS-L	MWS-L	N-L	S1-L	S2-L	S3-L	Unknown	W1-L	S1-M	Grand Tot
Post 1992	68.90%	12.00%	5.48%	1.80%	4.35%	3.97%	0.28%	0.47%	0.19%	0.19%	2.27%	0.09%	100.00%
Pre 1972	7.69%	0.00%	0.00%	0.00%	53.85%	0.00%	7.69%	7.69%	0.00%	0.00%	23.08%	0.00%	100.00%
Unknown	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
1972-1992	53.44%	1.06%	6.35%	9.52%	23.28%	3.17%	0.00%	0.00%	0.00%	1.06%	2.12%	0.00%	100.00%
Grand Total	21.86%	3.39%	1.84%	0.97%	2.55%	1.26%	0.11%	0.16%	0.05%	66.96%	0.82%	0.03%	100.00%

Figure 4.12. Statistics of Year of Construction interpreted from video camera survey data in Barangay Tuktukan and Santa Ana, Taguig City.

NSO WALL/ROOF	C1-L	C1-M	CHB-L	CWS-L	MWS-L	N-L	S1-L	S1-M	S2-L	S3-L	Unknown	W1-L	(blank)	Grand Total
Asphalt Shingle Roof Concrete/brick/stone	84													84
Asphalt Shingle Roof No walls	2													2
Galvanized Iron/aluminum Concrete/brick/stone	681	79	67	2	9	3	3	1	2			2	1	849
Galvanized Iron/aluminum Galvanized Iron/aluminum						1				1		1		3
Galvanized Iron/aluminum Glass	1													1
Galvanized Iron/aluminum Half concrete and half aluminum					1									1
Galvanized Iron/aluminum Half concrete /brick/stone and half galvanized iron	1					1								2
Galvanized Iron/aluminum Half concrete/brick/stone and half glass	1	1												2
Galvanized Iron/aluminum Half concrete/brick/stone and half wood	6		3	34	84	5								132
Galvanized Iron/aluminum Makeshift/salvaged/improvised materials						27								27
Galvanized Iron/aluminum Mixed Glass and wood						1								1
Galvanized Iron/aluminum No walls	1							4	1		1			7
Galvanized Iron/aluminum Unknown	1					1					2493			2493
Galvanized Iron/aluminum Wood						2	6					27		35
Half Concrete Half Galvanized Iron Concrete/brick/stone		1												1
Makeshift/salvaged/improvised materials Makeshift/salvaged/improvised materials						5								5
No roof yet Concrete/brick/stone	1													1
Tile/concrete/clay tile Concrete/brick/stone	47	46												93
Tile/concrete/clay tile Glass							1							1
Tile/concrete/clay tile Half concrete/brick/stone and half glass	3	1												4
Tile/concrete/clay tile Unknown											52			52
Unknown Concrete/brick/stone		1												1
Unknown Unknown	1													1
(blank)														
Grand Total	681	129	70	37	97	48	4	1	6	2	2545	31		3801

Figure 4.13. Comparison of NSO Wall/Roof type combinations and UPD-ICE type building classifications from video camera survey data in Barangay Tuktukan and Santa Ana, Taguig City.

4.3.4.2 Imagery available on the Internet

Interpretation of images of buildings from sites such as Panoramio is useful for preparing outstanding statistical distributions of building types. Following the calculation of multipliers from other data sources, the remaining Level 5 land uses were targeted for analysis. Once the remaining land use or facility types have been specified, the buildings residing in these land use areas are identified in Panoramio (in the map window). If one or more images are available in the website, these images are viewed and the building is classified according to its structural type. The classification is recorded in a classification table.

4.3.4.3 Compilation of Look Up Table

Once all of the multipliers had been generated for all possible Level 5 Land Use classifications, the values were passed to a master spreadsheet. The header of this spreadsheet contained the UPD-ICE type, and the multipliers for each Level 5 Land Use were transferred across each row. Values of zero were added to applicable cells.

For land uses where no multiplier had been generated from the documented processes, a surrogate from the available data was selected and used for that land use. The surrogate was selected based on the similarity of the subject land use to another land use where multipliers had been generated.

Table 4.11. List of Level 5 Land Uses requiring surrogate multiplier values.

Level 5 Land Use with no multipliers	Surrogate Level 5 Land Use
Gas	Liquid Fuels
Transmission (Water Supply)	Potable Water Storage
Solid Waste	Liquid Waste
Processing	Manufacturing

Mining	Manufacturing
Flood Monitoring Stations	Flood Gates
Vacant Areas	Urban Parks
Greenbelts	Urban Parks
Buffer Zones	Urban Parks

The final table was stored as both an Excel table and a CSV in readiness for the compilation process.

4.3.4.4 Assumptions and Issues

As a result of the image classification work from Panoramio, it was discovered that many of the buildings in non-residential land uses are classified as the C1 type. Aside from the C1 type, a majority of the Hospitals fall under the C4 classification. There is a little or no information at all for some critical facilities such as Processing, Mining, Greenbelts, and Buffer Zones. For land uses such as Processing, a surrogate land use is adopted, which reflects the function of the buildings in that land use class.

Some problems have been encountered while classifying buildings from sites such as Panoramio. Buildings in some land uses are not represented in Panoramio, and some images are not suitable for classifying buildings (due to clarity of image or proximity to the building). An on-site visit and visual inspection is recommended to precisely classify and inspect the building and ensure that data gathered is correct. There is also a need to survey more buildings so that a larger sample of buildings are gathered, which will improve the reliability of the final statistical distribution of observed building types.

4.3.5 Residential population

4.3.5.1 Challenge of estimating population in Informal Settlements

For the purposes of exposure information development, it is beneficial to understand the number of residents at the finest level of detail of the exposure data. Since exposure information is being developed for developable land areas in this project, it is necessary to estimate population totals for each polygon where there is a usual residential population. Within the framework of the exposure information, these areas are usually defined by Level 5 land uses of Residential, Mixed Residential and Small Commercial, Informal Settlements, Rural Residential, Agriculture, Horticulture, Market Gardening and Mixed Farming.

The emergence of Informal Settlements across the Greater Metro Manila Area is well known and understood at all levels of government and within the community. Informal Settlements vary from small collections of makeshift dwellings to large land areas containing hundreds or thousands of dwellings of various construction types. Some Informal Settlements are short-lived, whilst others have a well-established community of residents who have resided in that settlement for several years.

4.3.5.2 Background studies

During the Census of Population and Housing, enumerators ask numerous questions of each household, including a question about the tenure status of the residents: "Do you own or amortize this lot occupied by your household, do you rent it, or do you occupy it rent-free with consent of owner or rent-free without consent of the owner?" When the household status is "Rent-free without consent of

owner”, this response would imply the household is informal settlement. Whilst this information is recorded in the questionnaire, aggregated information about Informal Settlers in each barangay is not available through the public release of Census results. This creates difficulties for estimating the population at the polygon level for those land uses that carry both formalised residential dwellings and Informal Settlements.

Information on informal settlements was requested of the LGUs within the project area of interest. Some LGUs responded with statistical information at either the barangay level or the LGU level, and in most cases the LGUs reported the total number of households.

In 2003, a report published by UN-HABITAT entitled “Global Report on Human Settlements 2003, The Challenge of Slums” included a chapter on the situation in Metro Manila. Entitled “The Case of Metro Manila, Philippines”, this section of the report examined the distribution of Depressed Households across Metro Manila and produced useful data about the quantity of such households in the 17 cities and municipalities of Metro Manila. A key table in the report is the Number of Informal Settlers in Metro Manila by City and Municipality for 2002. This table reports the total number of households per LGU, as well as the total number and percentage of depressed households in each LGU.

The information available from the LGUs and through the Case of Metro Manila report assumes that one depressed household has an average of 5 persons.

4.3.5.3 Estimation of Informal Settlement population

Using the information contained in the Case of Metro Manila report, and assuming the percentage of depressed households is equivalent to the percentage of depressed persons, the following analysis was performed:

1. The ‘Depressed Population’ for each LGU in 2010 was calculated from the LGU percentage in 2002 and the 2010 population total for the LGU;
2. The balance of the population (the ‘Formal Population’) for each LGU was calculated;
3. The total floor area of buildings within the Informal Settlements Level 4 land use polygons was obtained from the final exposure polygons;
4. The total floor area of buildings in other land uses that carry formalised residential dwellings was obtained from the final exposure polygons;
5. For each LGU, the result of Steps 1 and 3 were used to calculate the number of people per square metre of floor area in Informal Settlements;
6. For each LGU, the result of Steps 2 and 4 were used to calculate the number of people per square metre of floor area in these land uses;
7. A mean rate for the outputs of Steps 5 and 6 were calculated.

The result of this calculation is shown in Figure 4.29.

City/Municipality	Data from 2002				Population Calculations for 2010			People per m ² of Floor Area calculations	
	Total Households	Number of Depressed Households	Depressed Households as Percentage of Total	Depressed Households Multiplier	Population Total from NSO 2010 Census	Calculated Informal Settlements Population	Calculated Balance of Population	Rate for Informal Settlements	Rate for other residential land uses
City of Manila	333547	99549	30	0.298	1,652,171	492,847	1,159,824	0.204	0.045
Mandaluyong	59682	25383	43	0.425	328,699	139,697	189,002	0.176	0.077
Markina City	80160	28580	36	0.356	424,150	150,997	273,153	0.172	0.030
Pasig City	107835	27328	25	0.252	669,773	168,783	500,990	Net included (due disputed areas)	
Ortigas City	480624	169490	35	0.352	2,761,720	972,125	1,789,595	0.189	0.028
Kalookan City	249567	67292	27	0.269	1,489,040	400,552	1,088,488	0.099	0.066
Malabon	74137	12461	17	0.168	353,337	59,363	293,976	0.069	0.049
Navotas	49450	19030	38	0.384	249,131	95,666	153,465	0.251	0.065
Valenzuela City	106382	36404	34	0.342	575,356	196,772	378,584	0.293	0.039
Las Piñas City	97962	36107	37	0.368	552,373	203,847	349,226	0.314	0.030
Makati City	98225	27024	28	0.275	529,039	145,486	383,553	Net included (due disputed areas)	
Muntinlupa City	78016	40457	52	0.518	439,941	238,249	221,692	0.271	0.021
Paranaque City	94106	29790	32	0.316	588,126	185,848	402,278	0.320	0.023
Pasay City	78180	57436	73	0.734	392,869	288,396	104,503	Not included (due disparate data)	
Pateros	12029	3502	29	0.291	64,147	18,667	45,480	0.204	0.043
Taguig	102723	21931	21	0.219	644,473	137,273	507,200	Not included (due disputed areas)	
				Average Rate	0.1919	0.0389			
				Standard Deviation	0.080748003	0.015030849			

Figure 4.14. Calculations for number of people per square metre of floor area in Metro Manila LGUs.

4.3.5.4 Polygon-level calculation of population

The LGU-specific rates calculated in this analysis were then used as multipliers for determining the population estimate for each polygon in the relevant LGU. For those Metro Manila LGUs where a specific rate was not calculated (due to disputed areas or disparate data), and for LGUs outside of Metro Manila, the average rate was applied and stored in the POP_SQM_FL field. For relevant polygons, the product of the multiplier and the floor area total (FLAREA_SUM) for each polygon yielded a population estimate, which is stored in the POP_EST field.

4.3.5.5 Assumptions and issues

This method made several assumptions about the available data:

- Depressed households are the equivalent of informal settlers;
- The percentage of depressed households is the same as the percentage of informal settlers in each LGU;
- The depressed household percentages in 2011-2012 are the same as those reported in 2002;
- The land use mapping correctly defines the extent of Informal Settlements and the formally settled areas in each LGU;
- The Building Geometry Model is estimating the total floor area in each polygon accordingly; and
- Buildings in the Rural Production land uses are formal dwellings and are the usual place of residence for owners and employees.

The results for Pasig City, Makati City and Taguig City were excluded from the process, as the extent of these LGUs are disputed. No spatial data is available from the NSO that delineates the extent of the LGUs that relate to the final results of the 2010 Census (as understood by the NSO and the 2010 Census enumerators). The best option for these LGUs is to apply the mean rates calculated from the other LGUs.

The results for Pasay City data were also excluded, as there appear to be discrepancies between the informal settlement population total and the spatial extent of informal settlements shown in the land use mapping. This may be due the differences between the definition of Informal Settlement and Depressed Households (i.e. Depressed Households may legally own or rent the land on which they are residing). These discrepancies would result in a very high rate for informal settlement areas and a

very low rate for other areas. These unrealistic rates would also significantly affect the mean value calculation, and as such were excluded from the calculations.

4.3.6 Area-Based Approach – Compilation

The Compilation process of the Area-Based Approach involves some additional analysis of the available polygon data and the final calculations to complete the exposure information.

4.3.6.1 Preparing polygon data

Prior to compiling the exposure information into a single polygon dataset, preparation of supporting datasets was carried out. The most significant of these was the barangay boundary extents for the year 2000.

As previously discussed, data extracted from the 2000 Census of Population and Housing was used to develop the statistical profiles of residential use buildings across GMMA. In order to transfer those statistics to the appropriate exposure data polygons, a polygon dataset representing those barangay extents was needed. During the evaluation of the available data from the various custodians, issues of alignment and geometry were detected with the NSO 2000 version of the barangays. Other datasets were assessed and the MMEIRS version of barangay boundaries was selected as best available data for barangays in Metro Manila. This data was released in 2004 but developed during the 2002 study. Some minor edits were made to this dataset to ensure that land areas along Manila Bay were fully covered (where polygons had not previously extended to the coastline).

For areas outside of Metro Manila, barangay boundary data would also be required. Through the evaluation of data provided by individual LGUs, it was noted that barangay boundaries and LGU extents showed significant overlaps. To remove the confusion over the status of barangays outside of Metro Manila, a barangay dataset provided by NAMRIA was adopted. Along the boundary between Metro Manila LGUs and Rizal Province LGUs, some gaps were detected. To ensure that all land areas were accounted for, some manual adjustments of the NAMRIA boundaries were made to close these gaps. The edits generally involved the extrapolation of internal boundaries to meet the Metro Manila LGU extents.

To provide a unique identifier for the barangays polygons that was based on their official names, the attribute table included a new field that carries the concatenation of the LGU name and the barangay name (e.g. ‘Manila Barangay 144’, ‘Pasig San Antonio’).

To facilitate the transfer of population data to the appropriate exposure polygons, a 2010 version of the barangay boundaries for the project area was also prepared. The outer boundaries of Taguig City and Makati City had been modified in 2009, and since the City of Taguig had increased the number of barangays from 18 to 28, these changes needed to be reflected in a 2010 version of barangay polygons. An update of the 2002 boundary dataset (described previously) was made by infusing the new barangay polygon data provided by the Assessor’s Office of the City of Taguig. Where these areas overlap with polygons from adjacent LGUs, the Taguig City polygons take precedence.

4.3.6.2 Performing additional building geometry analysis

The additional analysis of building geometry (called Post-BGM Analysis) is undertaken in ArcGIS and managed in the ModelBuilder environment. This environment allows for the creation, management and execution of geoprocessing workflows in a user-friendly graphic interface. Tools from the ArcGIS Toolbox, as well as SQL queries and Python scripts, can be added and arranged to suit the required workflow. Four distinct stages of Post-BGM Analysis were developed as models in ModelBuilder:

1. Post-BGM Floor Area Calculations;
2. Application of Structural Lookup Tables;
3. Attachment of Era of Construction attributes; and
4. Estimation of Residential Population.

A final distribution of building sub-types was performed on the final attribute table for the exposure information in the R programming environment.

1. Stage 1 of the Post-BGM Analysis follows these steps:
 2. Create a File Geodatabase for an Area of Interest;
 3. Import BGM vector output 's12_BGM_landuse_statistics.shp' into the File Geodatabase;
 4. Add new fields to data copied in Step 2 to store:
 - a. the initial floor area totals for each UPD-ICE building type*;
 - b. floor area totals for the UPD-ICE height classes;
 - c. population rates;
 - d. estimated population per polygon;
 - e. Era of Construction attribute;
 - f. Aggregation Polygon ID;
 - g. LGU name; and
 - h. LGU and Barangay name combination for 2002.
5. Import the BGM raster output 's12_lu_mosaic' (which records the number of storeys for each cell) to the File Geodatabase;
6. Reclassify the raster from Step 4 into the following categories:

New Raster Dataset	Cell Value Range
flarea_l1	1
flarea_l2	2
flarea_m	3 – 7
flarea_h	8 – 15
flarea_v	16 – 25
flarea_e	26 – 35
flarea_s	36 - 100

7. For each polygon in the Area of Interest, calculate Zonal Statistics as Table to summarise statistics of the cells that reside within the extent of each polygon;

8. Iteratively join each table from Step 7 to the polygon dataset from Step 3 and transfer the sum of the floor area to the appropriate field (prefixed with FLAREA_ and the height class such as L1, L2 etc.).

* The fields added to store the UPD-ICE type include those at the top level of the classification schema, ignoring building height and construction period (such as W1, W2, W3, N etc.).

4.3.6.3 Applying structural Look Up Tables

In order to distribute the structural information developed for the various land use classes, three distinct processes are executed to transfer building statistics to:

- Areas of formalised residential usage;
- Informal Settlements; and
- Remaining non-residential land uses.

Stage 2 of the Post-BGM Analysis involves the execution of these distributions.

For the formalised residential usage areas, the process follows these steps:

1. Using the existing File Geodatabase, perform a Spatial Join between the output of Step 8 of the previous process (Stage 1) and the modified 2002 barangay boundaries;
2. Import the table for the barangay-level building floor area distributions into the File Geodatabase;
3. Perform a definition query for the polygon data to isolate polygons with the following Level 4 land uses:
 - a. Formal Settlements;
 - b. Rural Residential;
 - c. Agriculture;
 - d. Aquaculture;
 - e. Horticulture;
 - f. Livestock;
 - g. Market Gardening; and
 - h. Mixed Farming;
4. Perform a table join on the datasets, using the LGU and barangay combination as the unique identifier;
5. For each of the ten UPD-ICE building types available in the NSO-derived data, calculate the per-polygon floor area for each type (the product of FLAREA_SUM and the applicable multiplier from the table); and
6. Remove the table join.

For the non-residential usage areas, a similar process is followed:

7. Import the table for the non-residential building floor area distributions into the File Geodatabase;

8. Using the output of Step 6 from the previous process, perform a definition query isolate polygons with the applicable Level 4 land uses*;
9. Perform a table join on the datasets, using the Level 5 land use as the unique identifier;
10. For each of the UPD-ICE building types, calculate the per-polygon floor area for each type (the product of FLAREA_SUM and the applicable multiplier from the table); and
11. Remove the table join.

* The process described above requires additional steps to apply statistics to polygons defined as Accommodation, as this Level 5 land use currently exists for both Government and Major Commercial Level 4 land uses.

For the Informal Settlement areas, the process follows these steps:

1. Import the table for the Informal Settlement building floor area distributions into the File Geodatabase;
2. Using the output of Step 5 of the previous process, perform a definition query isolate polygons with the Level 4 land use of Informal Settlements;
3. Perform a definition query on the table imported at Step 1 to define the records from the applicable Province to use in the calculations;
4. Perform a table join on the datasets, using the Level 4 land use as the unique identifier;
5. For each of the five UPD-ICE building types, calculate the per-polygon floor area for each type (the product of FLAREA_SUM and the applicable multiplier from the table); and
6. Remove the table join.

4.3.6.4 Attaching Era Of Construction attributes

Stage 3 of the Post-BGM Analysis is designed for the transfer of the appropriate Era of Construction attributes to the polygons in the Area of Interest, and the following process is followed:

1. Create a copy the output of Step 6 of the previous process;
2. Run the tool to repair any geometry errors in the polygons;
3. Convert the polygon feature class to a point feature class, ensuring the new points are created within the boundary of the appropriate polygon feature;
4. Perform a spatial join between the point features in Step 3 and the final Era of Construction polygon dataset for the Area of Interest;
5. Delete the surplus fields from the output of Step 4;
6. Perform a spatial join between the output of Step 6 from the previous process and Step 5 of the current process;
7. Populate the ERA_CONST field with the appropriate field carried over during the spatial join;
8. Delete the surplus fields;
9. Create a copy of the output of Step 8 for manual editing;
10. In an editing session, check through the output of Step 8 to ensure all polygons received the appropriate Era of Construction and modify as necessary.

4.3.6.5 Estimating population

Stage 4 of the Post-BGM Analysis is designed for the transfer of the appropriate population rates to the exposure polygons and to calculate the population estimate, the process below is followed:

1. Perform a table join the output of Step 10 in the previous process with the modified 2010 barangay boundary polygon data (described earlier);
2. Create a copy of the result of Step 1;
3. Import the population rate Lookup Table into the File Geodatabase;
4. Perform a query on the result of Step 2 to isolate land uses that support formal settlement:
 - a. Level 5 uses: Residential, Mixed Residential and Small Commercial
 - b. Level 4 uses: Agriculture, Horticulture, Market Gardening and Mixed Farming
5. Perform a table join on the results of Step 4 and Step 3;
6. Calculate the POP_SQM_FL for the matching records;
7. Remove the join;
8. Perform a query on the result of Step 2 to isolate Informal Settlements;
9. Perform a table join on the results of Step 8 and Step 3;
10. Calculate the POP_SQM_FL for the matching records;
11. Remove the join;
12. Perform a query on the result of Step 2 to isolate land uses that support formal settlement and that had not been attributed with a LGU name;
13. Calculate the POP_SQM_FL with the mean population rate (previously computed) for the corresponding records from Step 12;
14. Perform a query on the result of Step 2 to isolate Informal Settlements that had not been attributed with a LGU name;
15. Calculate the POP_SQM_FL with the mean population rate (previously computed) for the corresponding records from Step 14;
16. For all exposure polygons, calculate the POP_EST field by multiplying the FLAREA_SUM value by the POP_SQM_FL value;
17. Delete surplus fields.

4.3.6.6 Finalising Area-Based exposure information

The final step in the preparation of the exposure polygons is the re-calculation of the value for OID1. This is done by adopting the OBJECTID or FID of the final output of the process. Recalculating the OID1 ensures that there are no duplicated values in this field.

Up to this point in the processing, the floor area of each polygon has only been distributed to the top level of the UPD-ICE classification schema (e.g. W1, C1, CWS etc.). The schema provides for the sub-classification buildings according to the height of the building, and vulnerability models have been developed according to the more detailed schema. In order to support the risk analysis calculations, the distribution of building floor area in the exposure data requires more detailed treatment.

A process has been developed that calculates the following information for each exposure polygon:

1. The contribution of floor area from buildings within each of the height classes;
2. The sum of the values from Step 1;
3. The contribution of the initial distribution of initial building classifications (equivalent to the multipliers from the Lookup Table appropriate to the land use for that polygon);
4. Beginning with Super High Rise (S), calculate for each height class:
 - a. The sum of the multipliers building types that can exist in that height class;
 - b. The inverse of the calculation at Step 4a;
 - c. The Level Percentage, which is a multiple of the value of Step 2 and Step 4a for each type;
 - d. The individual floor area for each building sub-type, which is calculated by multiplying the result of Step 2 and Step 4c;

For each polygon, the total floor area of all buildings made for all buildings in Step 4d should be equal to the sum calculated in Step 2.

The result is a table of floor area values for each of the building sub-types (including the additional sub-types for one storey and two storey buildings) in the UPD-ICE building schema. The resultant table is joined back to the output of Stage 4, and fields are renamed (if needed) to abbreviate the attribute description of each field. These values then enable the calculation of losses using the vulnerability models developed for:

- Building types with individual vulnerability models (e.g. W1-L-2, C1-M);
- Groups of building types for which a single vulnerability curve applies (e.g. all buildings in H, V, E and S height classes).

Figures 4.15 to 4.25 describe the sequence of the processing.



Figure 4.15: On the left, an example area is shown with aerial imagery over a high density area with a Mixed Residential and Small Commercial land use polygon selected. On the right, the same area is shown, with the raster output of the Building Geometry Model showing the number of storeys. Green areas show low number of storeys, whilst red areas show greater number of storeys.

OBJECTID	Shape	NAME	L5_USE	L4_USE	AREA_SQM
5582	Polygon		Mixed Residential and Small Commercial	Formal Settlements	20287.11861

Figure 4.16. Initial attributes of polygon from land use mapping.

OID1	FOOTPR_PC	FLAREA_SUM	STOR_MAX	STOR_MIN	STOR_RANGE	STOR_MED	STOR_MAJ	STOR_MIN	STOR_MEAN	STOR_STD
5584	0.628181865	48044	19	1	18	2	2	19	3.769929886	3.832920074

Figure 4.17. Building Geometry Model calculations for polygon.

W1	W2	W3	N	CHB	URA	URM	RM1	RM2	MWS	CWS	C1	C2	C4	PC1	PC2	S1	S2	S3	S4
4585.55958	0	0	385.79332	5824.61434	143.939824	3.84352	0	0	7882.242772	14458.31332	14607.05754	0	0	0	0	152.587744	0	0	0

Figure 4.18. Initial distribution of building floor area for polygon (based on conversion of NSO 2000 data to UPD-ICE types).

FLAREA_L1	FLAREA_L2	FLAREA_M	FLAREA_H	FLAREA_V	FLAREA_E	FLAREA_S
2756	7606	19482	6163	11817	0	0

Figure 4.19. Post-BGM Analysis for polygon, showing distribution of floor area per height class.

SUM OF FLAREA_X 47824

Figure 4.20. The sum of FLAREA_L1, FLAREA_L2 etc. for the polygon. This varies slightly from the FLAREA_SUM value due to geoprocessing artefacts.

FLAREA_L1 (%)	0.057627969
FLAREA_L2 (%)	0.159041485
FLAREA_M (%)	0.407368685
FLAREA_H (%)	0.128868351
FLAREA_V (%)	0.24709351
FLAREA_E (%)	0
FLAREA_S (%)	0

W1 (%)	0.095445
W2 (%)	0
W3 (%)	0
N (%)	0.00803
CHB (%)	0.121235
URA (%)	0.002996
URM (%)	0.00008
RM1 (%)	0
RM2 (%)	0
MWS (%)	0.164063
CWS (%)	0.300939
C1 (%)	0.304035
C2 (%)	0
C4 (%)	0
PC1 (%)	0
PC2 (%)	0
S1 (%)	0.003176
S2 (%)	0
S3 (%)	0
S4 (%)	0

Figure 4.21. The table on the left shows floor areas of each height class as a proportion of SUM OF FLAREA_X (expressed as a percentage) for the polygon. The table on the right shows the contributions of each building type, according to NSO --> UPD-ICE type conversion, when distributed across FLAREA_SUM (expressed as a percentage) for the polygon.

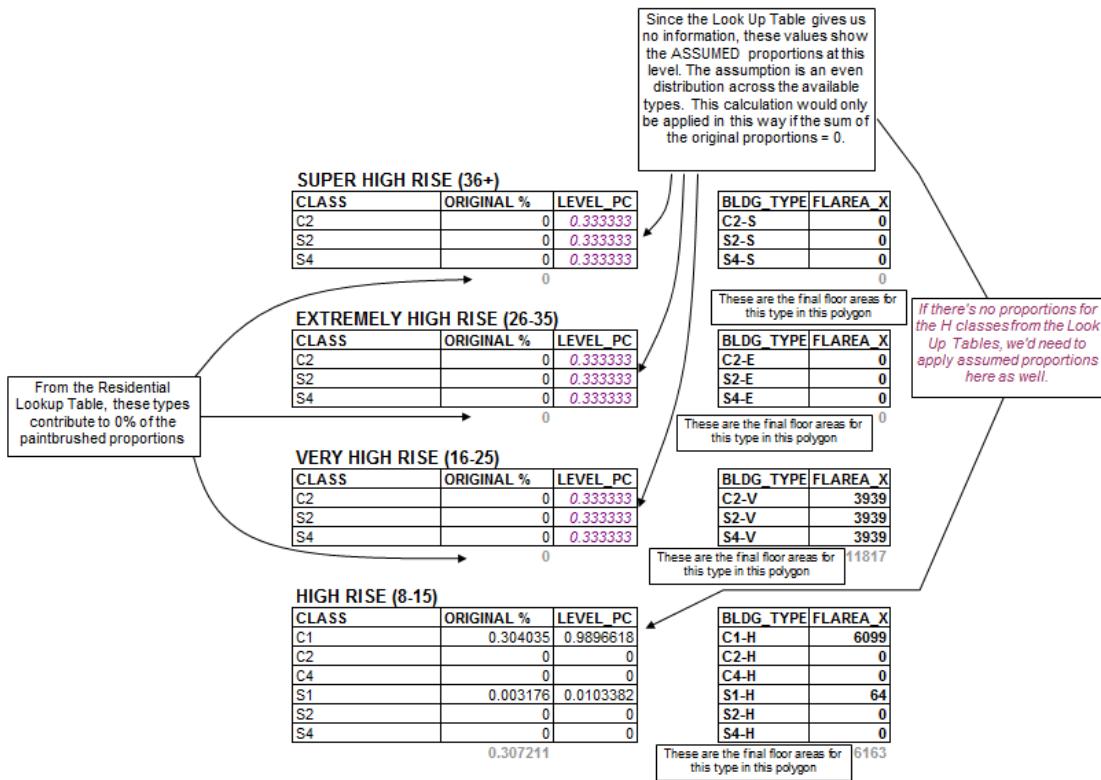


Figure 4.22. The distribution of floor areas for H, V, E and S height class buildings in the polygon

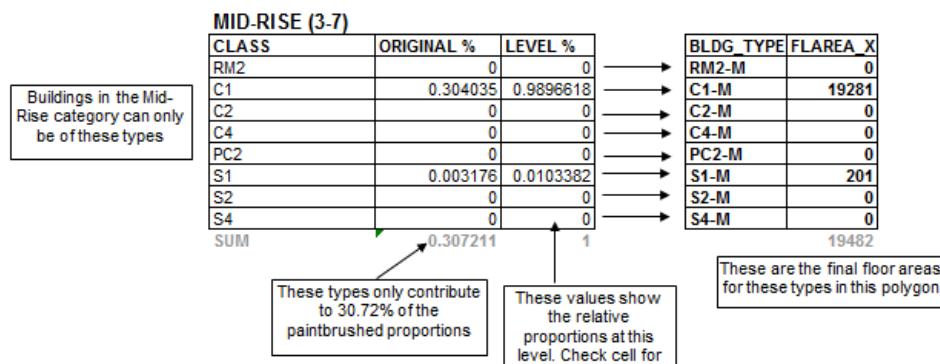


Figure 4.23. The distribution of floor areas for M height class buildings in the polygon

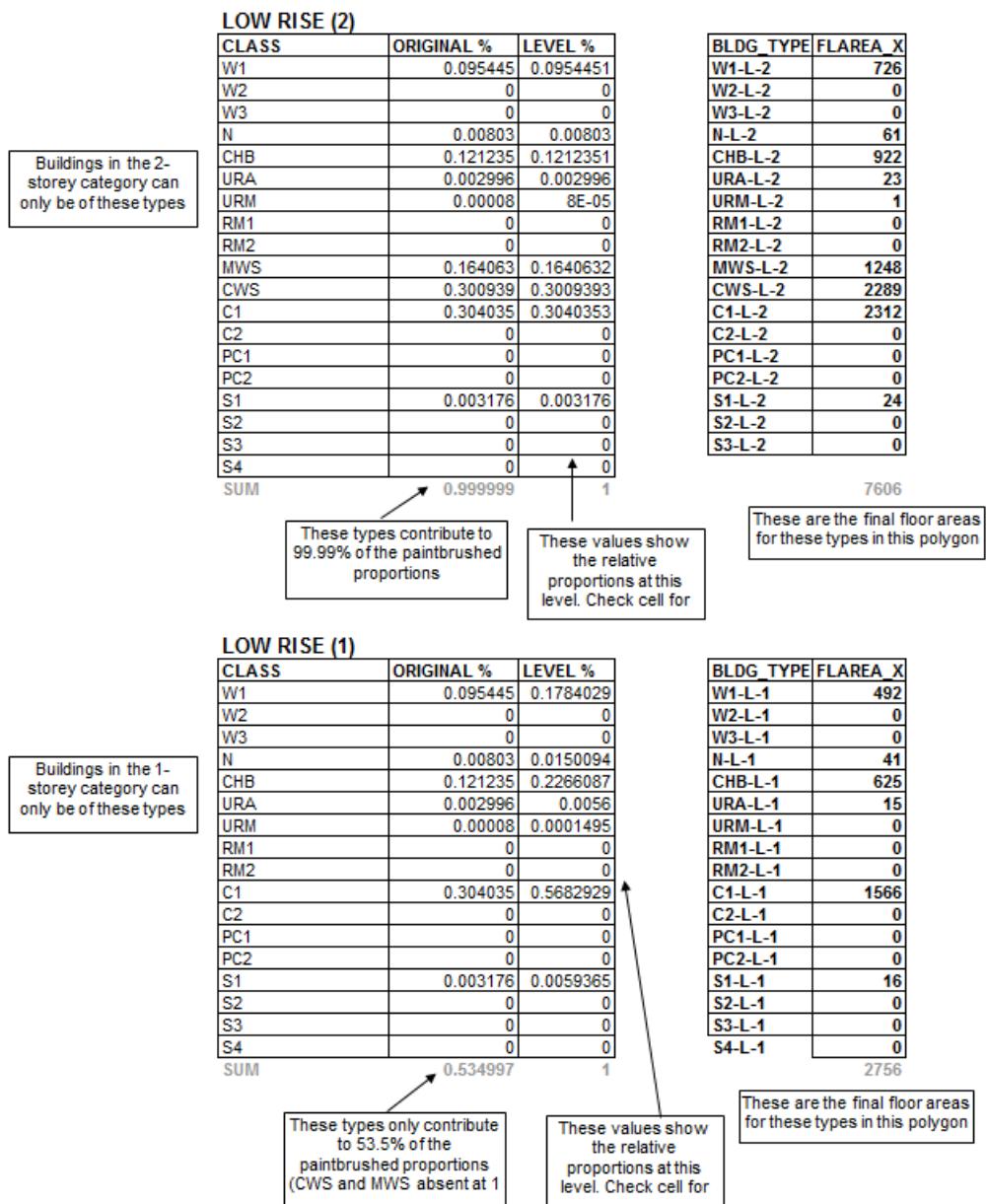


Figure 4.24. The distribution of floor areas for L1 and L2 height class buildings in the polygon.

WOOD	W1	W1-L-1	492	CONCRETE	CWS	CWS-L-2	2289	STEEL	S1	S1-L-1	16
		W1-L-2	726			C1-L-1	1566			S1-L-2	24
	W2	W2-L-1	0		C1	C1-L-2	2312		S1-M	201	
		W2-L-2	0			C1-M	19281		S1-H	64	
	W3	W3-L-1	0		C2	C1-H	6099		S2-L-1	0	
		W3-L-2	0			C2-L-1	0		S2-L-2	0	
MASONRY	N	N-L-1	41			C2-L-2	0		S2-M	0	
		N-L-2	61			C2-M	0		S2-H	0	
	CHB	CHB-L-1	625		C4	C2-H	0		S2-V	3939	
		CHB-L-2	922			C2-V	3939		S2-E	0	
	URA	URA-L-1	15			C2-E	0		S2-S	0	
		URA-L-2	23			C2-S	0		S3-L-1	0	
MASONRY	URM	URM-L-1	0		C4	C4-M	0		S3-L-2	0	
		URM-L-2	1			C4-H	0		S4-L-1	0	
	RM1	RM1-L-1	0		PC1	PC1-L-1	0		S4-L-2	0	
		RM1-L-2	0			PC1-L-2	0		S4-M	0	
	RM2	RM2-L-1	0		PC2	PC2-L-1	0		S4-H	0	
		RM2-L-2	0			PC2-L-2	0		S4-V	3939	
	MWS	MWS-L-1	0			PC2-M	0		S4-E	0	
		MWS-L-2	1248						S4-S	0	

Figure 4.25. The final distribution of floor areas across all buildings in the polygon.

Table 4.12 summarises the attributes of the final feature class and shapefile for the Area-Based Approach exposure information.

Table 4.12. Final fields in the attribute table for the compiled exposure data.

Field Name	Brief Description
OBJECTID /	Automatically generated unique identifier for polygon (generated by ArcGIS)
NAME	Name of the area or facility
L5_USE	Level 5 Land Use (as per Exposure Database Framework)
L4_USE	Level 4 Land Use (as per Exposure Database Framework)
AREA_SQM	Area of polygon in m ²
OID1	A unique identifier for the polygon
FOOTPR_PC	Percentage of the horizontal area of the polygon that is covered by a building or
FLAREA_SUM	The total estimated floor area for all buildings within the polygon
STOR_MAX	The maximum number of storeys detected in buildings within the polygon
STOR_MIN	The minimum number of storeys detected in buildings within the polygon
STOR_RANGE	The range of storeys detected in buildings within the polygon
STOR_MED	The median value of storeys for buildings within the polygon
STOR_MAJ	The majority number of storeys detected in buildings within the polygon
STOR_MNR	The minority number of storeys detected in buildings within the polygon
STOR_MEAN	The mean number of storeys detected in buildings within the polygon
STOR_STD	The standard deviation of the number of storeys detected in buildings within the polygon
W1	Total floor area for buildings of type W1
W2	Total floor area for buildings of type W2
W3	Total floor area for buildings of type W3
N	Total floor area for buildings of type N
CHB	Total floor area for buildings of type CHB
URA	Total floor area for buildings of type URA
URM	Total floor area for buildings of type URM
RM1	Total floor area for buildings of type RM1
RM2	Total floor area for buildings of type RM2
MWS	Total floor area for buildings of type MWS
CWS	Total floor area for buildings of type CWS
C1	Total floor area for buildings of type C1
C2	Total floor area for buildings of type C2
C4	Total floor area for buildings of type C4
PC1	Total floor area for buildings of type PC1
PC2	Total floor area for buildings of type PC2
S1	Total floor area for buildings of type S1
S2	Total floor area for buildings of type S2
S3	Total floor area for buildings of type S3
S4	Total floor area for buildings of type S4
FLAREA_L1	Total floor area for buildings in sub-type L (1 storey)

Field Name	Brief Description
FLAREA_L2	Total floor area for buildings in sub-type L (2 storeys)
FLAREA_M	Total floor area for buildings in sub-type M (3 - 7 storeys)
FLAREA_H	Total floor area for buildings in sub-type H (8 - 15 storeys)
FLAREA_V	Total floor area for buildings in sub-type V (16 - 25 storeys)
FLAREA_E	Total floor area for buildings in sub-type E (26 - 35 storeys)
FLAREA_S	Total floor area for buildings in sub-type S (36 storeys and higher)
POP_SQM_FL	Estimated number of people per square meter of floor area
POP_EST	Estimated number of people (residential population) for the polygon
ERA_CONST	The dominant era of construction of buildings within the polygon
AGG_POLY	A placeholder for a code for an aggregation polygon identifier (currently empty)
Shape_Area	Area of the polygon in m ² (automatically computed by ArcGIS)
Shape_Length	Length of the perimeter of the polygon in meters (automatically computed by ArcGIS)
COMP_NOTES	A placeholder for making notes, observations or comments about the polygon (currently empty)
W1_L_1	Total floor area for buildings of type W1-L (1 storey)
W2_L_1	Total floor area for buildings of type W2-L (1 storey)
W3_L_1	Total floor area for buildings of type W3-L (1 storey)
N_L_1	Total floor area for buildings of type N-L (1 storey)
CHB_L_1	Total floor area for buildings of type CHB-L (1 storey)
URA_L_1	Total floor area for buildings of type URA-L (1 storey)
URM_L_1	Total floor area for buildings of type URM-L (1 storey)
RM1_L_1	Total floor area for buildings of type RM1-L (1 storey)
RM2_L_1	Total floor area for buildings of type RM2-L (1 storey)
MWS_L_1	Total floor area for buildings of type MWS-L (1 storey)
CWS_L_1	Total floor area for buildings of type CWS-L (1 storey)
C1_L_1	Total floor area for buildings of type C1-L (1 storey)
C2_L_1	Total floor area for buildings of type C2-L (1 storey)
C4_L_1	Total floor area for buildings of type C4-L (1 storey)
PC1_L_1	Total floor area for buildings of type PC1-L (1 storey)
PC2_L_1	Total floor area for buildings of type PC2-L (1 storey)
S1_L_1	Total floor area for buildings of type S1-L (1 storey)
S2_L_1	Total floor area for buildings of type S2-L (1 storey)
S3_L_1	Total floor area for buildings of type S3-L (1 storey)
S4_L_1	Total floor area for buildings of type S4-L (1 storey)
W1_L_2	Total floor area for buildings of type W1-L (2 storeys)
W2_L_2	Total floor area for buildings of type W2-L (2 storeys)
W3_L_2	Total floor area for buildings of type W3-L (2 storeys)
N_L_2	Total floor area for buildings of type N-L (2 storeys)
CHB_L_2	Total floor area for buildings of type CHB-L (2 storeys)
URA_L_2	Total floor area for buildings of type URA-L (2 storeys)
URM_L_2	Total floor area for buildings of type URM-L (2 storeys)
RM1_L_2	Total floor area for buildings of type RM1-L (2 storeys)
RM2_L_2	Total floor area for buildings of type RM2-L (2 storeys)

Field Name	Brief Description
MWS_L_2	Total floor area for buildings of type MWS-L (2 storeys)
CWS_L_2	Total floor area for buildings of type CWS-L (2 storeys)
C1_L_2	Total floor area for buildings of type C1-L (2 storeys)
C2_L_2	Total floor area for buildings of type C2-L (2 storeys)
C4_L_2	Total floor area for buildings of type C4-L (2 storeys)
PC1_L_2	Total floor area for buildings of type PC1-L (2 storeys)
PC2_L_2	Total floor area for buildings of type PC2-L (2 storeys)
S1_L_2	Total floor area for buildings of type S1-L (2 storeys)
S2_L_2	Total floor area for buildings of type S2-L (2 storeys)
S3_L_2	Total floor area for buildings of type S3-L (2 storeys)
S4_L_2	Total floor area for buildings of type S4-L (2 storeys)
W1_M	Total floor area for buildings of type W1-M (3-7 storeys)
W2_M	Total floor area for buildings of type W2-M (3-7 storeys)
W3_M	Total floor area for buildings of type W3-M (3-7 storeys)
N_M	Total floor area for buildings of type N-M (3-7 storeys)
CHB_M	Total floor area for buildings of type CHB-M (3-7 storeys)
URA_M	Total floor area for buildings of type URA-M (3-7 storeys)
URM_M	Total floor area for buildings of type URM-M (3-7 storeys)
RM1_M	Total floor area for buildings of type RM1-M (3-7 storeys)
RM2_M	Total floor area for buildings of type RM2-M (3-7 storeys)
MWS_M	Total floor area for buildings of type MWS-M (3-7 storeys)
CWS_M	Total floor area for buildings of type CWS-M (3-7 storeys)
C1_M	Total floor area for buildings of type C1-M (3-7 storeys)
C2_M	Total floor area for buildings of type C2-M (3-7 storeys)
C4_M	Total floor area for buildings of type C4-M (3-7 storeys)
PC1_M	Total floor area for buildings of type PC1-M (3-7 storeys)
PC2_M	Total floor area for buildings of type PC2-M (3-7 storeys)
S1_M	Total floor area for buildings of type S1-M (3-7 storeys)
S2_M	Total floor area for buildings of type S2-M (3-7 storeys)
S3_M	Total floor area for buildings of type S3-M (3-7 storeys)
S4_M	Total floor area for buildings of type S4-M (3-7 storeys)
W1_H	Total floor area for buildings of type W1-H (8-15 storeys)
W2_H	Total floor area for buildings of type W2-H (8-15 storeys)
W3_H	Total floor area for buildings of type W3-H (8-15 storeys)
N_H	Total floor area for buildings of type N-H (8-15 storeys)
CHB_H	Total floor area for buildings of type CHB-H (8-15 storeys)
URA_H	Total floor area for buildings of type URA-H (8-15 storeys)
URM_H	Total floor area for buildings of type URM-H (8-15 storeys)
RM1_H	Total floor area for buildings of type RM1-H (8-15 storeys)
RM2_H	Total floor area for buildings of type RM2-H (8-15 storeys)
MWS_H	Total floor area for buildings of type MWS-H (8-15 storeys)
CWS_H	Total floor area for buildings of type CWS-H (8-15 storeys)

Field Name	Brief Description
C1_H	Total floor area for buildings of type C1-H (8-15 storeys)
C2_H	Total floor area for buildings of type C2-H (8-15 storeys)
C4_H	Total floor area for buildings of type C4-H (8-15 storeys)
PC1_H	Total floor area for buildings of type PC1-H (8-15 storeys)
PC2_H	Total floor area for buildings of type PC2-H (8-15 storeys)
S1_H	Total floor area for buildings of type S1-H (8-15 storeys)
S2_H	Total floor area for buildings of type S2-H (8-15 storeys)
S3_H	Total floor area for buildings of type S3-H (8-15 storeys)
S4_H	Total floor area for buildings of type S4-H (8-15 storeys)
W1_V	Total floor area for buildings of type W1-V (16-25 storeys)
W2_V	Total floor area for buildings of type W2-V (16-25 storeys)
W3_V	Total floor area for buildings of type W3-V (16-25 storeys)
N_V	Total floor area for buildings of type N-V (16-25 storeys)
CHB_V	Total floor area for buildings of type CHB-V (16-25 storeys)
URA_V	Total floor area for buildings of type URA-V (16-25 storeys)
URM_V	Total floor area for buildings of type URM-V (16-25 storeys)
RM1_V	Total floor area for buildings of type RM1-V (16-25 storeys)
RM2_V	Total floor area for buildings of type RM2-V (16-25 storeys)
MWS_V	Total floor area for buildings of type MWS-V (16-25 storeys)
CWS_V	Total floor area for buildings of type CWS-V (16-25 storeys)
C1_V	Total floor area for buildings of type C1-V (16-25 storeys)
C2_V	Total floor area for buildings of type C2-V (16-25 storeys)
C4_V	Total floor area for buildings of type C4-V (16-25 storeys)
PC1_V	Total floor area for buildings of type PC1-V (16-25 storeys)
PC2_V	Total floor area for buildings of type PC2-V (16-25 storeys)
S1_V	Total floor area for buildings of type S1-V (16-25 storeys)
S2_V	Total floor area for buildings of type S2-V (16-25 storeys)
S3_V	Total floor area for buildings of type S3-V (16-25 storeys)
S4_V	Total floor area for buildings of type S4-V (16-25 storeys)
W1_E	Total floor area for buildings of type W1-E (26-35 storeys)
W2_E	Total floor area for buildings of type W2-E (26-35 storeys)
W3_E	Total floor area for buildings of type W3-E (26-35 storeys)
N_E	Total floor area for buildings of type N-E (26-35 storeys)
CHB_E	Total floor area for buildings of type CHB-E (26-35 storeys)
URA_E	Total floor area for buildings of type URA-E (26-35 storeys)
URM_E	Total floor area for buildings of type URM-E (26-35 storeys)
RM1_E	Total floor area for buildings of type RM1-E (26-35 storeys)
RM2_E	Total floor area for buildings of type RM2-E (26-35 storeys)
MWS_E	Total floor area for buildings of type MWS-E (26-35 storeys)
CWS_E	Total floor area for buildings of type CWS-E (26-35 storeys)
C1_E	Total floor area for buildings of type C1-E (26-35 storeys)
C2_E	Total floor area for buildings of type C2-E (26-35 storeys)

Field Name	Brief Description
C4_E	Total floor area for buildings of type C4-E (26-35 storeys)
PC1_E	Total floor area for buildings of type PC1-E (26-35 storeys)
PC2_E	Total floor area for buildings of type PC2-E (26-35 storeys)
S1_E	Total floor area for buildings of type S1-E (26-35 storeys)
S2_E	Total floor area for buildings of type S2-E (26-35 storeys)
S3_E	Total floor area for buildings of type S3-E (26-35 storeys)
S4_E	Total floor area for buildings of type S4-E (26-35 storeys)
W1_S	Total floor area for buildings of type W1-S (36+ storeys)
W2_S	Total floor area for buildings of type W2-S (36+ storeys)
W3_S	Total floor area for buildings of type W3-S (36+ storeys)
N_S	Total floor area for buildings of type N-S (36+ storeys)
CHB_S	Total floor area for buildings of type CHB-S (36+ storeys)
URA_S	Total floor area for buildings of type URA-S (36+ storeys)
URM_S	Total floor area for buildings of type URM-S (36+ storeys)
RM1_S	Total floor area for buildings of type RM1-S (36+ storeys)
RM2_S	Total floor area for buildings of type RM2-S (36+ storeys)
MWS_S	Total floor area for buildings of type MWS-S (36+ storeys)
CWS_S	Total floor area for buildings of type CWS-S (36+ storeys)
C1_S	Total floor area for buildings of type C1-S (36+ storeys)
C2_S	Total floor area for buildings of type C2-S (36+ storeys)
C4_S	Total floor area for buildings of type C4-S (36+ storeys)
PC1_S	Total floor area for buildings of type PC1-S (36+ storeys)
PC2_S	Total floor area for buildings of type PC2-S (36+ storeys)
S1_S	Total floor area for buildings of type S1-S (36+ storeys)
S2_S	Total floor area for buildings of type S2-S (36+ storeys)
S3_S	Total floor area for buildings of type S3-S (36+ storeys)
S4_S	Total floor area for buildings of type S4-S (36+ storeys)

4.4 Feature-Based Approach - Spatial Data Processes

4.4.1 Definition of features for inclusion

Following the first Vulnerability Workshop in February 2013, agreements were reached about the inclusion of exposure information for Potentially Wind Sensitive Structures, namely:

- Billboards;
- Power transmission towers; and
- Broadcasting and telecommunications towers.

4.4.2 Advantages of stereo-imagery

The stereo-imagery described in Chapter 3.3.1.3 provided a unique opportunity for a Feature-Based Approach to exposure information development. With appropriate hardware, software and expertise, the stereo-imagery can be used to measure the height (above the ground or above Mean Sea Level) of a range of elevated structures. It is particularly helpful for structures with a lattice frame or whose components are quite narrow. These structures might not be adequately detected in a LiDAR survey unless the point cloud density is very high. It is also possible to capture the shape and orientation of particular components of these features of interest.

Through the manual measurement of the heights or elevation from stereo-imagery, and the post-capture calculation of other geometry properties, this type of spatial data can be re-organised into exposure information for critical infrastructure or other significant structures.

4.4.3 Data capture from stereo-imagery

The Photogrammetry Division of NAMRIA managed the capture of the three dimensional data for billboards, power transmission towers, medium-high voltage power distribution posts and broadcast towers using stereo-imagery during 2012. The majority of billboards captured are those located next to major thoroughfares in Metro Manila and Rizal Province, whilst the power transmission towers were mostly located along two branches connected to the Sucat power plant in Muntinlupa City.

The distribution of captured features is shown in Figure A.7 in Appendix A.

4.4.4 Post-processing of captured data

Following the capture of Potentially Wind Sensitive Structures via stereo-imagery, additional processing and spatial analysis is performed in the ArcGIS environment. Additional geometric parameters are determined to support the needs of Severe Wind risk analysis, and placeholders are added for qualitative attributes (which are provided from manual interpretation of the spatial data or provided by other data custodians).

The desirable attributes for Billboards are:

- Type of Billboard (Free-Standing or Mounted);
- Foundation Type (On Ground or On Building);
- Elevation (top of structure, above mean sea level);
- Foundation Height (from the foundation to top of structure, in metres);
- Total Height (height of the structure and foundation, in metres);
- Footprint Shape (description such as Square, Rectangular, V-Shaped etc.);
- Footprint Area (in square metres);
- Signage Material (such as Tarpaulin, Steel or Electronic);
- Signage Width (in metres);
- Signage Height (in metres);
- Welding Type (Shop Welded or Site Welded);
- Year of Construction;

- Coordinates; and
- Azimuth of Long and Cross Sections.

The desirable attributes for Power Transmission Towers are:

- Circuit Type (Single, Double or Multiple);
- Conductor material (All Aluminium or Steel-Core Aluminium);
- Function of Tower (Corner or Regular);
- Footprint Orientation (shape such as Square, Rectangular);
- Height of Tower (from its foundation, in metres);
- Structure Type (Lattice or Monopole);
- Welding Type (Shop Welded or Site Welded)
- Year of Construction; and
- Coordinates (at centre of tower).

Figure 4.26 and 4.27 explain the geometric attributes of the Billboards and Power Transmission Towers.

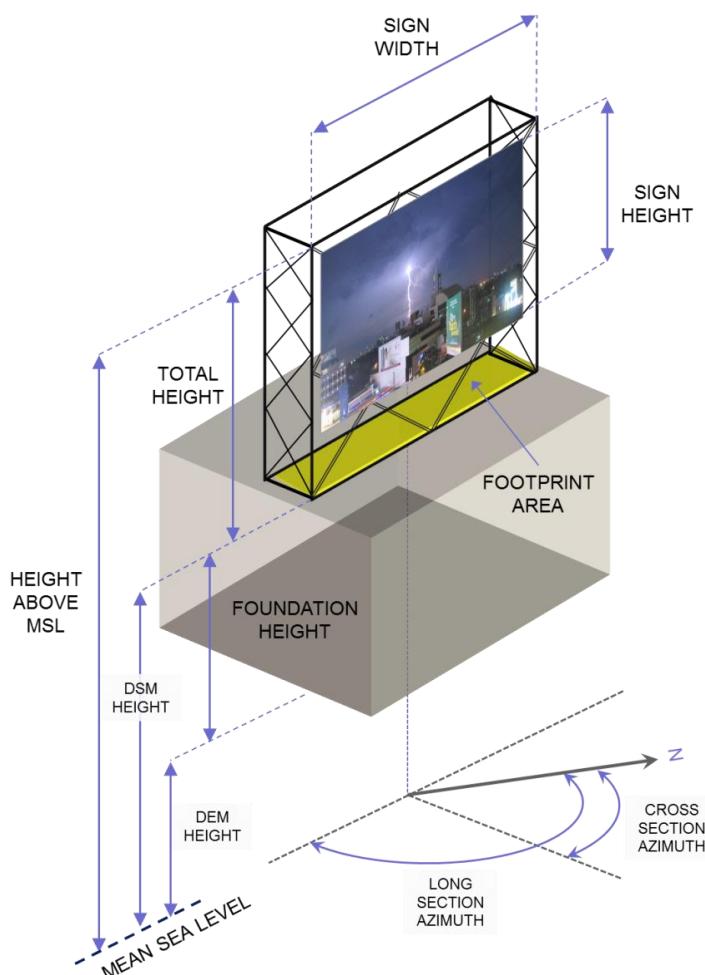


Figure 4.26. The geometric properties of a theoretical Billboard.

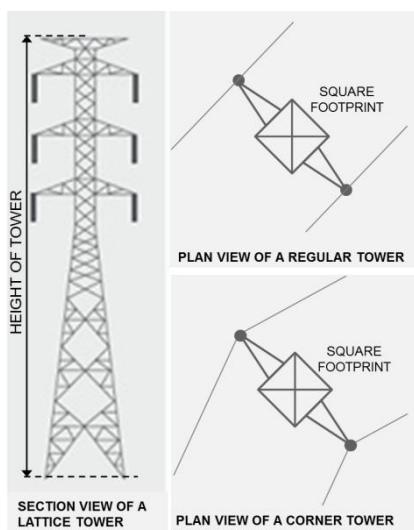


Figure 4.27. The geometric properties of a theoretical Power Transmission Tower (Section View image sourced from South Australian Government website).

The process for preparing the Billboards commences with the creation a new File Geodatabase to store intermediate and final results. The process then requires treatment of the Billboards captured as polygons:

1. Convert the polygon vertices to points;
2. Use the Add XY Coordinates tool on the result of Step 1 to obtain the height (above MSL) of each vertex;
3. Add fields to store the height (MSL) value and the DEM and DSM value at each vertex;
4. Run the Extract Values to Points tool on the result of Step 3, using the DEM as the reference surface;
5. Calculate the DEM value for each vertex;
6. Run the Extract Values to Points tool on the result of Step 5, using the DSM as the reference surface;
7. Calculate the DSM value for each vertex;
8. Run the Calculate Statistics tool on the result of Step 7 to calculate the mean DEM value and minimum DSM for each billboard;
9. Add fields to the result of Step 7 to store the Total Height and Foundation Height;
10. Perform a table join on the results of Step 9 and Step 8;
11. Calculate the values for Total Height and Foundation Height;
12. Remove the join;
13. Add a field to store the Foundation Type;
14. Perform a query on the result of Step 13 to isolate billboards with a Foundation Height of less than 3 metres;
15. Calculate the Foundation Type to be On Ground;
16. Perform a query on the result of Step 13 to isolate billboards with a Foundation Height of 3 metres or greater;
17. Calculate the Foundation Type to be On Building;

18. Perform a query on the result of Step 13 to select buildings that received a DEM height value (to exclude those outside of the LiDAR coverage area);
19. Run the Spatial Statistics tool on the result of Step 18 to collapse DEM and DSM height statistics for each billboard's unique ID;
20. Perform a table join on the results of Step 19 and the input to Step 1;
21. Create a new File Geodatabase to store the final outputs;
22. Create a new feature class in the File Geodatabase, using a pre-existing feature class as a template for field names and settings;
23. Append the results of Step 20 into the new feature class from Step 22, adjusting the field mapping to remove the field prefix FIRST_ (created after the join);
24. Repair the geometry of the exported polygons;
25. Calculate the footprint area of the billboard in m²;
26. Run the Minimum Bounding Geometry tool to calculate the 2D geometric properties of the polygon;
27. Perform a table join on the results of Step 24 and Step 21;
28. Calculate the fields for the Sign Width, Long Section Azimuth and Section Azimuth;
29. Remove the join; and
30. Convert the polygons to points (located at the centroid of the polygon).

For the Billboards captured as polylines is much the same, however the creation of vertices and the usage of the Minimum Bounding Geometry tool are performed with some minor differences. At the end of the polyline process, the result is appended to the output of Step 28 from the polygon process to create a final point feature class for Billboards.

For the enhancement of the Power Transmission Towers data, two feature classes are available for use:

- Base of tower: Polygon feature class
- Top of tower: Point feature class at centre of each circuit on the tower

The process for preparing the final Power Transmission Towers data follows these steps:

1. Copy the available polygons for the base of the towers to the File Geodatabase created for the Billboards;
2. Add fields to the copy in Step 1 to store the height (above MSL) for the Base and Top of the tower;
3. Convert the vertices of the polygons used as input for Step 1 to points;
4. Run the Add XY Coordinates tool on the result of Step 3 to obtain the height (above MSL) of each vertex;
5. Perform a table join on the results of Step 2 and Step 4 and create a copy of the joined dataset;
6. Transfer the base height value into the appropriate field created in Step 2;
7. Delete any surplus fields;
8. Copy the circuit point features into the File Geodatabase;

9. Run the Add XY Coordinates tool on the result of Step 8 to obtain the height (above MSL) of each point;
10. Delete surplus fields;
11. Perform a Spatial Join on the results of Step 7 and Step 10, specifying the Match Option to be Closest (to join the circuit point that is closest to the base polygon);
12. Calculate the values appropriate to the Elevation field;
13. Add a new field to carry the Total Height value and calculate the value from the appropriate join field;
14. Add a new field to carry the Foundation Height value and calculate the value from the appropriate join field;
15. Delete surplus fields;
16. Create a new feature class in the File Geodatabase created in Step 21 of the Billboards process, using a pre-existing feature class as a template for field names and settings;
17. Append the result of Step 15 into the feature class created in Step 16;
18. Repair the geometry of the polygons from Step 17;
19. Calculate the polygon area in m²; and
20. Convert the polygons to points.

4.4.4.1 Assumptions and issues

Several assumptions were made in the development of data for the Potentially Wind Sensitive Structures:

- The capture of the structures within the project extents is complete;
- The vertical datum used in the stereo-imagery data capture is identical to the datum adopted for the LiDAR data;
- The horizontal footprints of the features are accurately captured;
- The conversion of polyline data to polygon data results in realistic horizontal footprints;
- The calculation of the mean DEM height value is a reasonable approximation of the ground height below the structure; and
- The selection of the minimum DSM height value is a reasonable approximation of the foundation.

A post-processing check of the outputs against the aerial imagery shows a good agreement with the imagery. In most cases, the Foundation Type attribute for Billboards agrees with the feature's location in the imagery. The Foundation Height agrees well when compared to the LiDAR DEM and DSM data. However, in some cases where the billboard is close to the edge of the building, the DSM value falls on the ground and results in the misclassification of the Foundation Type. There are also some cases where the DSM value extraction has included a value from within the elevated part of the billboard, thus distorting the Foundation Height and Total Height.

The post-processing of the raw data for the structures only yields some of the attributes required for a risk analysis. Additional qualitative attributes need to be acquired through:

- Addition of information stored in asset management systems or hard copy records; and/or

- Field survey and visual inspection of each structure.

This additional data fusion was not undertaken during this project, owing to time and resource constraints. There are also security implications when such spatial data is combined with additional attribute information for these structures. These security issues were not dealt with in the scope of this project.

5 Results

5.1 Exposure Information Development – Taguig City (Phase 1)

5.1.1 Area of Interest

The Area of Interest for Phase 1 was provided by the Planning Office of the City of Taguig. This defined the extent of Taguig City as of 2011.

5.1.2 Barangay Boundaries

Along with the Area of Interest, the boundaries for the 28 barangays within Taguig City were provided as a polygon dataset from the Planning Office of the City of Taguig.

5.1.3 Non-Developable Areas and Developable Land Areas

Through the data sourced from NAMRIA and from the MMEIRS data repository, the Road Edge data for Taguig City was sourced and converted from line to polygon. This process required editing of the data to ensure that closed polygons were created during the conversion process.

5.1.4 Land Use Mapping

The first attempt at land use mapping was made with the involvement of the Exposure Technical Working Group in July 2011. Participants from CSCAND agencies, City of Taguig officials and members of other national government agencies assisted with the identification of critical facilities and classification of those areas using the Exposure Database Framework. At that time, separate polygon datasets were created and distributed to participants, who captured the land use extents based on local knowledge and evidence provided by the City of Taguig and others. These polygons were harmonised into a single polygon dataset for all land uses in Taguig City.

Efforts were made to validate this data through field inspection in several barangays of Taguig City. An example of a validation map is shown in Figure 5.1. Maps such as these were taken to the field and used to check that actual land use against the use classification recorded on the map. Comments made during the field inspection were applied to an edited version of the land use dataset, which reflected the actual land use as observed in the field. This edited dataset was finalised and included in the data package for the Phase 1 product delivery.

5.1.5 Data package

Along with the abovementioned datasets, other information provided in a data package included:

- Building footprints for the Level 3 Critical Facility areas and some limited residential areas (sourced from MMEIRS);

- Tables summarising additional attributes for Critical Facilities;
- A product description for the spatial and non-spatial datasets.

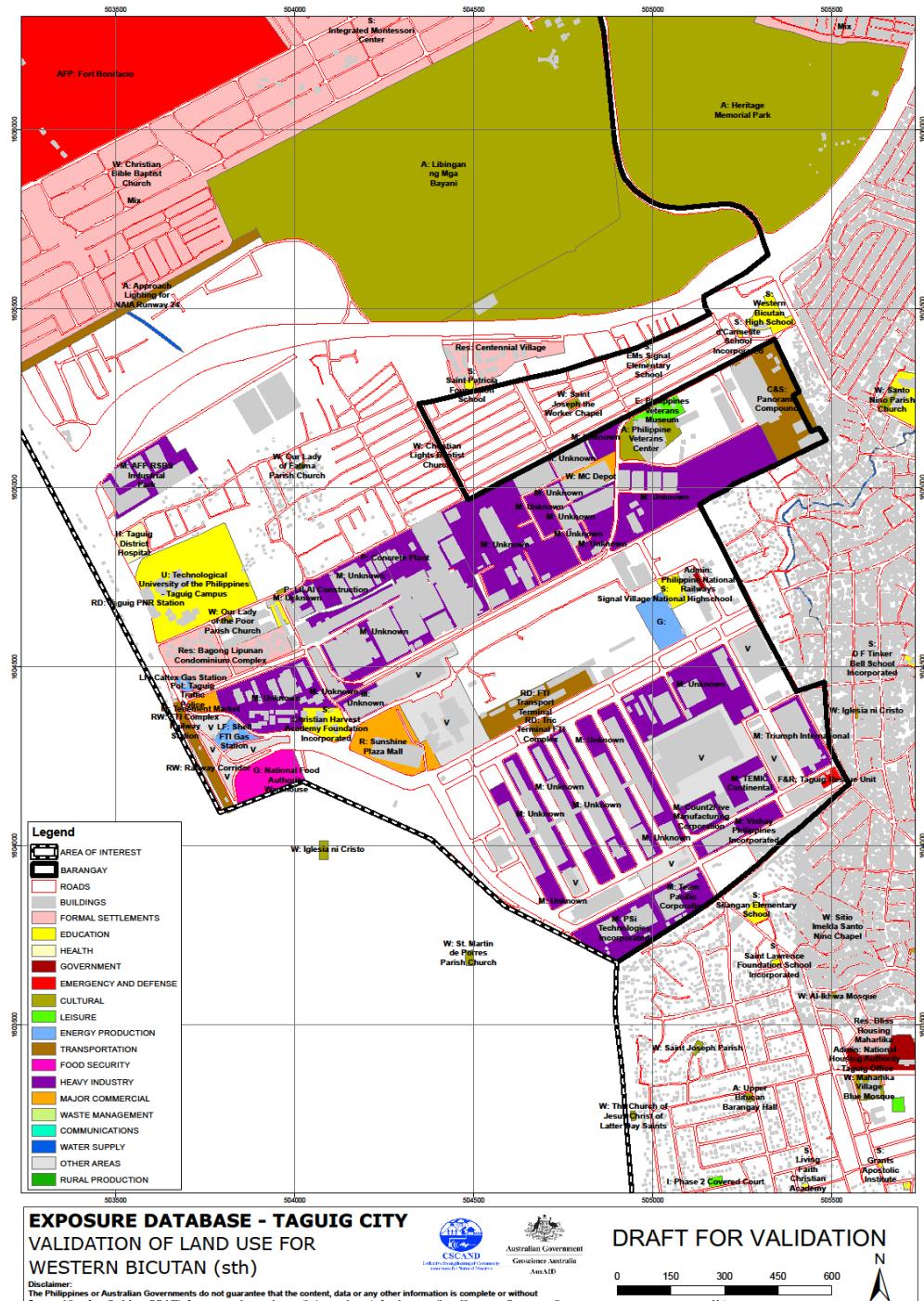


Figure 5.1. Example of land use validation map for Western Bicutan (prior to comments being added during a field inspection).

5.2 Exposure information development – remaining areas (Phase 2)

The development of exposure information was performed for all areas in Phase 2 of the activity using the process described in the flowchart in Figure 5.2.

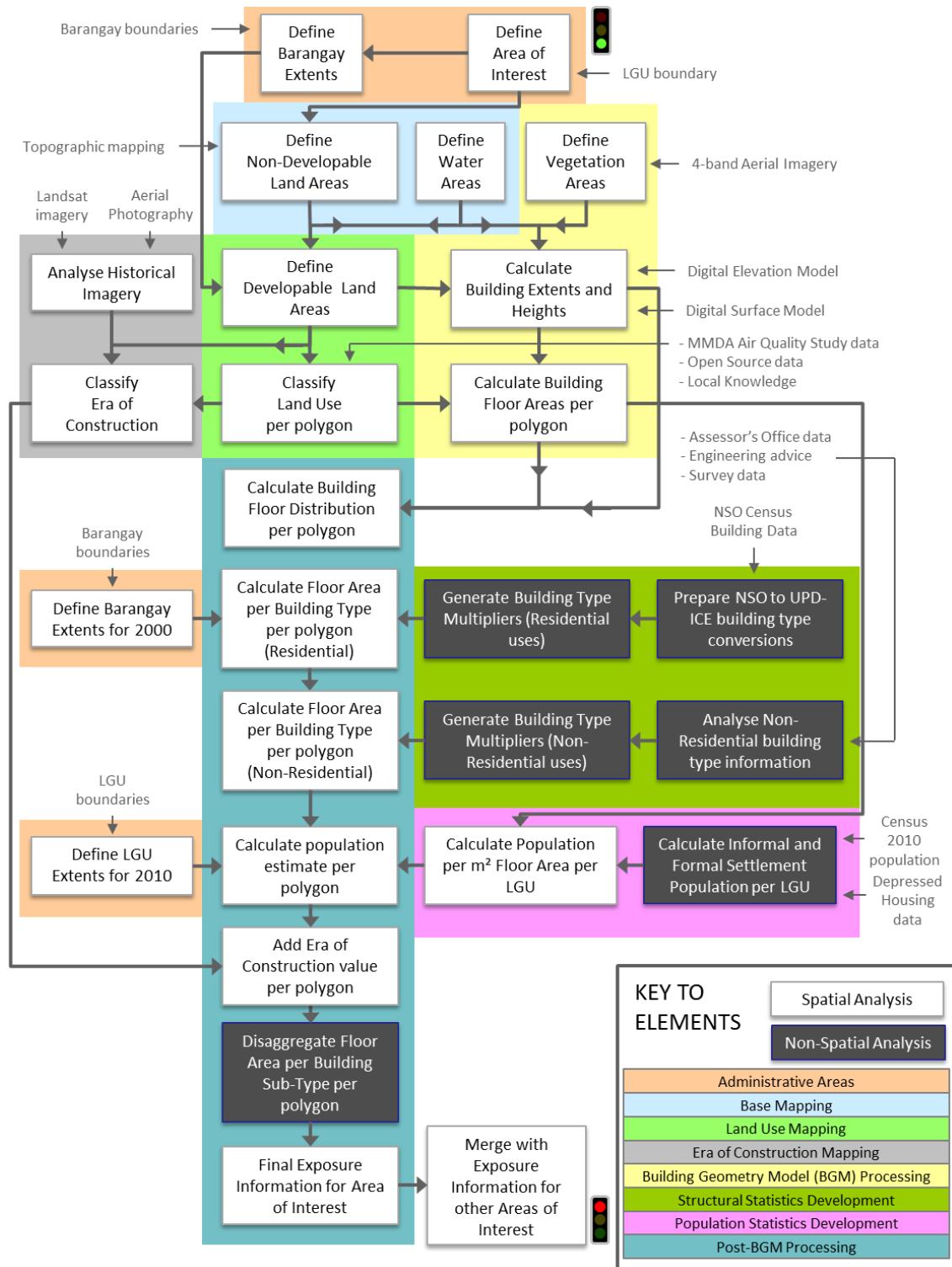


Figure 5.2. The workflow for exposure information development in the Area-Based Approach.

5.2.1 Area of Interest

For the LGUs of Metro Manila, an Area of Interest polygon was extracted from either:

- Taguig City AOI extent, provided by City of Taguig;
- LGU extent from the MMDA Air Quality Study data.

For the LGUs in Rizal Province, the Area of Interest for each was extracted from data provided by the LGU itself or from the datasets provided by NAMRIA.

5.2.2 Non-Developable Areas and Developable Land Areas

Using the processes described earlier (and included in the Exposure Database Development Manual), the Non-Developable Areas were prepared using data from either the MMDA Air Quality Study or from data captured manually from aerial imagery. Updates to this data were performed as necessary to reflect the current shape of Public Access Corridors and Water Areas. A Developable Land Areas dataset was then subsequently prepared for each LGU and made ready for the Land Use mapping activities.

5.2.3 Land Use Mapping

Land Use mapping for all LGUs was performed on the desktop using evidence and supporting data described in Chapter 4.2.5. Wherever possible, LGU officials participated in the desktop mapping exercise by advising on land use classifications for various parts of their jurisdiction or by undertaking the technical activities themselves. At the completion of the mapping and data entry, land use datasets were checked using the previously described QA/QC processes. Where LGUs were involved in the land use mapping, their participation was also regarded as a validation of the mapping, and did not require further checking on their part.

5.2.4 LGU Name and Barangay Boundaries

For the purposes of attributing the land use mapping data, the LGU name and barangay names were attributed to polygons in the land use datasets. These values were later modified in the compilation process, and were changed to facilitate table joins between the exposure polygon data and non-spatial data tables (i.e. the Look Up Tables).

5.2.5 Building Geometry Model outputs

As the land use mapping for each LGU is completed, the final land use polygon dataset, together with the Non-Developable Land Areas and Water Areas datasets, are used as inputs for the running of the Building Geometry Model for each area of interest. Once outputs from the Building Geometry Model are available, the processes grouped under the “Post-BGM Analysis” stages are undertaken for the Area of Interest.

The Building Geometry Model was run for each LGU Area of Interest as the final polygon data for Non-Developable Land Areas, Water Areas and Land Use became available, and final processes were completed between September 2012 and January 2013.

5.2.6 Era of Construction mapping

The mapping of the sequence of development across GMMA (described in Chapter 4.3.7) was carried out as a standalone activity. The transfer of values across to Land Use polygons took place on a per LGU basis once the validation of the Land Use dataset had been completed.

5.2.7 Look Up Table for Formal Settlements

The Lookup Table for building type distributions in the formally settled areas was completed in December 2012. The first distribution of UPD-ICE building types for relevant polygons was calculated for the applicable polygons across the project area. This was performed as part of Stage 1 of the “Post-BGM Analysis” process.

5.2.8 Look Up Table for Informal Settlements

Around the same time that the Lookup Table for formally settled areas was finalised, the Lookup Table for buildings in the Informal Settlements was also completed. This table was finalised in December 2012. Again, this was included as part of Stage 1 of the “Post-BGM Analysis” process.

5.2.9 Look Up Table for Non-Residential Uses

The Lookup Table for building type distributions in the non-residential areas was also completed in December 2012. The table was completed through the use of statistics derived from the Quezon City Assessor’s Office and the desktop survey of building images from the video surveys of key facilities and from images found through image sharing sites on the internet. The final table was included in Stage 1 of the “Post-BGM Analysis” process.

5.2.10 Look Up Table for population estimate calculations

The preparation of this table was completed in January 2013 following a review of the multipliers and a desktop comparison of the estimates against known barangay populations in Marikina City. A full comparison of all barangays in the project area was not completed in time for the final compilation of the exposure information.

5.2.11 Area-Based Approach data compilation

Once all areas of interest had undergone total processing, the final datasets were merged into a single polygon dataset, unique identifiers were recalculated for a final time, and the initial exposure information was released in January 2013. This data was stored in both the File Geodatabase Feature Class and Shapefile formats. In February 2013, the exposure dataset was improved to remove artefacts detected in the initial compilation. The pre-final building sub-type distribution was also calculated at that time, and the second release of data was available in late February 2013. Minor manual adjustments were made to the data in May and August of 2013 to improve the building distributions for a small number of exposure polygons.

5.2.12 Potentially Wind Sensitive Structure data compilation

Upon receipt of the final Billboard and Power Transmission Tower data from NAMRIA, the data was processed through a model developed in the ArcGIS ModelBuilder environment and output File Geodatabase feature classes and shapefiles were generated. These were released in February 2013.

6 Discussion

6.1 Limitations of available exposure information

6.1.1 Area-Based Approach

It is important to recognise the limitations of the available exposure information. Limitations can be grouped into the following general categories:

- Uncertainty of LGU Extents
- Uncertainty of Barangay Extents
- Challenges of Land Use Mapping
- Challenges of Era of Construction Mapping
- Artefacts of Building Geometry Model outputs
- Age and Interpretation of data derived from Census
- Availability of building information from LGUs
- Interpretation of specific data
- Issues arising from final data compilation

6.1.1.1 *Uncertainty of LGU extents*

A significant issue encountered throughout the development of exposure information was the uncertainty in LGU extents. The project was provided LGU boundary information from several sources, including the LGUs themselves, regional government agencies, national government agencies and related projects completed in the previous decade. In many instances there were differences in the alignment of boundaries when each dataset was compared to the others. These differences may be the result of:

- Errors in original data capture;
- Distortion of polygons due to transformation or projection of spatial data;
- Generalisation of the boundary locations; or
- Differences in the interpretation of the agreed location of the boundaries.

These location differences had implications for:

- Preparation of base mapping layers for LGUs of interest and ensuring relevant areas are accounted for;
- Distribution of population estimates at the polygon level; and
- Merging of compiled exposure information for each LGU into a single spatial data layer.

As described earlier, a 2010 version of LGU extents (based on 2010 barangay extents) was required to correctly distribute the population estimates. Where there is uncertainty about the location of LGU boundaries, the distribution is likely to be affected.

6.1.1.2 Uncertainty of barangay extents

In conjunction with the uncertainty of LGU extents, the uncertainty of barangay extents presented some significant issues. As with LGU extents, datasets representing barangay extents were provided from the same or similar sources, and differences may be caused by the same factors.

Since the multipliers for residential building types was applied at the barangay-level, a dataset that closely matches the barangay extents in the year 2000 was required. Due to distortions observed in the dataset produced at or around the time of the Census, a composite dataset was prepared using data from the MMEIRS project and from data provided by NAMRIA. Some gaps between the datasets were filled through a manual interpretation of the most likely extents of the barangays.

A similar process was followed to develop barangay extents for the year 2010. This second process took into account the new barangay information provided for the City of Taguig, where the city had changed from having 18 barangays to 28 barangays. As well as the additional barangays, the extent of the City of Taguig had expanded to include areas of Fort Bonifacio.

The uncertain barangay extents, especially for barangays recognised as being in dispute between adjacent LGUs, make it difficult to confidently disaggregate barangay-level information to sub-barangay polygons. For this reason, it was decided that the disaggregation of population information from the 2010 Census of Population and Housing would not be performed in this project.

Since it was not possible to confidently disaggregate the population to the sub-barangay level, there may be instances of overestimation or underestimation of population in particular areas. Depending on the level of damage expected from the building types, the casualty calculations may be affected and may provide an unrealistic estimate of fatalities and injuries. This is an area requiring greater attention in future exposure information development.

6.1.1.3 Challenges of Land Use mapping

The mapping of land use is a critical component of the Area-Based Approach for exposure information development. The classification of land use for each polygon governs the calculation of most other exposure attributes for that polygon. Consequently, the accuracy of the land use classification can have a significant impact on the quality of the risk analysis results. This is particularly important in complex metropolitan environments such as the Greater Metro Manila Area.

The detailed classification of land use for an area of interest requires a number of resources to be available:

- A sufficient framework for categorising land use for the purpose of developing exposure information at different levels of detail;
- Suitable definitions of each land use class;
- Sufficient human resources to interpret background data and information;
- Sufficient parameters and instructions for capturing the land use extents;
- Sufficient and recent base mapping information to differentiate classes of land, or recent cadastral information to provide the legal definition of land areas;
- Recent aerial imagery to support interpretation of land use extents;
- Up-to-date spatial information on actual land or building use;

- Recent open source information to verify or supplement other spatial data;
- Suitable GIS software available for operators to prepare land use datasets;
- Suitable tools in the GIS software to perform quality control; and
- Local knowledge to validate the draft land use datasets.

Through the development of the Exposure Database Framework, a well-considered land use classification schema was available to support the mapping of land use across the Greater Metro Manila Area. Through the development of the Exposure Database Development Manual, rules and methodologies for the preparation, capture and management of land use data were specified.

It must be remembered that land use mapping and classification is a qualitative interpretation of available information, and cannot be automated unless very detailed and reliable information is already in existence. The human element of this process must be remembered when considering the final land use mapping datasets and the final exposure information.

The mapping of land use across the Greater Metro Manila Area involved numerous participants from national, regional and local governments. Many participants were able to contribute through knowledge and experience in geography, surveying, land information management, asset management and/or town planning. For nearly all participants, contribution to development of exposure data was a new activity. The interpretation of available GIS data and aerial imagery and the operation of GIS software were new concepts to some participants.

Base mapping was prepared from available LGU and barangay extents and through enhancements and updates to existing data for the road corridors and water bodies. The production of Developable Areas enabled contributors to classify the resultant polygons as-is, or single polygons could be further divided into smaller polygons and classified accordingly. In a vast majority of cases, the subdivision of polygons was successful, though there are instances of polygons for which the splitting process was not overly successful. Some instances of duplicated polygons were detected in the final output, which may have resulted from unintentional copying of the feature.

In some cases, the data received from contributors suggested some editing of the extents of the Developable Areas had taken place, which involved either the modification of the existing polygon shapes or the capture of completely new polygons. New polygons sometimes shared the boundaries of adjacent polygons, though many had completely different boundaries. These artefacts caused some issues during subsequent processing.

In the Metro Manila areas, the MMDA Air Quality Study data provided an excellent source of background information for land use mapping. In most areas of Metro Manila, this data assisted with the delineation of land use polygons and became the basis for the land use classification. Information available from crowd-sourcing sites such as Open Street Map and Wikimapia was helpful for interpreting the land use in parts of Metro Manila and many parts in the Rizal Province portion of the project area. It is likely that all three sources of information will have their own inherent data quality issues, which will naturally affect the quality of the land use data developed for the project.

LGU representatives were invited to participate in the mapping of land use, and/or validate the draft land use data for their respective area of interest. Where this opportunity is taken up, confidence in the final land use mapping will increase. However, LGU validation was not possible for all draft land use data.

6.1.1.4 Challenges of Era of Construction mapping

The process of determining the Era of Construction of buildings has been described in an earlier chapter. This process relies on the availability of Landsat scenes that have minimal cloud coverage, are relatively free of haze and have been captured at or near the threshold dates. The process also relies on the ability to distinguish built-up areas from other areas in order to determine the extent of the urban footprint at the time of acquisition.

Some considerations for the use of supervised classification of Landsat imagery are detailed in Table 6.2.

Table 6.2. Considerations for the supervised classification of Landsat imagery.

Artefact	Source	Implication
Cloud coverage in imagery	Atmospheric effects	Cloud will be included in one of the classes
Haze in imagery	Atmospheric effects	Classification may be inaccurate due to poor image contrast
Non-urban areas appearing as urban areas	Reflectance of sunlight	Non-urban areas, such as forest areas cleared for development, may be classified as urban

One aspect of urban development that cannot be accounted for in this technique is development within the urban footprint. For example, many parts of Makati City and areas on the south bank of the Marikina River near Marcos Highway have been redeveloped since the first Landsat image was captured in 1972. All subsequent images will show a similar spectral reflectance, and the process will continue to show this area as having a vintage of Pre-1972. For this reason, the validation of the draft Era of Construction mapping is critical for its accuracy.

In areas where this mapping has not been validated, the exposure information may not be entirely accurate and the results of the risk analysis could be affected. This needs to be considered when interpreting the risk analysis results, particularly for areas containing building types where the vulnerability is sensitive to the Era of Construction attribute.

6.1.1.5 Artefacts of Building Geometry Model outputs

As mentioned in the explanation of the process to determine building geometry, there are several artefacts of the Building Geometry Model that need to be considered when interpreting the final exposure information.

Table 6.3. Considerations for the artefacts of the Building Geometry Model.

Artefact	Source	Implication
Elevated features in Water Areas (not included in polygon dataset)	Digital Surface Model and Water Areas dataset	Increased floor area estimate if not correctly masked
Vegetation included in approximation of building	NDVI calculation from aerial imagery	Increased floor area estimate for some land uses

areas		
Buildings with blue or dark green roof included in vegetation mask	NDVI calculation from aerial imagery	Decreased floor area estimate for affected areas
Tall structures (other than buildings) included with building areas	Digital Surface Model	Increased floor area estimate for affected areas
Attachments to buildings included with building areas	Digital Surface Model	Increased floor area estimate for affected polygons
Rooftop furniture included in floor area calculations	Digital Surface Model	Increased floor area estimate for affected polygons
Unusual land use attributes	Land Use data	Incorrect floor area estimate for affected polygons

Additionally, the conversion of building height values to Number of Storeys values is dependent on the accuracy of the values in the Inter-Storey Height Lookup Table. Within a land use class, there may be instances where the estimated floor areas vary due to variations in Inter-Storey Heights for particular construction styles. These variations need to be considered when interpreting the detailed exposure information.

6.1.1.6 Age and interpretation of data derived from the Census of Population and Housing

In earlier parts of this report, the process describing the derivation of building types from the NSO 2000 Census of Population and Housing data was outlined. The predominant consideration for the use of this data is the passage of time between the collection of the data in May 2000 and the use of the data in 2011-2012. The implications for use of ageing data have been discussed in earlier sections.

Other factors which may affect the accuracy of the derivation of the building types from this data include:

- Absence of a building identifier, which prevents the classification of a building type on a per-building basis;
- Inability to distinguish the data for formally and informally settled areas, and the effect this can have on the disaggregation of barangay-level data to the polygons;
- Possible overestimation of the quantity of wooden buildings in residential areas, since the percentage of wooden buildings will not have increased between 2000 and 2011-2012 due to the ban on the logging of timber for construction prior to 2000;
- Interpretation of ‘concrete’ in the Wall Type description by Census enumerators, which could be used to describe Concrete Hollow Blocks, precast concrete or concrete poured in-situ;
- Absence of building height information in the NSO data, resulting in difficulties in providing sub-classifications of buildings directly from this data;
- Accuracy of mapping NSO Roof/Wall combinations to UPD-ICE building types;

- Use of surrogate statistics for missing barangay data may result in distortions in the quantity of floor area for certain building types, particularly if the choice of surrogate statistics is not validated or checked against the actual buildings in that area.

6.1.1.7 Availability of building information from LGUs

Since the data drawn from the NSO Census of Population and Housing can only be applied to formally settled areas (such as the Level 4 categories of Formal Settlements), building information for other land uses should be derived from other sources or sampled in the field. The use of Assessor's Office data from Quezon City has been described in detail in earlier sections of this report. Attempts were made to obtain assessment information from other LGUs; however it was difficult to obtain access to digital copies of data elsewhere.

It was decided that the statistics derived from the Assessor's Office data would be assumed to be representative of building types across the Greater Metro Manila Area. Subsequently, multipliers for selected land uses in the Non-Residential Lookup Table were derived from this data.

There are several factors that should be considered when interpreting the exposure information calculated for those land uses:

- Statistics were calculated on counts of assets recorded in the Assessor's Office data, and an assumption was made that assets with a particular use class (e.g. Small Commercial) would have a roughly equivalent floor area;
- Interpretation of the building and land use categories embedded in the Assessor's Office data was required to adequately match buildings to the exposure database schema;
- Potential errors in land use assignment where the use code required manual modification;
- The sample size used to generate some building type distributions was small (sometimes less than 50 assets), and where possible these small samples should be overwritten with statistics developed from other sources; and
- Statistics generated from Quezon City Assessor's Office have not been rigorously validated with field survey data.

6.1.1.8 Interpretation of specific data

As distinct from data modelling, exposure information is developed using as much actual information from existing data sources. This data, as has been described throughout this report, requires management, evaluation, analysis adaptation and reorganisation before it can be used to build an exposure database. For those involved in exposure information development, it can be challenging to make sense of data available from a wide range of sources and of various themes.

Throughout the project, data was sourced from a wide range of sources and data custodians. At times, very limited information was available about the intended purpose, development history and attribution of the individual datasets. Formal metadata was rarely provided with the supplied datasets. This can further complicate the use of the data, as much time is required to interpret and build a solid understanding of the data. If specific data is going to be ingested into the exposure database,

engagement with, and, guidance from, the data custodian or provider is essential. In the absence of this engagement, advice from subject matter experts is the next best option.

During the project, many assumptions have been made about the validity of particular datasets provided by various organisations. These assumptions have been made using the best possible judgement of the development team in the absence of appropriate guidance, advice or documentation from the data's custodian.

Some of the raw datasets required significant effort to prepare them for use in the exposure information development process. Issues of consistency and completeness of the raw data have required correction before that data can be properly utilised. This has an impact on the whole development process, especially where other processes are awaiting the readiness of a particular input.

6.1.1.9 Issues arising from final data compilation

For the Area-Based Approach, some difficulties arose during the merging of the compiled of the final data. The predominant issue encountered were caused by some variations in the extents of LGUs. During the initial preparation of base mapping for some Areas of Interest, some differences in the extents caused the following issues:

- Overlaps occurred between some land areas, notably in cases where individual LGU extents conflict with the extents defined by adjacent LGUs;
- Small gaps between LGU extents, where the boundary between two or more neighbouring LGUs diverge, creating areas where no exposure information was generated; and
- Some Non-Developable Land Areas had been captured twice, resulting in some polygons with slightly different shapes.

These overlaps were particularly noticeable in the Rizal Province area, where large overlaps exist between some LGU extent polygons provided by the LGUs. The merging of the exposure information for the affected LGUs resulted in geometry artefacts that required repairing, and the careful selection of the land use polygons for the running of the Building Geometry Model.

Significant gaps between LGUs were treated through the manual creation of extent, base mapping, land use and Era of Construction polygons, and the running of the Building Geometry Model for those areas. Some small gaps remain in the final exposure information feature class.

During the “Post-BGM Analysis”, there were occasional instances of the following issues:

- Some incorrect calculations, traced back to the Zonal Statistics as Table tool in the Stage 1 of the analysis, has resulted in erroneous building geometry calculations in isolated pockets of the project area;
- Occasional duplicate polygons have resulted in some conflicting building floor area calculations in the Stage 1 of the analysis. Duplicate polygons are likely to exist due to an operator error, where a feature has been copied and pasted in the same location, and both either have identical attributes or have been duplicated to record two land uses on the same polygon. The number of such duplicated polygons is small across the project area.

6.1.2 Feature-Based Approach

6.1.2.1 Structural Attributes

During the course of the data development, it was not possible to infuse structural characteristics to the Potentially Wind Sensitive Structures. These attributes would be well understood by the manufacturer, compliance and/or maintenance authority, or can be developed from inspection by a suitably qualified professional. The organisation(s) responsible for the compliance and maintenance of the structures may also be managing data and information about each structure, but this information was not available at any time during the project.

7 Acknowledgements

In addition to the authors of this report, the following organisations and particular individuals from the NDRRMC-CSCAND agencies of the Government of the Philippines and Geoscience Australia (GA) are hereby acknowledged for their valuable input into this Component:

Geoscience Australia

Kriton Glenn, Hamish Anderson, Andreia Siqueira, Luke Peel, Andrew Clive, Chris Inskeep, Krishna Nadimpalli, Frank Fu, Lauren Power, Jeff Kingwell, Rohan Coghlan, Mark Jillard, Leo Lymburner, Murray Woods, Chris Lawson, Amanda Spalding, Lachlan Hatch, Mark Edwards, Shelby Canterford, Hyeuk Ryu and Tariq Maqsood.

National Mapping and Resource Information Authority

Linda SD. Papa, John Santiago F. Fabic, Ofelia T. Castro, Leo B. Grafil and staff.

University of the Philippines – Institute of Civil Engineering

Benito M. Pacheco, Jaime Y. Hernandez Jr., Peter Paul M. Castro, Eric Augustus J. Tingatinga, Ulpiano P. Ignacio Jr. and staff.

8 References

- Bautista, M. L. P., Bautista, B. C., Narag, I. C., Lanuza, A. G., Deocampo, J.B., Papiona, K. L., Atando, R. A., Solidum Jr., R. U., Allen, T. I., Jakab, M., Ryu, H., Edwards, M., Nadimpalli, K., Leonard, M. and Dunford, M. A., 2012. *Strengthening natural hazard risk assessment capacity in the Philippines: An earthquake impact pilot study for Iloilo City, Western Visayas*. Record 2012/70. Geoscience Australia: Canberra.
- Pacheco, B.M et al, 2013. *Development of vulnerability curves of key building types in the Greater Metro Manila Area, Philippines*. Institute of Civil Engineering, University of the Philippines Diliman, Quezon City.
- Jakab, M.P, Dunford, M.A, Fu, F, 2013. *Building Geometry Model User Guide*. GeoCat Number 75459. Geoscience Australia: Canberra
- Japan International Cooperation Agency (JICA), Metropolitan Manila Development Authority (MMDA) and Philippine Institute of Volcanology and Seismology (PHIVOLCS), 2004. *Earthquake Impact Reduction Study for Metropolitan Manila, Republic of the Philippines*. Pacific Consultants International, OYO International Corporation and PASCO Corporation
- National Statistics Office, 1999. *Census 2000 Enumerator's Manual*. National Statistics Office, Manila, Philippines.
- National Statistics Office, 2012. Population Counts – National Capital Region. Accessed from <http://www.census.gov.ph/sites/default/files/attachments/hsd/pressrelease/National%20Capital%20Region.pdf>
- National Statistics Office, 2012. Population Counts – National Capital Region. Accessed from <http://www.census.gov.ph/sites/default/files/attachments/hsd/pressrelease/National%20Capital%20Region.pdf>
- National Statistics Office, 2012. Population Counts – CALABARZON. Accessed from <http://www.census.gov.ph/sites/default/files/attachments/hsd/pressrelease/CALABARZON.pdf>
- UN-Habitat, 2003. *Global Report on Human Settlements 2003, The Challenge of Slums*, Earthscan, London; Part IV: 'Summary of City Case Studies', pp195-228. Accessed from http://www.ucl.ac.uk/dpu-projects/Global_Report/cities/manila.htm
- United States Geological Survey, 2013. Landsat Missions. Accessed from <http://landsat.usgs.gov/index.php>
- United States Geological Survey, 2013. Landsat Science. Accessed from http://landsat.gsfc.nasa.gov/?page_id=2281
- <http://www.sa.gov.au/subject/Water,+energy+and+environment/Electrical,+gas+and+plumbing+safety+and+technical+regulation/Electricity+and+gas+safety+for+consumers/Electricity+safety/Powerline+safety/Identifying+powerlines>

Appendix A – Thematic maps of exposure

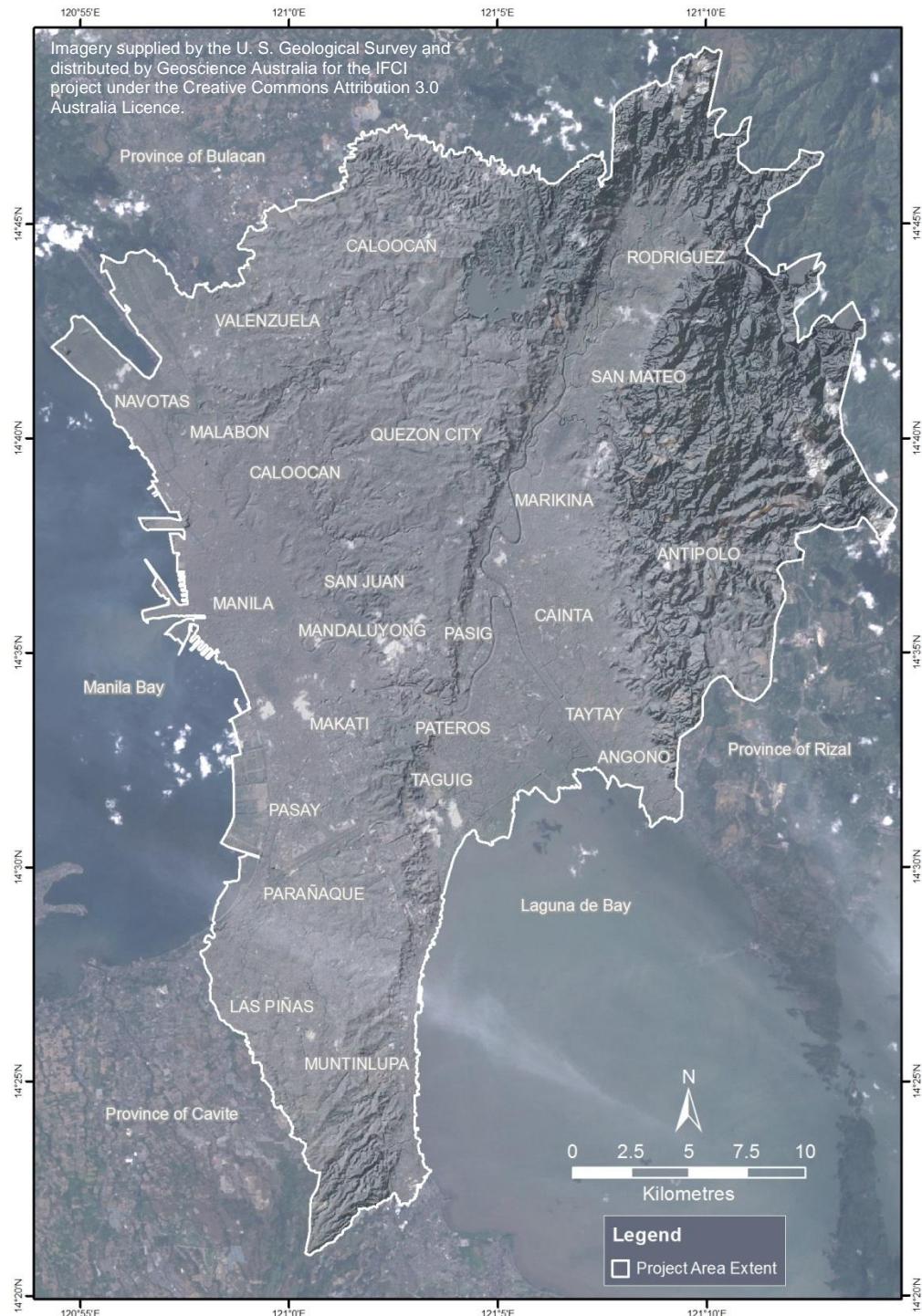


Figure A.1. Overview and extent of the project area.

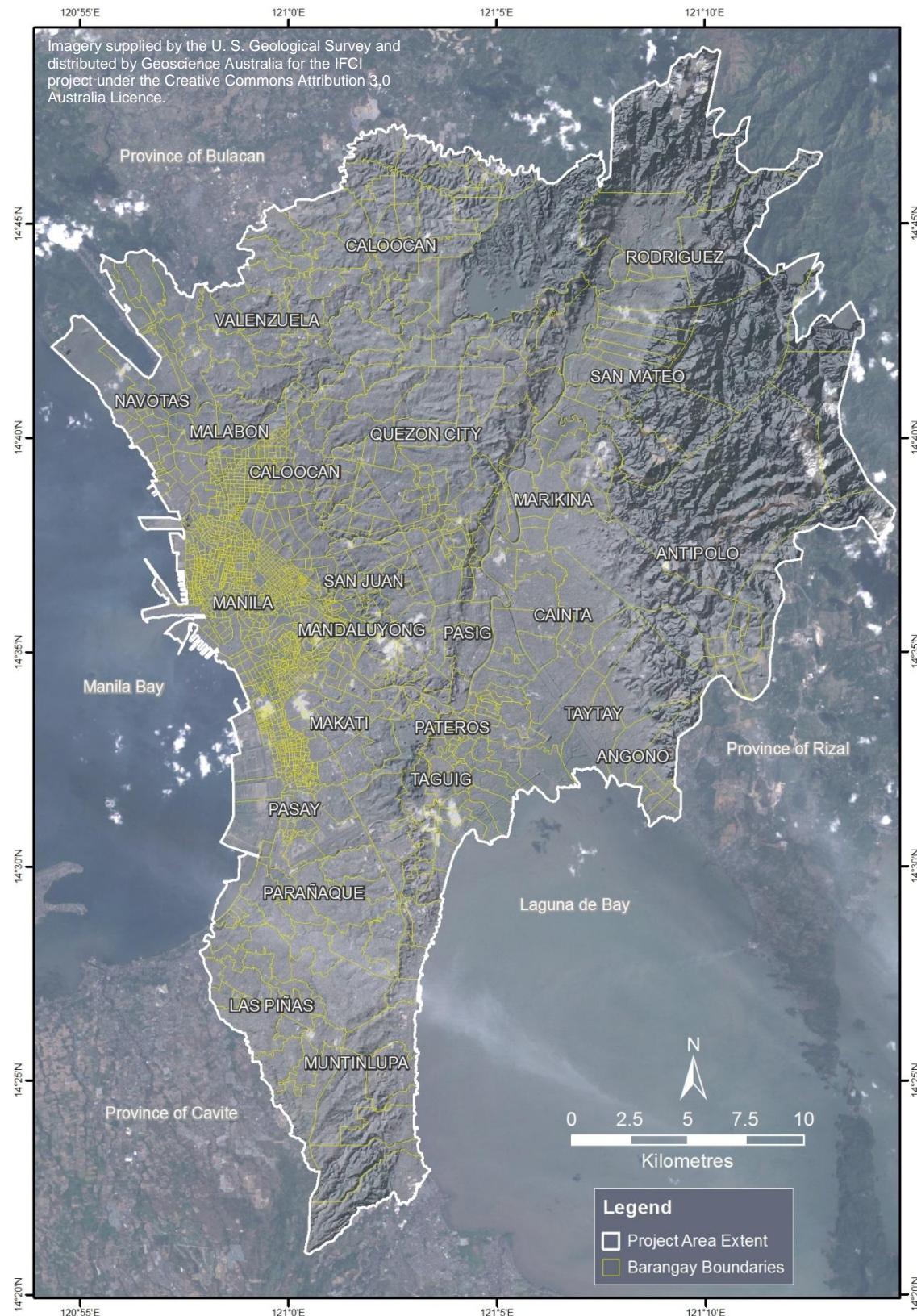


Figure A.2. Barangay boundaries within the project area.

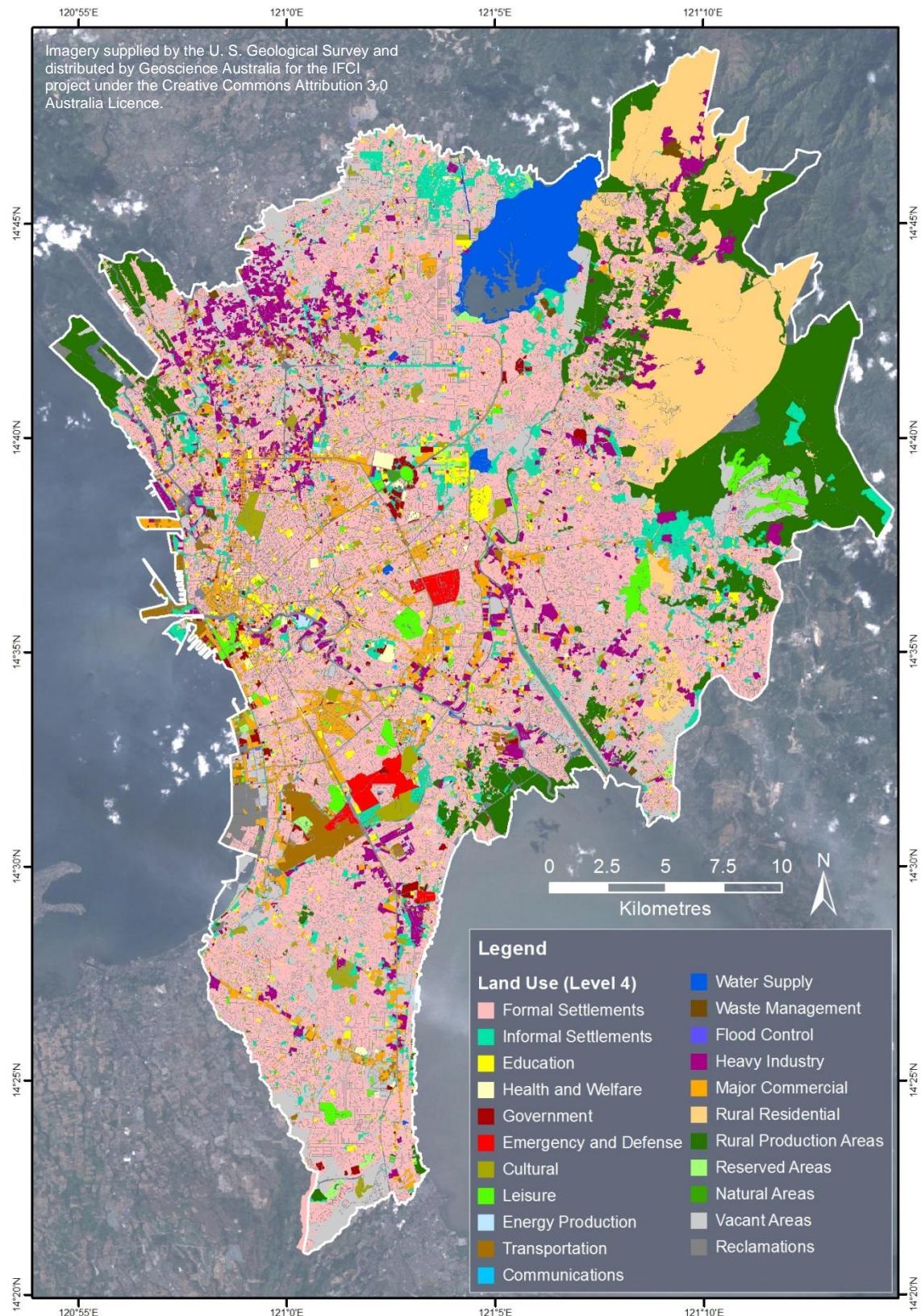


Figure A.3. Level 4 Land Use classification across the project area.

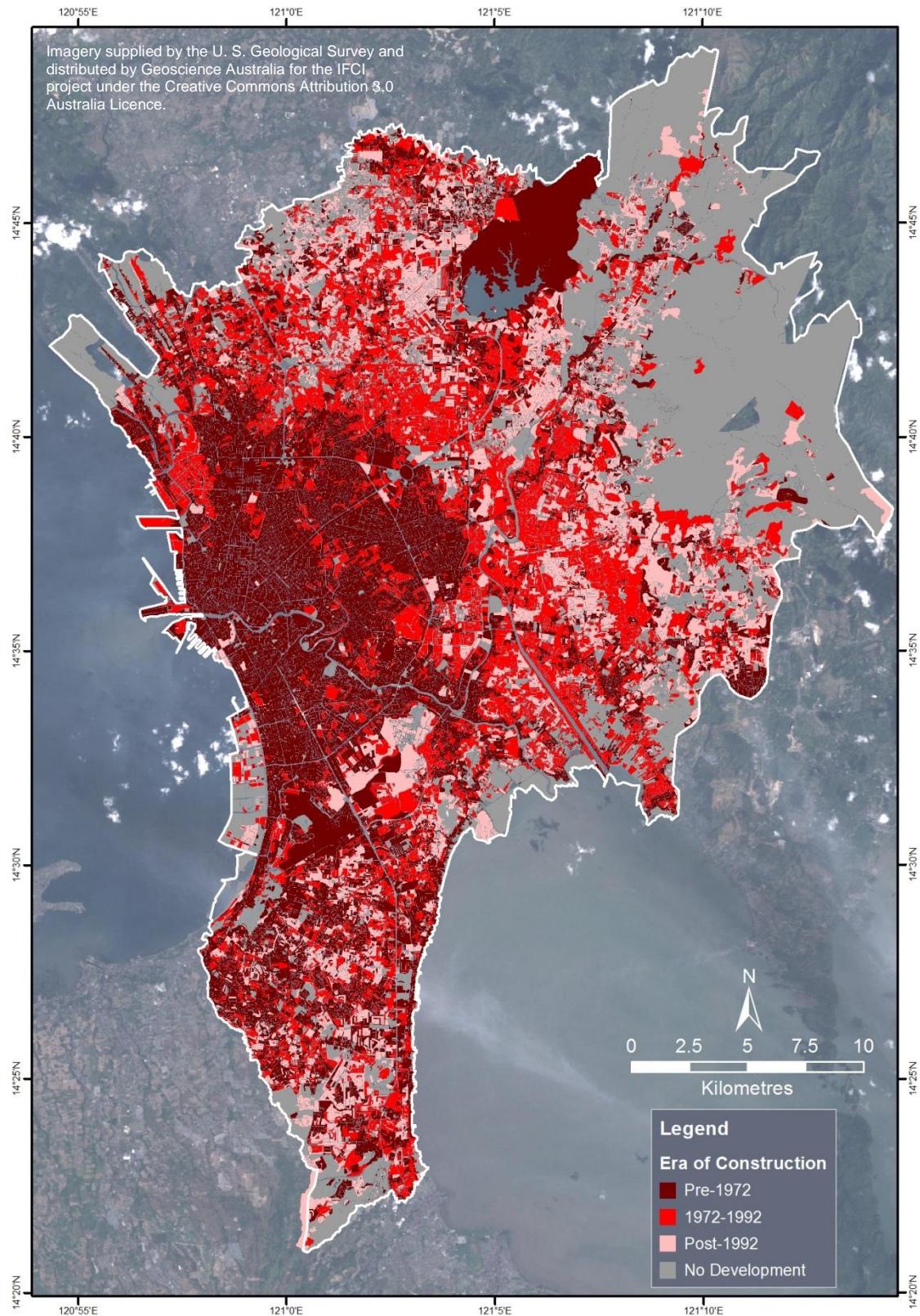


Figure A.4. Era of Construction classification across the project area.

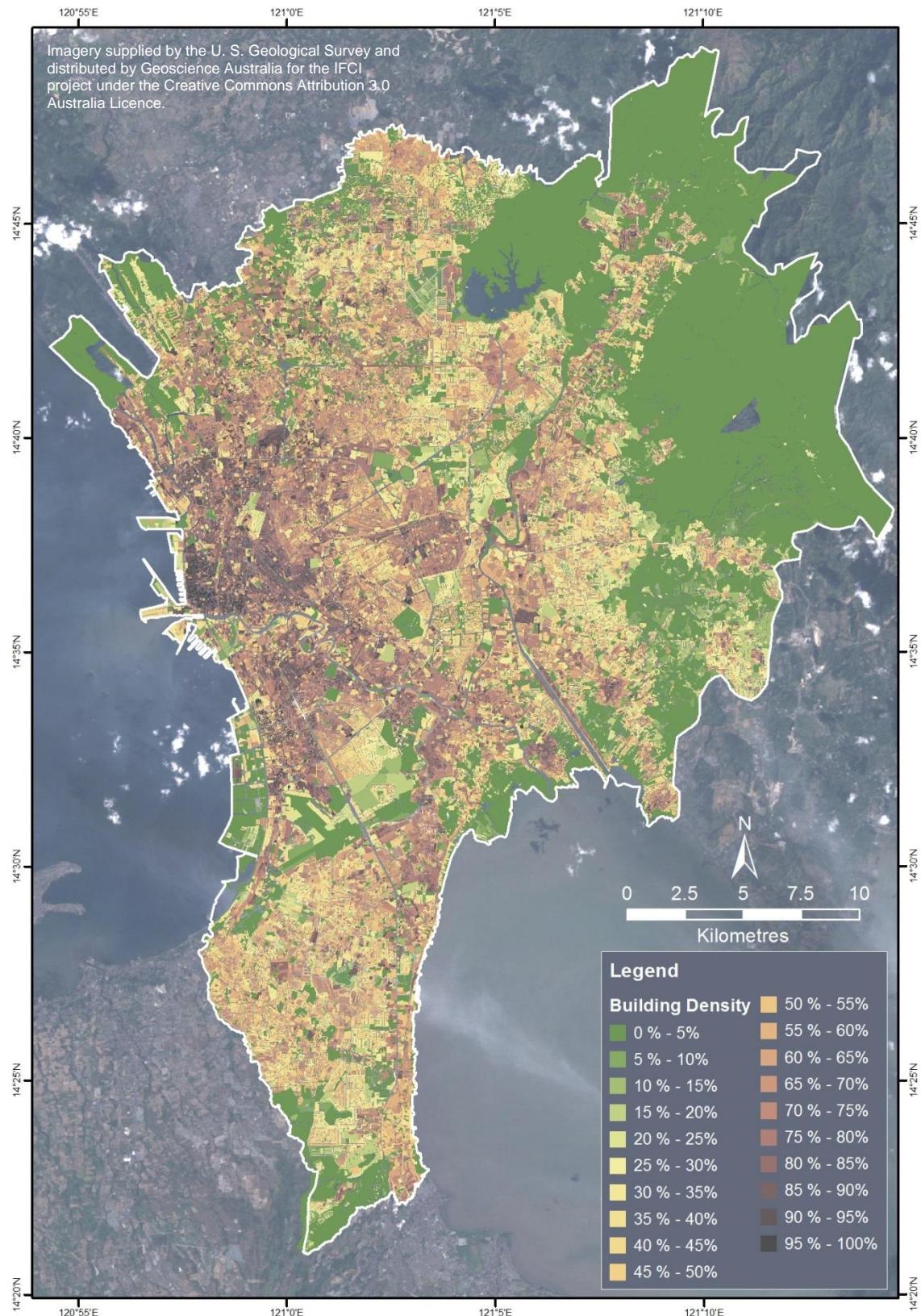


Figure A.5. Density of buildings (expressed in terms of percentage of land occupied by buildings) across the project area.

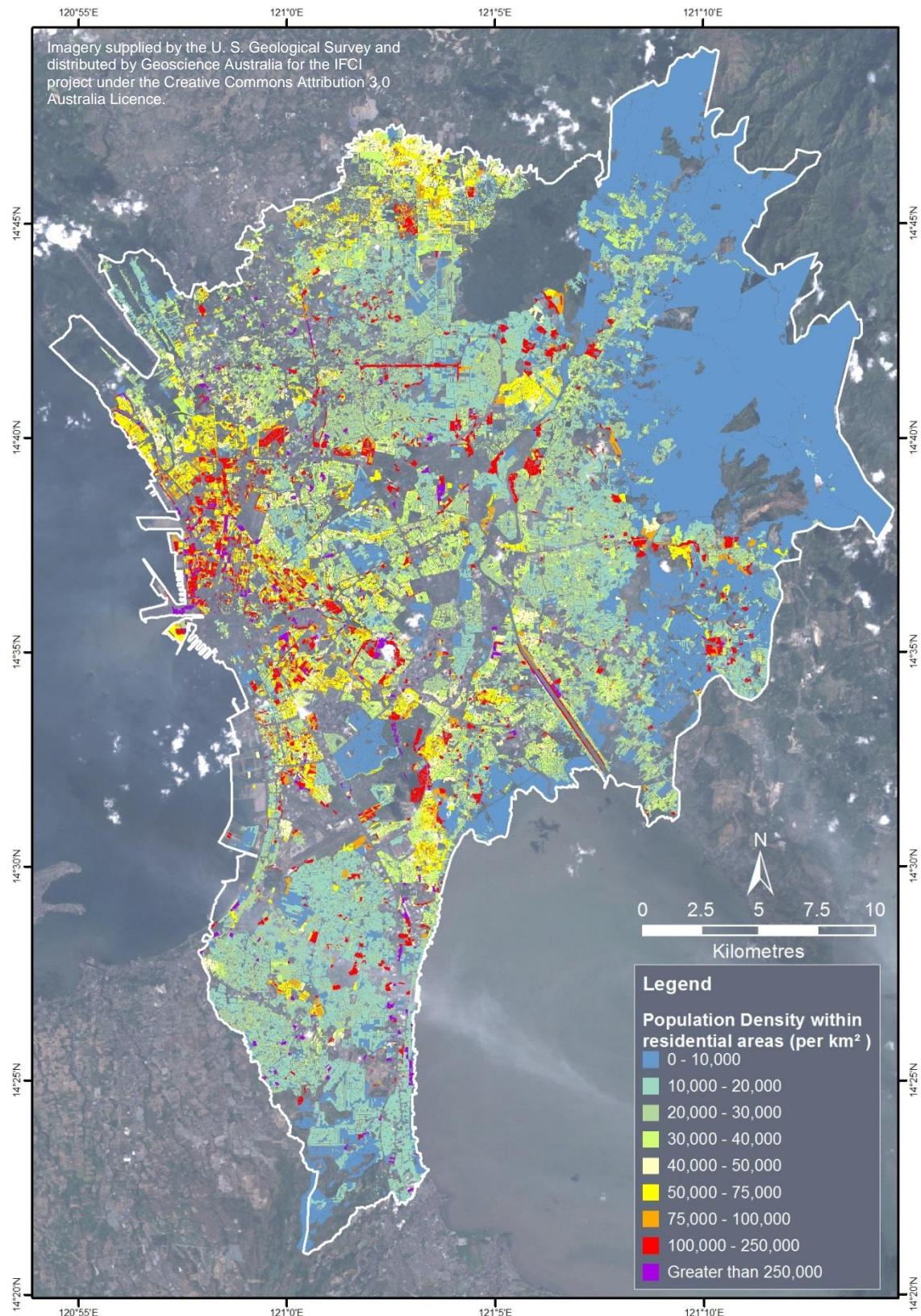


Figure A.6. Density of population within residential areas (expressed in terms of people per km² of Developable Land) across the project area.

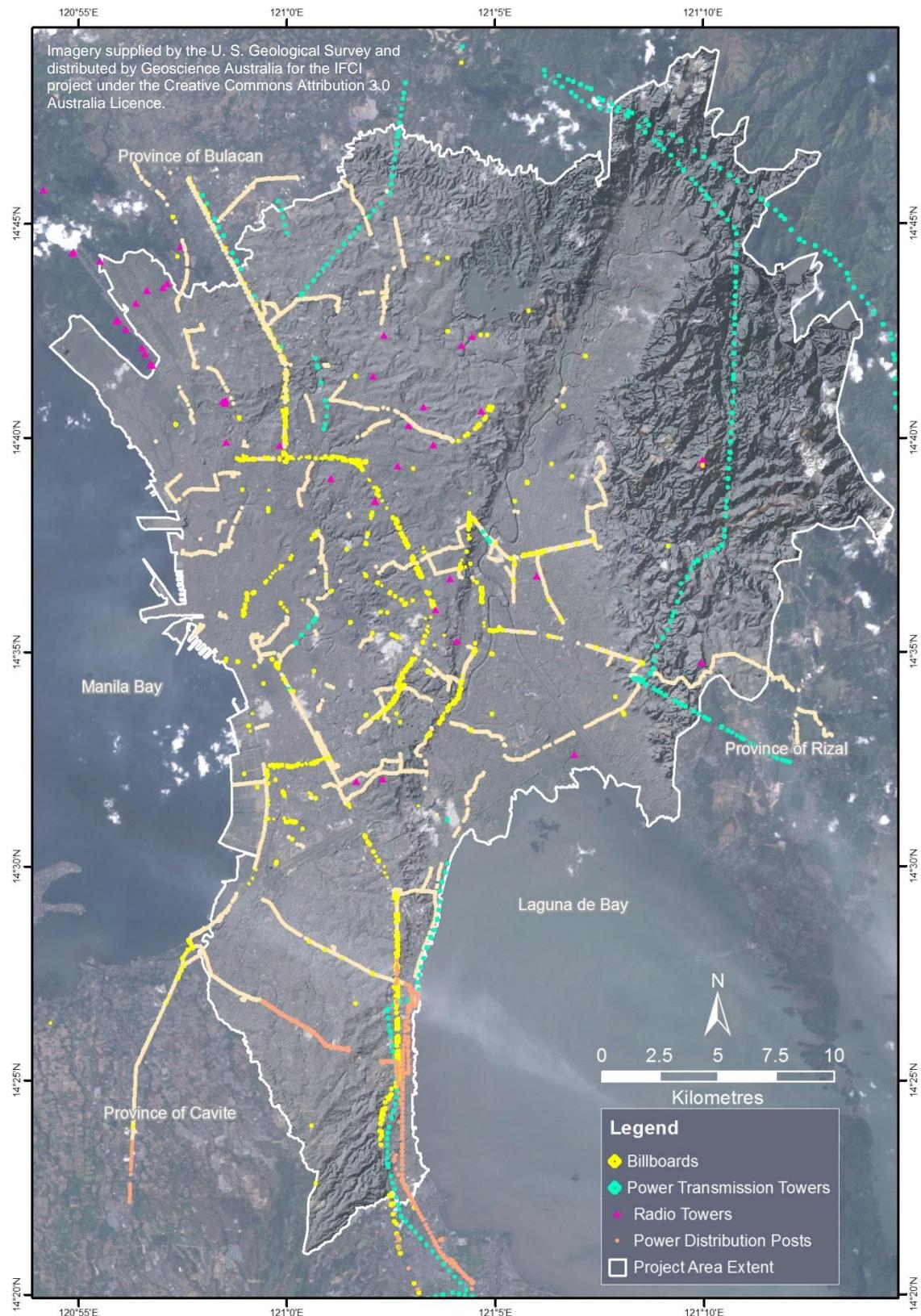


Figure A.7. Distribution of Potentially Wind Sensitive Structures captured from stereo-imagery.

Appendix B – Dictionary of building types

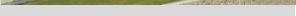
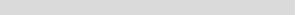
Material	Description	Type	Sub-Type	Construction	Example
Wood	<p>These are typically single- or multiple-family dwellings. The essential structural feature of these buildings is repetitive framing by wood rafters or joists on wood stud walls. Loads are light and spans are small. Most of these buildings, especially the single-family residences, are not engineered but constructed in accordance with “conventional construction” provisions of building codes. Hence, they usually have the components of a lateral-force-resisting system even though it may be incomplete. Lateral loads are transferred by diaphragms to walls. The diaphragms are roof panels and floors which may be sheathed with wood, plywood or fiberboard sheathing. Walls are exterior walls sheathed with boards, plaster, plywood, gypsum board, particle board, or fiberboard, or interior partition walls sheathed with plaster or gypsum board.</p>	W1	W1 - L	Wood frame with Area < 500 sq. m - (1-2 storeys)	
	<p>These buildings usually are commercial or industrial buildings with a large floor area and with few, if any, interior walls. The essential structural character of these buildings is framing by beams or major horizontally spanning members over columns. These horizontal members may be glued-laminated (glu-lam) wood, solid-sawn wood beams, or wood trusses, or steel beams or trusses. Lateral loads usually are resisted by wood diaphragms and exterior walls sheathed with plywood, plaster, or other paneling. The walls may</p>	W2	W2 - L	Wood frame with Area > 500 sq. m - (1-2 storeys)	

	have diagonal bracing				
	Bamboo houses are elevated single-story units with bamboo tied together using lashings to form the frame of the structure. The columns are embedded in the ground but their bottom portions do not have any covering since the living quarters are elevated. Walls usually have openings for doors and large windows. Bamboo houses have thatched roof using nipa or anahaw leaves attached to bamboo rafters and purlins using nylon.	W3	W3 - L	Bamboo - (1-2 storeys)	
	Makeshift houses are improvised one- to two-story structures with light wood frames as the main structural feature. Walls are attached to the frame by nails to provide protection from the elements and can be made from various light materials such as plywood, cardboard, tarpaulin, or corrugated galvanized iron sheet. Roofs are usually made from corrugated galvanized iron sheets and are sometimes anchored to the structure by placing weights such as concrete hollow blocks or rubber tires.	N	N - L	Makeshift - (1-2 storeys)	
Masonry	These are low-rise structures with walls made of concrete hollow blocks interlocked at the corners, and have no reinforced concrete frame. The floors consist of either plywood or board sheathing, supported by wood sub-framing. The roofs are corrugated galvanized iron sheets attached to wooden or light metal roof trusses	CHB	CHB - L	Concrete Hollow Blocks - (1-2 storeys)	
	These buildings are similar to URM except that the walls are made of large stone blocks (e.g. adobe).	URA	URA - L	Adobe - (1-2 storeys)	

<p>These buildings have bearing walls of unreinforced brick masonry. The walls may or may not be anchored with the diaphragms. Ties between the walls and diaphragms are more common for the bearing walls than for walls that are parallel to the floor framing. The floor and roof construction consists of either: plywood or board sheathing, supported by wood sub-framing; or metal deck supported by steel framing elements. Interior partitions that interconnect the floors and roof can have the effect of reducing diaphragm displacements.</p>	URM	URM - L	Brick - (1-2 storeys)	
<p>These buildings have perimeter bearing walls of reinforced brick masonry. These walls are the lateral-force-resisting system of the structure. The floors and roofs are framed with: wood joists and beams with plywood or sheathing; or steel beams with metal deck. Wood floor framing is supported by interior wood posts or steel columns; steel beams are supported by steel columns.</p>	RM1	RM1 - L	Flexible Diaphragm - (1-2 storeys)	
<p>These buildings are similar to RM1, except the roof and floors are composed of precast concrete elements such as planks or tee-beams. The precast roof and floor elements are supported on interior beams and columns of steel or concrete. The precast horizontal elements often have a cast-in-place topping.</p>	RM2	RM2 - L	Rigid Diaphragm - (1-2 storeys)	
		RM2 - M	Rigid Diaphragm - (3-7 storeys)	

	<p>These structures are usually made of concrete hollow block masonry as walls and have no reinforced concrete frame. The walls of the upper storeys are made of either wood sheathing or light metals. The floor construction consists of wood sheathing supported by wood sub-framing. The roof is made of corrugated galvanized iron sheets attached to wooden roof trusses or light metal trusses.</p>	MWS	MWS - L	Half-Masonry/half-Wood/metal Rigid Diaphragm - (1-2 storeys)	
Concrete	<p>These are low-rise structures with walls made of concrete hollow blocks interlocked at the corners and have no reinforced concrete frame. The floors consist of either plywood or board sheathing supported by wood sub-framing. The roofs are corrugated galvanised iron sheets attached to wooden or light metal roof trusses.</p>	CWS	CWS - L	Half – RC Frame/ Half-Wood/Metal - (1-2 storeys)	
	<p>These buildings are similar to steel moment frame buildings except that the frames are reinforced concrete</p>	C1	C1 - L	Moment Frame - (1-2 storeys)	
			C1 - M	Moment Frame - (3-7 storeys)	
			C1 - H	Moment Frame - (8-15 storeys)	
	The lateral-force-resisting systems in these buildings are concrete shear wall	C2	C2 - L	Shear Walls - (1-2 storeys)	

		C2 - M	Shear Walls - (3-7 storeys)	
		C2 - H	Shear Walls - (8-15 storeys)	
		C2 - V	Shear Walls - (16-25 storeys)	
		C2 - E	Shear Walls - (26-35) storeys	
		C2 - S	Shear Walls - (36+ storeys)	
The lateral-force-resisting systems in these buildings are concrete shear walls in one principal direction and moment frames in the other direction. This may also include a combination of shear walls and frames in each direction.	C4	C4 - M	Shear Walls and Frames - (3-7 storeys)	
		C4 - H	Shear Walls and Frames - (8-15 storeys)	
These buildings have a wood or metal deck roof diaphragm that distributes the lateral forces to precast concrete shear walls. The walls are thin but relatively heavy while the roofs are light.	PC1	PC1 - L	Precast Tilt-up - (1-2 storeys)	
These buildings contain floor and roof diaphragms typically composed of precast concrete elements with or without cast in place concrete topping slabs. The diaphragms are supported by precast concrete girders and columns. The girders often bear-column joints usually are cast-in-place concrete. Welded steel inserts often are used to interconnect precast	PC2	PC2 - L	Precast Frame - (1-2 storeys)	
		PC2 - M	Precast Frame - (3-7 storeys)	

	element's. Lateral loads are resisted by precast or cast-in-place concrete shear walls.				
Steel	<p>These buildings have a frame of steel columns and beams. In some cases, the beam-column connections have very small moment resisting capacity but, in other cases, some of the beams and columns are fully developed as moment frames to resist lateral forces. Usually the structure is concealed on the outside by exterior walls, which can be of almost any material (curtain walls, brick or concrete masonry, or precast concrete panels), and on the inside by ceilings and column furring. Lateral loads are transferred by diaphragms to moment resisting frames. The diaphragms can be almost any material. The frames develop their stiffness by full or partial moment connections. The frames can be located almost anywhere in the building. Usually the columns have their strong directions oriented so that some columns act primarily in one direction while the others act in the other direction.</p>	S1	S1 - L	Moment Frame - (1-2 storeys)	
			S1 - M	Moment Frame - (3-7 storeys)	
	<p>These buildings are similar to steel moment frame buildings except that the lateral-force-resisting systems are braced frames rather than moment frames.</p>	S2	S2 - L	Braced Frame - (1-2 storeys)	
			S2 - M	Braced Frame - (3-7 storeys)	
			S2 - H	Braced Frame - (8-15 storeys)	
			S2 - V	Braced Frame - (16-25 storeys)	
			S2 - E	Braced Frame - (26-35 storeys)	
			S2 - S	Braced Frame	

				- (36 + storeys)	
These buildings are pre-engineered and prefabricated with transverse rigid frames. The roof and walls consist of lightweight panels, usually corrugated metal. The frames are designed for maximum efficiency, often with tapered beam and column sections built up of light steel plates. The frames are built in segments and assembled in the field with bolted joints. Lateral loads in the transverse direction are resisted by the frames with loads distributed to them by diaphragm elements, typically rod-braced steel roof framing bays. Loads in the longitudinal direction are resisted entirely by shear elements which can be: roof and wall sheathing panels; an independent system of tension-only rod bracing; or a combination of panels and bracing.	S3	S3 - L	Light Metal - (1-2 storeys)		
The shear walls in these buildings are cast-in-place concrete and may be bearing walls. The shear walls are the lateral-force-resisting system in this structure. The steel frame is designed for vertical loads only. Lateral loads are transferred by diaphragms of almost any material to the shear walls. The steel frame may provide a secondary lateral-force-resisting system depending on the stiffness of the frame and the moment capacity of the beam-column connections.	S4	S4 - L	Frame w/ Cast-in-place Shear Wall - (1-2 storeys)		
		S4 - M	Frame w/ Cast-in-place Shear Wall - (3-7 storeys)		
		S4 - H	Frame w/ Cast-in-place Shear Wall - (8-15 storeys)		
		S4 - V	Frame w/ Cast-in-place Shear Wall - (16-25 storeys)		
		S4 - E	Frame w/ Cast-in-place Shear Wall - (26-35 storeys)		

			S4 - S	Frame w/ Cast-in-place Shear Wall - (36 + storeys)	
--	--	--	--------	---	--

Appendix C – Processes for 2000 Census data

The following PUFs were used to extract the required information for this study.

- c2k21390.puf Public use file for Manila
- c2k22741.puf Public use file for City of Mandaluyong
- c2k22742.puf Public use file for City of Marikina
- c2k22743.puf Public use file for City of Pasig
- c2k22744.puf Public use file for Quezon City
- c2k22745.puf Public use file for San Juan
- c2k22751.puf Public use file for City of Valenzuela
- c2k22752.puf Public use file for Kalookan City
- c2k22753.puf Public use file for Malabon
- c2k22754.puf Public use file for Navotas
- c2k22761.puf Public use file for City of Las Piñas
- c2k22762.puf Public use file for City of Makati
- c2k22763.puf Public use file for City of Muntinlupa
- c2k22764.puf Public use file for City of Parañaque
- c2k22765.puf Public use file for Pasay City
- c2k22766.puf Public use file for Pateros
- c2k22767.puf Public use file for Taguig.
- c2k21140.puf Public use file for Bulacan
- c2k21210.puf Public use file for Cavite
- c2k21340.puf Public use file for Laguna
- c2k21580.puf Public use file for Rizal

Appendix D – Key exposure statistics

Table D.1. Floor Area of buildings by construction type.

Materials	Construction Type	Floor area (m ²)
Wood	W1	31,711,078
	W2	5,953,685
	W3	47,347
	N	19,624,143
Masonry	CHB	57,314,392
	URA	227,370
	URM	670,942
	RM1	15,782
	RM2	317,298
Concrete	MWS	15,856,023
	CWS	59,168,032
	C1	201,602,098
	C2	223,765
	C4	17,652,108
	PC1	0
	PC2	136,124
Steel	S1	2,354,491
	S2	1,912,534
	S3	376,492
	S4	19,517

Table D.2. Floor Area of buildings by Level 4 Land Use.

Level 4 Land Use	Population Estimate	Era of Construction Floor Area				Floor area (m ²)
		Post-1992	1972-1992	Pre-1972	No Devt	
Agriculture	11,324	395			286,696	287,091
Aquaculture					14,818	14,818
Communications		21,043	224,083	520,318		765,444
Cultural		468,392	886,228	1,600,158	11,163	2,965,941
Education		2,243,771	3,931,021	11,108,268		17,283,060
Emergency and Defense		438,676	130,278	1,430,051		1,999,005
Energy Production		57,033	227,897	477,064		761,994
Flood Control		4,368	6,427	5,840		16,635
Food Security			135,718	151,906		287,624
Formal Settlements	9,844,387	41,923,233	79,295,953	139,509,924	30,429	260,759,539
Government	447	488,298	1,307,806	3,502,268		5,298,372
Health and Welfare		228,943	435,644	2,713,740		3,378,327
Heavy Industry		2,465,450	11,596,781	15,090,709	1,077	29,154,017
Horticulture	10,207	3,139	12,814	0	244,385	260,338
Informal Settlements	4,348,392	4,319,477	10,330,528	10,404,467	22,634	25,077,106
Leisure		272,322	506,512	725,691	939	1,505,464
Livestock				2,215	112,244	114,459
Major Commercial		7,346,497	15,646,113	39,296,496	3,784	62,292,890
Market Gardening	1,320				41,809	41,809
Mixed Farming	7,805				201,760	201,760
Natural Areas						
Poultry				3,674	158,137	161,811
Reclamations						
Reserved Areas			1,214	480	335,779	337,473
Rural Residential	20,078	32,745	92	6,669	439,137	478,643
Services			3,830			3,830
Transportation		503,795	1,436,959	3,011,761	11	4,952,526
Vacant Areas						
Waste Management		14,244	11,995	19,696		45,935
Water Supply		102,816	113,777	92,076		308,669
Grand Total	14,243,960	60,934,637	126,241,670	229,673,471	1,904,802	418,754,580

Appendix E – Inter-Storey Height Values

Table E.1. Inter-Storey Heights assigned to buildings for each Level 4 Land Use classification.

Level 4 Land Use	Inter-Storey Height (m)	Number of possible storeys	Upper Limit of Ground Floor above ground (m)	Increment of Upper Limit of floors thereafter above ground (m)
Formal Settlements	3.0	Unlimited	6.0	3.0
Informal Settlements	2.2	Unlimited	4.4	2.2
Education	3.2	Unlimited	6.4	3.2
Health and Welfare	3.2	Unlimited	6.4	3.2
Government	3.2	Unlimited	6.4	3.2
Emergency and Defense	3.2	Unlimited	6.4	3.2
Cultural	0	1	300	n/a
Leisure	0	1	300	n/a
Energy Production	0	1	300	n/a
Water Supply	0	1	300	n/a
Communications	3.5	Unlimited	7.0	3.5
Waste Management	0	1	300	n/a
Transportation	6	Unlimited	12.0	6
Major Commercial	3.5	Unlimited	7.0	3.5
Heavy Industry	4.5	Unlimited	9.0	4.5
Food Security	6.0	Unlimited	12.0	6.0
Flood Control	0	1	300	n/a
Rural Residential	3.0	Unlimited	6.0	3.0
Agriculture	2.2	Unlimited	4.4	2.2
Horticulture	2.2	Unlimited	4.4	2.2
Aquaculture	2.2	Unlimited	4.4	2.2
Livestock	2.2	Unlimited	4.4	2.2
Poultry	2.2	Unlimited	4.4	2.2
Market Gardening	2.2	Unlimited	4.4	2.2
Mixed Farming	2.2	Unlimited	4.4	2.2
Reserved Areas	3.0	Unlimited	6.0	3.0

Table F.2. The first four rows of the Inter-Storey Height Lookup Table for Formal Settlements.

LOWER_LIMIT	UPPER_LIMIT	NO_STOREYS
2	9	1

9	13.5	2
13.5	18	3
18	22.5	4

Appendix F – Look Up Tables for Structural Multipliers

Table F.1. Look Up Table with multipliers for residential buildings (derived from NSO 2000 Census of Population and Housing).

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.251435	0.135388	0.303589	0.163471	0.000736	0.000000	0.000000	0.000000	0.000000	0.134523	0.010858	1.000000	CALOOCAN BARANGAY 1
0.302349	0.140230	0.265063	0.115076	0.017503	0.001964	0.001970	0.000855	0.000456	0.141628	0.012906	1.000000	CALOOCAN BARANGAY 2
0.139195	0.069714	0.571304	0.123896	0.000000	0.000394	0.000000	0.000064	0.000070	0.095363	0.000000	1.000000	CALOOCAN BARANGAY 3
0.233899	0.094339	0.346755	0.120373	0.011599	0.002679	0.000276	0.001246	0.000489	0.182822	0.005523	1.000000	CALOOCAN BARANGAY 4
0.125162	0.058955	0.428537	0.151158	0.006228	0.000836	0.000460	0.000368	0.000502	0.225078	0.002717	1.000000	CALOOCAN BARANGAY 5
0.554971	0.288460	0.015205	0.008187	0.003119	0.001014	0.000000	0.000000	0.000000	0.120858	0.008187	1.000000	CALOOCAN BARANGAY 6
0.250610	0.123784	0.379146	0.201368	0.005361	0.001091	0.000000	0.000000	0.000000	0.037530	0.001109	1.000000	CALOOCAN BARANGAY 7
0.268768	0.137933	0.276636	0.091884	0.025282	0.000626	0.001857	0.000360	0.000153	0.188076	0.008424	1.000000	CALOOCAN BARANGAY 8
0.241546	0.130063	0.243391	0.131057	0.038549	0.000000	0.005489	0.000000	0.000000	0.203596	0.006309	1.000000	CALOOCAN BARANGAY 9
0.398193	0.214412	0.231172	0.102429	0.000000	0.000000	0.000000	0.000000	0.000000	0.047772	0.006022	1.000000	CALOOCAN BARANGAY 10
0.236497	0.091926	0.447905	0.153270	0.009607	0.003462	0.002402	0.000000	0.000000	0.045989	0.008942	1.000000	CALOOCAN BARANGAY 11
0.361777	0.172410	0.270153	0.067240	0.013088	0.002083	0.000401	0.000816	0.000697	0.103073	0.008263	1.000000	CALOOCAN BARANGAY 12
0.518942	0.274930	0.051753	0.027867	0.000000	0.000464	0.000000	0.000186	0.000279	0.122795	0.002786	1.000000	CALOOCAN BARANGAY 13
0.339200	0.168747	0.261840	0.081219	0.012433	0.001068	0.000437	0.000405	0.000351	0.124946	0.009353	1.000000	CALOOCAN BARANGAY 14
0.086139	0.030190	0.623052	0.180919	0.017847	0.001874	0.002380	0.000324	0.000464	0.037180	0.019631	1.000000	CALOOCAN BARANGAY 15
0.535778	0.285675	0.027892	0.014176	0.002316	0.000215	0.000579	0.000088	0.000094	0.127809	0.005377	1.000000	CALOOCAN BARANGAY 16
0.555034	0.292656	0.065739	0.034674	0.001016	0.000590	0.000000	0.000115	0.000148	0.047526	0.002501	1.000000	CALOOCAN BARANGAY 17
0.324721	0.154389	0.284281	0.125684	0.004037	0.001482	0.000313	0.001815	0.000157	0.101699	0.001422	1.000000	CALOOCAN BARANGAY 18
0.381583	0.191302	0.220255	0.081198	0.007129	0.000547	0.000000	0.000908	0.000000	0.114227	0.002852	1.000000	CALOOCAN BARANGAY 19
0.431386	0.220176	0.175025	0.079373	0.020530	0.001359	0.001249	0.000513	0.000491	0.058923	0.010974	1.000000	CALOOCAN BARANGAY 20
0.222548	0.113146	0.205409	0.102098	0.021049	0.000442	0.000994	0.000147	0.000000	0.318528	0.015639	1.000000	CALOOCAN BARANGAY 21
0.377071	0.166074	0.252489	0.082939	0.022036	0.003425	0.001098	0.001716	0.000477	0.086428	0.006247	1.000000	CALOOCAN BARANGAY 22
0.315127	0.142486	0.209915	0.042877	0.014140	0.002401	0.002631	0.000612	0.000493	0.269319	0.000000	1.000000	CALOOCAN BARANGAY 23
0.476753	0.226549	0.089375	0.048125	0.010543	0.002948	0.001413	0.000000	0.000000	0.144293	0.000000	1.000000	CALOOCAN BARANGAY 24
0.063585	0.018885	0.478444	0.152183	0.000000	0.001548	0.000000	0.000668	0.000929	0.282388	0.001369	1.000000	CALOOCAN BARANGAY 25
0.228223	0.119539	0.378303	0.199140	0.015356	0.000331	0.000000	0.000026	0.000040	0.058247	0.000794	1.000000	CALOOCAN BARANGAY 26
0.294646	0.156675	0.282382	0.152476	0.008255	0.000000	0.000000	0.000613	0.000000	0.103066	0.001887	1.000000	CALOOCAN BARANGAY 27
0.301824	0.134339	0.290478	0.089890	0.034836	0.002647	0.000592	0.000702	0.000426	0.114173	0.030095	1.000000	CALOOCAN BARANGAY 28
0.313278	0.133742	0.310397	0.110795	0.001325	0.003179	0.000000	0.000583	0.000874	0.125828	0.000000	1.000000	CALOOCAN BARANGAY 29
0.165296	0.078587	0.404095	0.202491	0.005392	0.000273	0.001263	0.002218	0.000136	0.138202	0.002047	1.000000	CALOOCAN BARANGAY 30
0.400010	0.173437	0.147108	0.065212	0.032415	0.003036	0.001941	0.002494	0.002182	0.159744	0.012422	1.000000	CALOOCAN BARANGAY 31
0.023396	0.003533	0.651406	0.075703	0.000000	0.001172	0.000000	0.000151	0.000227	0.242610	0.001802	1.000000	CALOOCAN BARANGAY 32
0.289095	0.129078	0.254770	0.063219	0.009528	0.002360	0.000244	0.001713	0.000353	0.235758	0.013881	1.000000	CALOOCAN BARANGAY 33

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.321071	0.137019	0.379212	0.075266	0.017684	0.003207	0.000274	0.001254	0.001734	0.062425	0.000855	1.000000	CALOOCAN BARANGAY 34
0.368216	0.149040	0.266390	0.078775	0.009160	0.003307	0.000733	0.005517	0.001035	0.102330	0.015497	1.000000	CALOOCAN BARANGAY 35
0.212118	0.105918	0.411175	0.164478	0.013837	0.001012	0.000859	0.000231	0.000163	0.078227	0.011983	1.000000	CALOOCAN BARANGAY 36
0.199271	0.096249	0.408089	0.126285	0.004902	0.001090	0.000060	0.000376	0.000546	0.158322	0.004811	1.000000	CALOOCAN BARANGAY 37
0.202881	0.090102	0.353522	0.140970	0.006740	0.002295	0.001189	0.000724	0.000308	0.191225	0.010044	1.000000	CALOOCAN BARANGAY 38
0.068144	0.034672	0.490850	0.195803	0.000000	0.000083	0.000000	0.000167	0.000167	0.210115	0.000000	1.000000	CALOOCAN BARANGAY 39
0.232277	0.094163	0.198241	0.106745	0.001160	0.003019	0.000000	0.000750	0.001063	0.362582	0.000000	1.000000	CALOOCAN BARANGAY 40
0.201835	0.070503	0.539011	0.149848	0.022816	0.003750	0.001516	0.000993	0.001352	0.007579	0.000798	1.000000	CALOOCAN BARANGAY 41
0.239218	0.128810	0.357763	0.175302	0.002070	0.000000	0.000000	0.000000	0.000000	0.096837	0.000000	1.000000	CALOOCAN BARANGAY 42
0.191286	0.094595	0.501165	0.167987	0.000932	0.001165	0.000000	0.000000	0.000000	0.038211	0.004660	1.000000	CALOOCAN BARANGAY 43
0.328430	0.106456	0.427685	0.095158	0.001241	0.006704	0.000000	0.000819	0.001229	0.032278	0.000000	1.000000	CALOOCAN BARANGAY 44
0.229615	0.091864	0.274103	0.147594	0.115486	0.003106	0.000000	0.000000	0.000000	0.138233	0.000000	1.000000	CALOOCAN BARANGAY 45
0.127794	0.052713	0.479173	0.248221	0.000593	0.001527	0.000000	0.000148	0.000000	0.081233	0.008598	1.000000	CALOOCAN BARANGAY 46
0.466697	0.251298	0.128021	0.068935	0.008953	0.000000	0.000000	0.000000	0.000000	0.001791	0.074306	1.000000	CALOOCAN BARANGAY 47
0.414070	0.222961	0.208524	0.112282	0.005500	0.000000	0.000000	0.000000	0.000000	0.036664	0.000000	1.000000	CALOOCAN BARANGAY 48
0.120974	0.038355	0.558963	0.060697	0.002813	0.001600	0.000240	0.001915	0.000618	0.207611	0.006215	1.000000	CALOOCAN BARANGAY 49
0.072793	0.038873	0.544207	0.285398	0.000799	0.000000	0.000000	0.000000	0.000000	0.057930	0.000000	1.000000	CALOOCAN BARANGAY 50
0.380784	0.089044	0.340564	0.077377	0.000000	0.011324	0.000000	0.000363	0.000544	0.087255	0.012745	1.000000	CALOOCAN BARANGAY 51
0.078340	0.034265	0.603372	0.091809	0.019496	0.000777	0.002563	0.000206	0.000265	0.159874	0.009034	1.000000	CALOOCAN BARANGAY 52
0.253929	0.105000	0.302030	0.162632	0.003008	0.003102	0.000000	0.000000	0.000000	0.121053	0.049248	1.000000	CALOOCAN BARANGAY 53
0.391286	0.170841	0.195907	0.105488	0.033572	0.003942	0.000000	0.000355	0.000532	0.098076	0.000000	1.000000	CALOOCAN BARANGAY 54
0.269369	0.135079	0.224438	0.120837	0.002391	0.001028	0.000000	0.000426	0.000617	0.245815	0.000000	1.000000	CALOOCAN BARANGAY 55
0.325263	0.175141	0.240461	0.128161	0.001657	0.000000	0.000162	0.000012	0.000000	0.129143	0.000000	1.000000	CALOOCAN BARANGAY 56
0.035881	0.012967	0.857060	0.004084	0.000000	0.000744	0.000000	0.000000	0.000000	0.089265	0.000000	1.000000	CALOOCAN BARANGAY 57
0.230073	0.123886	0.254291	0.136926	0.000000	0.000000	0.000000	0.000000	0.000000	0.254824	0.000000	1.000000	CALOOCAN BARANGAY 58
0.216517	0.112167	0.319099	0.170688	0.005658	0.000289	0.000374	0.000530	0.000082	0.168309	0.006287	1.000000	CALOOCAN BARANGAY 59
0.398502	0.203590	0.214485	0.093126	0.029344	0.000926	0.000000	0.000298	0.000000	0.056400	0.003330	1.000000	CALOOCAN BARANGAY 60
0.308574	0.152750	0.304224	0.137702	0.006099	0.001383	0.000067	0.000553	0.000830	0.079820	0.007999	1.000000	CALOOCAN BARANGAY 61
0.561896	0.300929	0.039352	0.021190	0.000000	0.000159	0.000000	0.000000	0.000000	0.076474	0.000000	1.000000	CALOOCAN BARANGAY 62
0.415531	0.215983	0.166243	0.089515	0.009133	0.000759	0.000719	0.000000	0.000000	0.102117	0.000000	1.000000	CALOOCAN BARANGAY 63
0.246394	0.128062	0.274944	0.148047	0.018708	0.000451	0.001202	0.000000	0.000000	0.177686	0.004508	1.000000	CALOOCAN BARANGAY 64
0.149928	0.071416	0.425130	0.228916	0.000000	0.000910	0.000000	0.000000	0.000000	0.101156	0.022543	1.000000	CALOOCAN BARANGAY 65
0.414491	0.173780	0.245603	0.125153	0.000000	0.004920	0.000000	0.000708	0.001029	0.022788	0.011528	1.000000	CALOOCAN BARANGAY 66
0.240565	0.109714	0.336365	0.148643	0.002897	0.001893	0.000000	0.000343	0.000466	0.135940	0.023174	1.000000	CALOOCAN BARANGAY 67
0.382523	0.170006	0.046077	0.016569	0.081712	0.002231	0.000000	0.001608	0.001608	0.294423	0.003243	1.000000	CALOOCAN BARANGAY 68
0.310285	0.144437	0.361418	0.025010	0.008809	0.002419	0.001375	0.000369	0.000512	0.144857	0.000509	1.000000	CALOOCAN BARANGAY 69
0.142147	0.070227	0.491100	0.244527	0.017266	0.000362	0.002094	0.000478	0.000331	0.020807	0.010661	1.000000	CALOOCAN BARANGAY 70
0.185434	0.078453	0.686000	0.041736	0.003585	0.000981	0.000000	0.000392	0.000589	0.002075	0.000755	1.000000	CALOOCAN BARANGAY 71

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.036422	0.019612	0.529957	0.034698	0.182759	0.000000	0.037069	0.000000	0.000000	0.008621	0.150862	1.000000	CALOOCAN BARANGAY 72
0.178773	0.078921	0.392362	0.176049	0.013193	0.001003	0.001090	0.001477	0.000989	0.150486	0.005658	1.000000	CALOOCAN BARANGAY 73
0.267626	0.140739	0.350717	0.182384	0.001195	0.000040	0.000119	0.000936	0.000000	0.056244	0.000000	1.000000	CALOOCAN BARANGAY 74
0.156327	0.072788	0.601044	0.094084	0.018773	0.001261	0.004143	0.000655	0.000130	0.050795	0.000000	1.000000	CALOOCAN BARANGAY 75
0.508577	0.265462	0.088019	0.046981	0.004615	0.000865	0.000000	0.000346	0.000519	0.084615	0.000000	1.000000	CALOOCAN BARANGAY 77
0.370090	0.180017	0.178006	0.095849	0.006504	0.001883	0.000428	0.000000	0.000000	0.167223	0.000000	1.000000	CALOOCAN BARANGAY 78
0.338879	0.070958	0.348631	0.127750	0.069119	0.015056	0.008725	0.003276	0.004773	0.012831	0.000000	1.000000	CALOOCAN BARANGAY 79
0.526639	0.263692	0.091165	0.047855	0.006645	0.002050	0.001120	0.000807	0.001211	0.048631	0.010185	1.000000	CALOOCAN BARANGAY 80
0.258418	0.138008	0.320421	0.164883	0.013107	0.000000	0.002515	0.000000	0.000000	0.102648	0.000000	1.000000	CALOOCAN BARANGAY 81
0.288110	0.145370	0.285393	0.153673	0.009030	0.000985	0.001875	0.000233	0.000350	0.114980	0.000000	1.000000	CALOOCAN BARANGAY 82
0.610855	0.325055	0.029818	0.015273	0.002182	0.000244	0.000000	0.000196	0.000196	0.008364	0.007818	1.000000	CALOOCAN BARANGAY 83
0.526001	0.282666	0.076428	0.039834	0.003064	0.000000	0.000000	0.000000	0.000000	0.069162	0.002845	1.000000	CALOOCAN BARANGAY 84
0.434373	0.233893	0.210099	0.107248	0.007834	0.000000	0.000160	0.000000	0.000000	0.006395	0.000000	1.000000	CALOOCAN BARANGAY 85
0.380627	0.203648	0.209707	0.111295	0.008131	0.000108	0.001023	0.000043	0.000065	0.080237	0.005116	1.000000	CALOOCAN BARANGAY 86
0.379905	0.198695	0.239228	0.128815	0.011474	0.000574	0.000000	0.000000	0.000000	0.036718	0.004590	1.000000	CALOOCAN BARANGAY 87
0.341944	0.184124	0.251488	0.135417	0.012644	0.000000	0.000082	0.000000	0.000000	0.074302	0.000000	1.000000	CALOOCAN BARANGAY 88
0.502301	0.257980	0.112128	0.061324	0.000855	0.000821	0.000000	0.001615	0.000369	0.060554	0.002053	1.000000	CALOOCAN BARANGAY 89
0.233224	0.124836	0.388129	0.207422	0.000547	0.000073	0.000000	0.000000	0.000000	0.045770	0.000000	1.000000	CALOOCAN BARANGAY 90
0.281893	0.149908	0.295607	0.159173	0.000000	0.000184	0.000000	0.000000	0.000000	0.113235	0.000000	1.000000	CALOOCAN BARANGAY 91
0.602104	0.225821	0.113847	0.025042	0.002946	0.009617	0.000000	0.000000	0.000000	0.020623	0.000000	1.000000	CALOOCAN BARANGAY 92
0.290088	0.134382	0.238226	0.097114	0.010273	0.001600	0.001605	0.000284	0.000263	0.206100	0.020064	1.000000	CALOOCAN BARANGAY 93
0.373475	0.201102	0.268675	0.144671	0.012077	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	CALOOCAN BARANGAY 94
0.447090	0.238552	0.148485	0.030570	0.009380	0.000139	0.000000	0.000156	0.000087	0.125541	0.000000	1.000000	CALOOCAN BARANGAY 95
0.373776	0.199634	0.265729	0.116461	0.011604	0.000000	0.000000	0.000000	0.000000	0.019929	0.012866	1.000000	CALOOCAN BARANGAY 96
0.378239	0.186540	0.206672	0.086100	0.061133	0.001577	0.001448	0.000634	0.000853	0.073183	0.003620	1.000000	CALOOCAN BARANGAY 97
0.417662	0.205909	0.169531	0.079591	0.004791	0.001948	0.000639	0.000703	0.001054	0.067071	0.051102	1.000000	CALOOCAN BARANGAY 98
0.530415	0.237052	0.175240	0.036751	0.000000	0.004913	0.000000	0.001502	0.001900	0.012227	0.000000	1.000000	CALOOCAN BARANGAY 99
0.385769	0.200440	0.079897	0.041909	0.018936	0.000708	0.000000	0.000061	0.000092	0.267980	0.004208	1.000000	CALOOCAN BARANGAY 100
0.502002	0.270309	0.091076	0.049041	0.006950	0.000000	0.000000	0.000000	0.000000	0.080623	0.000000	1.000000	CALOOCAN BARANGAY 101
0.364189	0.066593	0.324700	0.015978	0.010144	0.011856	0.000704	0.003064	0.002539	0.200235	0.000000	1.000000	CALOOCAN BARANGAY 102
0.245285	0.123050	0.111059	0.006519	0.485448	0.000931	0.002794	0.000373	0.000559	0.000698	0.023283	1.000000	CALOOCAN BARANGAY 103
0.545066	0.250359	0.014773	0.007955	0.002871	0.004217	0.000718	0.000000	0.000000	0.174043	0.000000	1.000000	CALOOCAN BARANGAY 104
0.024424	0.003827	0.649192	0.256156	0.016306	0.000808	0.001046	0.000185	0.000278	0.047778	0.000000	1.000000	CALOOCAN BARANGAY 105
0.518696	0.279298	0.074212	0.026074	0.000000	0.000000	0.000000	0.000000	0.000000	0.101719	0.000000	1.000000	CALOOCAN BARANGAY 106
0.414041	0.218951	0.195178	0.105952	0.004592	0.000000	0.000000	0.001236	0.000000	0.060049	0.000000	1.000000	CALOOCAN BARANGAY 107
0.386394	0.188331	0.245090	0.103567	0.045707	0.001761	0.004491	0.000000	0.000000	0.014531	0.010128	1.000000	CALOOCAN BARANGAY 108
0.204388	0.089223	0.470304	0.218385	0.008976	0.003187	0.000000	0.000400	0.000601	0.002035	0.002503	1.000000	CALOOCAN BARANGAY 109
0.647660	0.074468	0.105106	0.056596	0.000000	0.026809	0.000000	0.000000	0.000000	0.089362	0.000000	1.000000	CALOOCAN BARANGAY 110

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.405940	0.180426	0.228470	0.123022	0.008345	0.003738	0.002086	0.000064	0.000096	0.047812	0.000000	1.000000	CALOOCAN BARANGAY 111
0.123918	0.059028	0.731787	0.057618	0.002821	0.001003	0.000000	0.000313	0.000000	0.023511	0.000000	1.000000	CALOOCAN BARANGAY 112
0.519839	0.154246	0.117057	0.063031	0.005857	0.012518	0.000000	0.001786	0.002679	0.071742	0.051245	1.000000	CALOOCAN BARANGAY 113
0.366927	0.190016	0.316186	0.098791	0.000000	0.000000	0.000000	0.002340	0.000000	0.025741	0.000000	1.000000	CALOOCAN BARANGAY 114
0.243683	0.086287	0.285439	0.153698	0.009245	0.004391	0.000000	0.000000	0.000000	0.217257	0.000000	1.000000	CALOOCAN BARANGAY 115
0.563549	0.303450	0.000000	0.000000	0.002845	0.000000	0.000711	0.000000	0.000000	0.129445	0.000000	1.000000	CALOOCAN BARANGAY 116
0.144531	0.073690	0.227788	0.117002	0.017550	0.000488	0.001950	0.000414	0.000073	0.412553	0.003961	1.000000	CALOOCAN BARANGAY 117
0.078507	0.035229	0.435936	0.185429	0.007859	0.000638	0.000414	0.000090	0.000124	0.254395	0.001379	1.000000	CALOOCAN BARANGAY 118
0.265643	0.120568	0.169479	0.030288	0.002074	0.000998	0.000000	0.000607	0.000288	0.365993	0.044064	1.000000	CALOOCAN BARANGAY 119
0.080772	0.020421	0.477338	0.094403	0.004855	0.000069	0.000524	0.001550	0.000068	0.307172	0.012828	1.000000	CALOOCAN BARANGAY 120
0.440394	0.083251	0.173610	0.009993	0.000000	0.013336	0.000000	0.006897	0.001583	0.267417	0.003519	1.000000	CALOOCAN BARANGAY 121
0.192644	0.086022	0.504326	0.070504	0.008148	0.001169	0.000000	0.000690	0.000793	0.135704	0.000000	1.000000	CALOOCAN BARANGAY 122
0.233026	0.124484	0.279034	0.147934	0.003350	0.000000	0.000000	0.000000	0.000000	0.150195	0.061977	1.000000	CALOOCAN BARANGAY 123
0.258394	0.135401	0.389234	0.185572	0.000000	0.000446	0.000000	0.000345	0.000195	0.000000	0.030414	1.000000	CALOOCAN BARANGAY 124
0.294000	0.147611	0.339275	0.181530	0.000000	0.001074	0.000000	0.000215	0.000322	0.035973	0.000000	1.000000	CALOOCAN BARANGAY 125
0.111646	0.039101	0.478777	0.252154	0.013785	0.001809	0.000000	0.000775	0.000000	0.079839	0.022114	1.000000	CALOOCAN BARANGAY 126
0.303148	0.162144	0.335507	0.169490	0.015592	0.000112	0.000900	0.000045	0.000067	0.000000	0.012994	1.000000	CALOOCAN BARANGAY 127
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	CALOOCAN BARANGAY 128
0.014012	0.000000	0.981916	0.002515	0.000000	0.001557	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	CALOOCAN BARANGAY 129
0.218546	0.106944	0.408701	0.193276	0.000000	0.000490	0.000000	0.001781	0.000000	0.018791	0.051471	1.000000	CALOOCAN BARANGAY 130
0.168738	0.060124	0.510434	0.239615	0.000000	0.002360	0.000000	0.000441	0.000000	0.018289	0.000000	1.000000	CALOOCAN BARANGAY 131
0.358374	0.178226	0.252105	0.127005	0.005955	0.001322	0.000000	0.000544	0.000355	0.067221	0.008892	1.000000	CALOOCAN BARANGAY 132
0.388445	0.193081	0.208701	0.094463	0.006061	0.001180	0.000389	0.001093	0.000708	0.087867	0.018011	1.000000	CALOOCAN BARANGAY 133
0.447209	0.111851	0.252791	0.002956	0.002830	0.010613	0.000000	0.004410	0.004682	0.128066	0.034591	1.000000	CALOOCAN BARANGAY 134
0.434956	0.108365	0.039451	0.010487	0.000000	0.012984	0.000000	0.005194	0.007790	0.380774	0.000000	1.000000	CALOOCAN BARANGAY 135
0.506428	0.252266	0.091781	0.049420	0.000000	0.002107	0.000000	0.000843	0.001264	0.095890	0.000000	1.000000	CALOOCAN BARANGAY 136
0.235000	0.104478	0.208209	0.113097	0.047910	0.001537	0.000597	0.003112	0.000985	0.225373	0.059701	1.000000	CALOOCAN BARANGAY 137
0.349867	0.175116	0.178529	0.096223	0.004506	0.000530	0.000000	0.001193	0.001060	0.192975	0.000000	1.000000	CALOOCAN BARANGAY 138
0.274663	0.135884	0.239270	0.128801	0.004713	0.001171	0.001007	0.000357	0.000453	0.209792	0.003889	1.000000	CALOOCAN BARANGAY 139
0.119329	0.054497	0.502640	0.209217	0.002237	0.000940	0.000000	0.000447	0.000626	0.107830	0.002237	1.000000	CALOOCAN BARANGAY 140
0.177262	0.089017	0.450324	0.030867	0.003353	0.000619	0.000838	0.000253	0.000371	0.246142	0.000953	1.000000	CALOOCAN BARANGAY 141
0.214180	0.073706	0.420065	0.201077	0.011140	0.004143	0.000472	0.000697	0.000520	0.069278	0.004723	1.000000	CALOOCAN BARANGAY 142
0.279781	0.148319	0.219725	0.115711	0.006249	0.000119	0.001068	0.000364	0.000071	0.225628	0.002966	1.000000	CALOOCAN BARANGAY 143
0.348237	0.070874	0.433155	0.113101	0.001612	0.010921	0.000000	0.003149	0.001421	0.015112	0.002418	1.000000	CALOOCAN BARANGAY 144
0.293389	0.129702	0.355577	0.158235	0.015456	0.002365	0.000000	0.001182	0.000145	0.042272	0.001676	1.000000	CALOOCAN BARANGAY 145
0.378052	0.114814	0.373122	0.075369	0.000000	0.008106	0.000000	0.002949	0.001523	0.043157	0.002907	1.000000	CALOOCAN BARANGAY 146
0.214559	0.105615	0.361302	0.172133	0.000000	0.000798	0.000000	0.000727	0.000086	0.133656	0.011123	1.000000	CALOOCAN BARANGAY 147
0.262880	0.092944	0.409167	0.163926	0.001185	0.004574	0.000296	0.000893	0.000617	0.063148	0.000370	1.000000	CALOOCAN BARANGAY 148

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.457741	0.205517	0.187801	0.097281	0.014987	0.004014	0.002663	0.000122	0.000121	0.028240	0.001513	1.000000	CALOOCAN BARANGAY 149
0.300865	0.117874	0.388280	0.088393	0.027517	0.004671	0.000124	0.001851	0.002020	0.057597	0.010809	1.000000	CALOOCAN BARANGAY 150
0.296744	0.108601	0.364329	0.058730	0.009850	0.004181	0.000182	0.002337	0.000722	0.149398	0.004925	1.000000	CALOOCAN BARANGAY 151
0.384999	0.168318	0.240308	0.116715	0.015635	0.003895	0.002620	0.000638	0.000957	0.055463	0.010452	1.000000	CALOOCAN BARANGAY 152
0.214707	0.112807	0.464281	0.168225	0.007223	0.000282	0.000000	0.000046	0.000069	0.031205	0.001156	1.000000	CALOOCAN BARANGAY 153
0.380351	0.153049	0.221807	0.081060	0.009091	0.003867	0.000834	0.004524	0.001430	0.127445	0.016542	1.000000	CALOOCAN BARANGAY 154
0.201245	0.021680	0.691984	0.045322	0.000000	0.008441	0.000000	0.005119	0.003334	0.014980	0.007895	1.000000	CALOOCAN BARANGAY 155
0.418098	0.218479	0.167566	0.072751	0.014886	0.000364	0.000679	0.000277	0.000171	0.092686	0.014043	1.000000	CALOOCAN BARANGAY 156
0.604843	0.323237	0.053639	0.012206	0.002379	0.000198	0.000453	0.000170	0.000042	0.000000	0.002832	1.000000	CALOOCAN BARANGAY 157
0.451484	0.237595	0.247260	0.041553	0.003653	0.000419	0.000913	0.000000	0.000000	0.000000	0.017123	1.000000	CALOOCAN BARANGAY 158
0.527070	0.283807	0.076590	0.041230	0.001488	0.000000	0.000000	0.000011	0.000000	0.069805	0.000000	1.000000	CALOOCAN BARANGAY 159
0.319348	0.159856	0.266940	0.084080	0.020772	0.000847	0.002908	0.000304	0.000236	0.136345	0.008365	1.000000	CALOOCAN BARANGAY 160
0.349355	0.170213	0.241154	0.088476	0.012221	0.002259	0.000463	0.000084	0.000104	0.131260	0.004412	1.000000	CALOOCAN BARANGAY 161
0.475451	0.224436	0.215513	0.031292	0.024293	0.002951	0.000042	0.001429	0.001002	0.012461	0.011130	1.000000	CALOOCAN BARANGAY 162
0.554928	0.274450	0.067939	0.029559	0.010530	0.002066	0.000792	0.001012	0.000365	0.052650	0.005709	1.000000	CALOOCAN BARANGAY 163
0.465482	0.241609	0.116896	0.044064	0.023989	0.000877	0.000733	0.000213	0.000292	0.097775	0.008070	1.000000	CALOOCAN BARANGAY 164
0.524559	0.264090	0.104039	0.024467	0.008819	0.001673	0.000506	0.000572	0.000456	0.063828	0.006990	1.000000	CALOOCAN BARANGAY 165
0.420774	0.208279	0.248770	0.052480	0.016245	0.001774	0.001182	0.000706	0.000525	0.035537	0.013727	1.000000	CALOOCAN BARANGAY 166
0.489944	0.204812	0.221984	0.018560	0.017876	0.005737	0.000635	0.000971	0.000424	0.032951	0.006106	1.000000	CALOOCAN BARANGAY 167
0.501961	0.264693	0.132326	0.052063	0.011606	0.000540	0.000392	0.000229	0.000268	0.027744	0.008178	1.000000	CALOOCAN BARANGAY 168
0.638071	0.333824	0.014900	0.007370	0.003747	0.000977	0.000000	0.000266	0.000399	0.000446	0.000000	1.000000	CALOOCAN BARANGAY 169
0.546986	0.288379	0.059217	0.021074	0.018712	0.000529	0.000482	0.000205	0.000214	0.056023	0.008179	1.000000	CALOOCAN BARANGAY 170
0.462218	0.189041	0.259795	0.039992	0.023151	0.005937	0.000154	0.000941	0.000867	0.011760	0.006145	1.000000	CALOOCAN BARANGAY 171
0.580054	0.304066	0.085658	0.008559	0.006304	0.000854	0.000412	0.000332	0.000288	0.007351	0.006122	1.000000	CALOOCAN BARANGAY 172
0.604460	0.300457	0.033736	0.016588	0.019693	0.002675	0.004123	0.001025	0.001423	0.005986	0.009834	1.000000	CALOOCAN BARANGAY 173
0.489054	0.256936	0.093537	0.046882	0.018802	0.000635	0.001797	0.000135	0.000104	0.087599	0.004519	1.000000	CALOOCAN BARANGAY 174
0.505941	0.261375	0.088947	0.032337	0.040150	0.000963	0.001250	0.000240	0.000261	0.042137	0.026397	1.000000	CALOOCAN BARANGAY 175
0.453087	0.217327	0.166186	0.037740	0.035895	0.002517	0.003158	0.000953	0.000585	0.066405	0.016146	1.000000	CALOOCAN BARANGAY 176
0.498694	0.255524	0.135795	0.028971	0.020859	0.001191	0.000745	0.000567	0.000397	0.050008	0.007248	1.000000	CALOOCAN BARANGAY 177
0.440980	0.222141	0.122346	0.044736	0.044182	0.001497	0.002077	0.000593	0.000697	0.101734	0.019016	1.000000	CALOOCAN BARANGAY 178
0.534703	0.269743	0.063316	0.025335	0.036126	0.001695	0.000981	0.000581	0.000256	0.052524	0.014740	1.000000	CALOOCAN BARANGAY 179
0.485449	0.258240	0.098894	0.051286	0.048849	0.000310	0.003089	0.000059	0.000089	0.037974	0.015760	1.000000	CALOOCAN BARANGAY 180
0.433580	0.231118	0.122943	0.046953	0.053507	0.000224	0.002732	0.000101	0.000085	0.072868	0.035891	1.000000	CALOOCAN BARANGAY 181
0.485180	0.256535	0.049370	0.026468	0.050487	0.000462	0.001805	0.000007	0.000011	0.091650	0.038026	1.000000	CALOOCAN BARANGAY 182
0.491154	0.231032	0.062895	0.026350	0.014618	0.003021	0.000000	0.001549	0.001483	0.157309	0.010590	1.000000	CALOOCAN BARANGAY 183
0.591311	0.317736	0.011873	0.006393	0.033049	0.000027	0.000273	0.000055	0.000055	0.030522	0.008706	1.000000	CALOOCAN BARANGAY 184
0.533082	0.282463	0.051889	0.027940	0.017370	0.000450	0.000426	0.000053	0.000076	0.079704	0.006548	1.000000	CALOOCAN BARANGAY 185
0.543344	0.290335	0.066385	0.034683	0.013051	0.000225	0.000460	0.000039	0.000057	0.044878	0.006543	1.000000	CALOOCAN BARANGAY 186

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.465455	0.249151	0.091501	0.049325	0.032537	0.000119	0.001538	0.000088	0.000004	0.098430	0.011854	1.000000	CALOOCAN BARANGAY 187
0.323308	0.164049	0.278998	0.026849	0.030022	0.000992	0.000876	0.000700	0.000344	0.132566	0.041298	1.000000	CALOOCAN BARANGAY 188
0.452206	0.232364	0.069516	0.026764	0.021719	0.001030	0.000352	0.000200	0.000255	0.183433	0.012161	1.000000	LAS PIÑAS ALMANZA UNO
0.308460	0.161925	0.306725	0.064480	0.011447	0.000406	0.000460	0.000367	0.000032	0.137009	0.008688	1.000000	LAS PIÑAS DANIEL FAJARDO
0.238608	0.103882	0.407784	0.092333	0.004835	0.002378	0.000036	0.000334	0.000369	0.133523	0.015918	1.000000	LAS PIÑAS ELIAS ALDANA
0.140897	0.061384	0.467977	0.102548	0.004779	0.001203	0.000290	0.000814	0.000077	0.202735	0.017297	1.000000	LAS PIÑAS ILAYA
0.405934	0.211401	0.171861	0.086278	0.010559	0.000714	0.000229	0.000202	0.000297	0.104654	0.007870	1.000000	LAS PIÑAS MANUYO UNO
0.474664	0.252448	0.119363	0.059322	0.005245	0.000268	0.000515	0.000065	0.000085	0.076820	0.011205	1.000000	LAS PIÑAS PAMPLONA UNO
0.316380	0.136987	0.260406	0.070704	0.017317	0.003274	0.000751	0.000794	0.000824	0.182085	0.010478	1.000000	LAS PIÑAS PULANG LUPA UNO
0.420546	0.217942	0.061879	0.027860	0.015029	0.000802	0.000333	0.000213	0.000262	0.249660	0.005473	1.000000	LAS PIÑAS TALON UNO
0.285437	0.145379	0.252763	0.052712	0.017019	0.000492	0.001806	0.000225	0.000165	0.232400	0.011604	1.000000	LAS PIÑAS ZAPOTE
0.450207	0.202404	0.082322	0.022663	0.097629	0.003715	0.000981	0.001973	0.001649	0.122264	0.014194	1.000000	LAS PIÑAS ALMANZA DOS
0.519459	0.272338	0.068043	0.035775	0.026490	0.000686	0.000605	0.000191	0.000169	0.064690	0.011555	1.000000	LAS PIÑAS MANUYO DOS
0.601789	0.318808	0.020738	0.008668	0.009753	0.000491	0.000075	0.000046	0.000069	0.031409	0.008153	1.000000	LAS PIÑAS PAMPLONA DOS
0.626930	0.288709	0.018380	0.004581	0.014740	0.004845	0.000115	0.000279	0.000368	0.032425	0.008628	1.000000	LAS PIÑAS PAMPLONA TRES
0.623542	0.332304	0.007291	0.002848	0.015332	0.000337	0.000079	0.000131	0.000082	0.010483	0.007570	1.000000	LAS PIÑAS PILAR
0.511291	0.253270	0.117874	0.038645	0.019513	0.002055	0.000248	0.000701	0.000446	0.046350	0.009606	1.000000	LAS PIÑAS PULANG LUPA DOS
0.612107	0.279128	0.044105	0.017963	0.020533	0.005043	0.000240	0.001162	0.001644	0.011370	0.006705	1.000000	LAS PIÑAS TALON DOS
0.430237	0.223764	0.160616	0.078303	0.037671	0.000704	0.000457	0.000399	0.000342	0.057185	0.010323	1.000000	LAS PIÑAS TALON TRES
0.441746	0.171246	0.188749	0.071003	0.037553	0.006396	0.000394	0.000907	0.000521	0.069004	0.012481	1.000000	LAS PIÑAS TALON CUATRO
0.539940	0.283827	0.057938	0.017176	0.043809	0.000674	0.000153	0.000171	0.000236	0.051378	0.004698	1.000000	LAS PIÑAS TALON SINGKO
0.298959	0.150875	0.236056	0.116012	0.006847	0.000669	0.000368	0.000741	0.000184	0.175970	0.013319	1.000000	MAKATI BANGKAL
0.651375	0.276461	0.015820	0.008966	0.003047	0.007061	0.000000	0.000678	0.000048	0.002249	0.034296	1.000000	MAKATI BEL-AIR
0.418712	0.213705	0.181267	0.095166	0.007854	0.001101	0.000942	0.000226	0.000100	0.076441	0.004487	1.000000	MAKATI CEMBO
0.370249	0.184752	0.278250	0.103670	0.003321	0.001176	0.000510	0.000797	0.000275	0.053718	0.003280	1.000000	MAKATI COMEMBO
0.143276	0.075280	0.432460	0.223338	0.000492	0.000000	0.000123	0.000631	0.000000	0.124400	0.000000	1.000000	MAKATI CARMONA
0.361553	0.185413	0.230456	0.113597	0.024022	0.000738	0.000211	0.000527	0.000118	0.078019	0.005347	1.000000	MAKATI EAST REMBO
0.636634	0.267417	0.020162	0.011236	0.022323	0.007136	0.000000	0.001552	0.000846	0.004087	0.028606	1.000000	MAKATI FORBES PARK
0.223231	0.103212	0.370225	0.146467	0.009082	0.001473	0.000244	0.000732	0.000373	0.137366	0.007595	1.000000	MAKATI GUADALUPE NUEVO
0.234842	0.113779	0.254190	0.109474	0.033658	0.001125	0.001956	0.000210	0.000135	0.238884	0.011746	1.000000	MAKATI GUADALUPE VIEJO
0.357391	0.184485	0.271655	0.129783	0.002795	0.000620	0.000676	0.000325	0.000289	0.052082	-0.000100	1.000000	MAKATI KASILAWAN
0.406958	0.194490	0.187115	0.075740	0.016491	0.002400	0.000434	0.000392	0.000505	0.097120	0.018356	1.000000	MAKATI LA PAZ
0.611500	0.223328	0.054874	0.019458	0.037754	0.010085	0.000000	0.000689	0.000071	0.040042	0.002198	1.000000	MAKATI MAGALLANES
0.259272	0.101801	0.386685	0.106836	0.006979	0.003398	0.000553	0.001382	0.000898	0.123491	0.008705	1.000000	MAKATI OLYMPIA
0.296556	0.146156	0.351333	0.134972	0.018006	0.001242	0.000200	0.000433	0.000258	0.046560	0.004286	1.000000	MAKATI PALANAN
0.384057	0.156063	0.326003	0.060544	0.002988	0.004577	0.000287	0.001535	0.000868	0.053524	0.009554	1.000000	MAKATI PEMBO
0.258276	0.135804	0.337083	0.171739	0.012398	0.000288	0.000043	0.000045	0.000045	0.070436	0.013843	1.000000	MAKATI PINAGKAISAHAN
0.319970	0.139328	0.269364	0.123052	0.024518	0.003239	0.000238	0.000238	0.000085	0.111824	0.008145	1.000000	MAKATI PIO DEL PILAR

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.332127	0.161497	0.290476	0.089048	0.001623	0.001472	0.000110	0.000741	0.000770	0.112374	0.009763	1.000000	MAKATI PITOGO
0.299991	0.124857	0.389770	0.086454	0.004941	0.003206	0.000053	0.001176	0.000789	0.080565	0.008197	1.000000	MAKATI POBLACION
0.400764	0.204884	0.305515	0.037989	0.018029	0.001085	0.000354	0.001200	0.000279	0.020377	0.009524	1.000000	MAKATI POST PROPER NORTHSIDE
0.439224	0.220639	0.085410	0.045733	0.038594	0.001412	0.001553	0.000487	0.000108	0.161045	0.005795	1.000000	MAKATI POST PROPER SOUTHSIDE
0.304848	0.147093	0.393688	0.070266	0.047525	0.001488	0.001279	0.000446	0.000280	0.029038	0.004049	1.000000	MAKATI SAN ANTONIO
0.480730	0.250163	0.112710	0.037334	0.027970	0.000853	0.000016	0.000029	0.000035	0.088242	0.001917	1.000000	MAKATI SAN ISIDRO
0.594055	0.260756	0.017223	0.008896	0.054265	0.005786	0.000000	0.000062	0.000093	0.021101	0.037763	1.000000	MAKATI SAN LORENZO
0.385228	0.131219	0.285041	0.118797	0.014412	0.007505	0.000335	0.000958	0.000674	0.050293	0.005538	1.000000	MAKATI SANTA CRUZ
0.373514	0.153839	0.180305	0.092267	0.003453	0.004385	0.000515	0.000355	0.000347	0.188660	0.002362	1.000000	MAKATI SINGKAMAS
0.384193	0.200714	0.266705	0.110237	0.008068	0.000562	0.000759	0.000101	0.000079	0.026780	0.001803	1.000000	MAKATI SOUTH CEMBO
0.272397	0.115074	0.224660	0.049054	0.014044	0.002896	0.000246	0.000300	0.000045	0.304611	0.016673	1.000000	MAKATI TEJEROS
0.793999	0.143458	0.010382	0.004915	0.000658	0.027780	0.000000	0.000100	0.000150	0.007711	0.010846	1.000000	MAKATI URDANETA
0.382878	0.198971	0.252452	0.117388	0.008925	0.000711	0.000417	0.000088	0.000089	0.036832	0.001250	1.000000	MAKATI VALENZUELA
0.497866	0.233152	0.119192	0.047228	0.023701	0.003295	0.000777	0.000434	0.000152	0.066783	0.007419	1.000000	MAKATI WEST REMBO
0.355650	0.174684	0.297068	0.063668	0.013789	0.001578	0.001116	0.000275	0.000170	0.080938	0.011063	1.000000	MAKATI RIZAL
0.294247	0.141942	0.214861	0.102850	0.023082	0.001508	0.000137	0.000347	0.000369	0.215621	0.005036	1.000000	MALABON ACACIA
0.275409	0.116102	0.340316	0.097924	0.003771	0.002966	0.000017	0.001137	0.000411	0.148974	0.012973	1.000000	MALABON BARITAN
0.073806	0.022425	0.613896	0.071431	0.010696	0.001491	0.001659	0.000715	0.000191	0.191775	0.011914	1.000000	MALABON BAYAN-BAYANAN
0.165155	0.068029	0.166879	0.057838	0.034222	0.001665	0.002509	0.000448	0.000498	0.469247	0.033510	1.000000	MALABON CATMON
0.146760	0.068032	0.436552	0.158918	0.010741	0.000825	0.000397	0.000471	0.000452	0.161301	0.015552	1.000000	MALABON CONCEPCION
0.344575	0.177832	0.285636	0.119594	0.013549	0.000663	0.000677	0.000421	0.000285	0.048366	0.008403	1.000000	MALABON DAMPALIT
0.193987	0.078214	0.279387	0.084456	0.006334	0.002381	0.000754	0.001254	0.000755	0.347955	0.004524	1.000000	MALABON FLORES
0.325470	0.144474	0.246891	0.081811	0.007862	0.002768	0.000862	0.001011	0.000619	0.181486	0.006746	1.000000	MALABON HULONG DUHAT
0.240957	0.117851	0.238728	0.127614	0.066712	0.001071	0.000000	0.000347	0.000036	0.200827	0.005857	1.000000	MALABON IBABA
0.394761	0.190112	0.194515	0.070655	0.016172	0.001769	0.001508	0.001799	0.000388	0.116218	0.012104	1.000000	MALABON LONGOS
0.288548	0.140311	0.060237	0.026026	0.024867	0.001329	0.000767	0.000496	0.000372	0.437809	0.019237	1.000000	MALABON MAYSILO
0.287163	0.141694	0.312976	0.123324	0.011010	0.001095	0.000702	0.000230	0.000185	0.116056	0.005566	1.000000	MALABON MUZON
0.485929	0.254744	0.099938	0.033143	0.008756	0.000588	0.000000	0.000233	0.000281	0.105339	0.011051	1.000000	MALABON NIUGAN
0.290172	0.154464	0.283757	0.146530	0.010393	0.000191	0.000286	0.000067	0.000049	0.105510	0.008581	1.000000	MALABON PANGHULO
0.308358	0.146652	0.267796	0.097902	0.016649	0.001705	0.001521	0.000817	0.000545	0.152329	0.005725	1.000000	MALABON POTRERO
0.275706	0.139949	0.193362	0.103198	0.013413	0.000826	0.000983	0.000112	0.000090	0.267590	0.004771	1.000000	MALABON SAN AGUSTIN
0.412968	0.194513	0.132543	0.038699	0.006269	0.002587	0.000511	0.000393	0.000491	0.202387	0.008638	1.000000	MALABON SANTOLAN
0.375652	0.176619	0.184727	0.085908	0.005407	0.002456	0.000168	0.000729	0.000538	0.156658	0.011139	1.000000	MALABON TINAJEROS
0.258443	0.120400	0.158241	0.071590	0.012010	0.001656	0.001391	0.000369	0.000340	0.363288	0.012272	1.000000	MALABON TONSUYA
0.280871	0.138828	0.292122	0.141286	0.003675	0.001126	0.000206	0.000352	0.000216	0.130909	0.010410	1.000000	MALABON TUGATOG
0.236209	0.058565	0.361239	0.115147	0.013993	0.006667	0.000733	0.000790	0.000211	0.199088	0.007357	1.000000	MANDALUYONG ADDITION HILLS
0.177490	0.063795	0.449692	0.243209	0.008269	0.001445	0.001509	0.005267	0.000010	0.043044	0.006271	1.000000	MANDALUYONG BAGONG SILANG
0.348451	0.126706	0.314898	0.061393	0.018422	0.005533	0.000340	0.001961	0.000258	0.110609	0.011428	1.000000	MANDALUYONG BARANGKA DRIVE

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.275355	0.122461	0.405559	0.079593	0.007936	0.003119	0.001074	0.000883	0.000348	0.096960	0.006712	1.000000	MANDALUYONG BARANGKA IBABA
0.394439	0.106944	0.328421	0.050632	0.004630	0.010203	0.000790	0.004645	0.005798	0.091238	0.002258	1.000000	MANDALUYONG BARANGKA ILAYA
0.413212	0.122945	0.247103	0.107918	0.005885	0.009578	0.000339	0.000380	0.000154	0.088642	0.003844	1.000000	MANDALUYONG BARANGKA ITAAS
0.208080	0.056145	0.432526	0.113019	0.004195	0.003448	0.000000	0.002349	0.002160	0.169808	0.008272	1.000000	MANDALUYONG BUROL
0.471151	0.253696	0.085631	0.046064	0.004447	0.000000	0.000000	0.000044	0.000000	0.138966	0.000000	1.000000	MANDALUYONG BUAYANG BATO
0.262645	0.136138	0.303750	0.162458	0.004555	0.000511	0.000353	0.000000	0.000000	0.128019	0.001571	1.000000	MANDALUYONG DAANG BAKAL
0.244363	0.123898	0.352335	0.164047	0.003097	0.000567	0.000029	0.000646	0.000232	0.109369	0.001417	1.000000	MANDALUYONG HAGDANG BATO ITAAS
0.305215	0.129276	0.362896	0.131060	0.007545	0.003925	0.000921	0.000542	0.000266	0.054820	0.003534	1.000000	MANDALUYONG HAGDANG BATO LIBIS
0.254230	0.131064	0.333437	0.175785	0.017042	0.000289	0.000152	0.000820	0.000145	0.085819	0.001217	1.000000	MANDALUYONG HARAPIN ANG BUKAS
0.353998	0.156700	0.232087	0.103717	0.008093	0.003112	0.000317	0.000495	0.000248	0.045590	0.095644	1.000000	MANDALUYONG HIGHWAY HILLS
0.214988	0.078625	0.383073	0.111530	0.011994	0.003344	0.000831	0.001431	0.000900	0.181644	0.011640	1.000000	MANDALUYONG HULO
0.200187	0.091647	0.376300	0.185615	0.025320	0.001485	0.001403	0.000313	0.000167	0.113717	0.003845	1.000000	MANDALUYONG MABINI-J. RIZAL
0.402271	0.196433	0.276407	0.065181	0.027537	0.001938	0.000493	0.000765	0.001086	0.018663	0.009226	1.000000	MANDALUYONG MALAMIG
0.274471	0.143113	0.215283	0.098702	0.061283	0.000416	0.002257	0.000228	0.000043	0.183982	0.020221	1.000000	MANDALUYONG MAUWAY
0.422455	0.208453	0.215991	0.069053	0.015241	0.001776	0.000521	0.000863	0.000668	0.053220	0.011760	1.000000	MANDALUYONG NAMAYAN
0.289194	0.143991	0.353122	0.088241	0.008317	0.001356	0.000000	0.000385	0.000278	0.112584	0.002531	1.000000	MANDALUYONG PAG-ASA
0.424352	0.198908	0.197997	0.068002	0.020026	0.002825	0.000551	0.000519	0.000343	0.072929	0.013547	1.000000	MANDALUYONG PLAINVIEW
0.354698	0.124738	0.271630	0.141583	0.003366	0.006469	0.000212	0.000089	0.000064	0.094367	0.002783	1.000000	MANDALUYONG PLEASANT HILLS
0.230910	0.107734	0.362465	0.121383	0.025271	0.001229	0.000297	0.001513	0.000401	0.143383	0.005414	1.000000	MANDALUYONG POBLACION
0.336286	0.149368	0.331221	0.080836	0.006583	0.002706	0.001203	0.000919	0.001378	0.085183	0.004317	1.000000	MANDALUYONG SAN JOSE
0.191341	0.067179	0.468791	0.177305	0.009270	0.003602	0.001310	0.000164	0.000057	0.078463	0.002519	1.000000	MANDALUYONG VERGARA
0.623691	0.179704	0.108704	0.031685	0.000000	0.015137	0.000000	0.000795	0.000428	0.010196	0.029661	1.000000	MANDALUYONG WACK-WACK GREENHILLS
0.889153	0.000000	0.040393	0.000000	0.009576	0.046798	0.000000	0.000000	0.000000	0.010306	0.003775	1.000000	MANILA BARANGAY 287
0.784762	0.149226	0.000603	0.000325	0.016089	0.026717	0.000000	0.000000	0.000000	0.022277	0.000000	1.000000	MANILA BARANGAY 288
0.580083	0.304979	0.004795	0.002582	0.069156	0.000761	0.000000	0.000304	0.000456	0.035961	0.000922	1.000000	MANILA BARANGAY 289
0.438881	0.236321	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.215633	0.109164	1.000000	MANILA BARANGAY 290
0.737434	0.033470	0.031610	0.017021	0.031058	0.037515	0.000000	0.015006	0.022509	0.072333	0.002043	1.000000	MANILA BARANGAY 291
0.721326	0.078976	0.044084	0.023390	0.001101	0.028646	0.000000	0.005063	0.000000	0.097413	0.000000	1.000000	MANILA BARANGAY 292
0.255759	0.010662	0.591599	0.125440	0.000000	0.012625	0.000000	0.001566	0.002349	0.000000	0.000000	1.000000	MANILA BARANGAY 293
0.258433	0.025899	0.236309	0.091432	0.000599	0.011324	0.000000	0.001929	0.002894	0.100659	0.270521	1.000000	MANILA BARANGAY 294
0.857826	0.065206	0.000000	0.000000	0.009358	0.038792	0.000000	0.000128	0.000191	0.028499	0.000000	1.000000	MANILA BARANGAY 295
0.658989	0.211868	0.046559	0.025070	0.013670	0.013975	0.000000	0.000000	0.000000	0.028933	0.000936	1.000000	MANILA BARANGAY 296
0.395624	0.202455	0.234472	0.126254	0.000000	0.001067	0.000000	0.000256	0.000384	0.039488	0.000000	1.000000	MANILA BARANGAY 659
0.919873	0.025495	0.000000	0.000000	0.008709	0.045922	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 659-A
0.225287	0.032184	0.000000	0.000000	0.724138	0.009195	0.000000	0.003678	0.005517	0.000000	0.000000	1.000000	MANILA BARANGAY 660
0.168182	0.084848	0.487584	0.109301	0.053030	0.001094	0.000505	0.000000	0.000000	0.087037	0.008418	1.000000	MANILA BARANGAY 660-A
0.128836	0.021575	0.552055	0.150959	0.005479	0.003699	0.000000	0.002795	0.001726	0.013699	0.119178	1.000000	MANILA BARANGAY 661
0.432206	0.085441	0.201471	0.101176	0.047059	0.001176	0.000000	0.042529	0.000706	0.082353	0.005882	1.000000	MANILA BARANGAY 666

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.419585	0.225931	0.062140	0.033460	0.002538	0.000000	0.000000	0.000000	0.000000	0.256345	0.000000	1.000000	MANILA BARANGAY 667
0.299776	0.155817	0.192562	0.067729	0.013423	0.000000	0.000000	0.000000	0.000000	0.270694	0.000000	1.000000	MANILA BARANGAY 668
0.690909	0.000000	0.000000	0.000000	0.218182	0.036364	0.054545	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 669
0.169178	0.091096	0.378425	0.203767	0.000000	0.000000	0.000000	0.000000	0.000000	0.157534	0.000000	1.000000	MANILA BARANGAY 670
0.087929	0.038820	0.732339	0.065782	0.008196	0.001091	0.002049	0.000989	0.000000	0.062806	0.000000	1.000000	MANILA BARANGAY 663
0.244706	0.131765	0.122941	0.053529	0.018824	0.000000	0.004706	0.000000	0.000000	0.423529	0.000000	1.000000	MANILA BARANGAY 663-A
0.374054	0.109730	0.277568	0.149459	0.043243	0.009459	0.000000	0.003784	0.005676	0.027027	0.000000	1.000000	MANILA BARANGAY 664
0.121755	0.064249	0.106947	0.045791	0.001826	0.000000	0.000000	0.000000	0.000000	0.659432	0.000000	1.000000	MANILA BARANGAY 654
0.136269	0.053511	0.118716	0.025904	0.000000	0.000561	0.000000	0.002468	0.000337	0.637723	0.024512	1.000000	MANILA BARANGAY 655
0.027687	0.007780	0.173607	0.091855	0.011115	0.000265	0.001393	0.000531	0.000531	0.676609	0.008626	1.000000	MANILA BARANGAY 656
0.266807	0.143666	0.279645	0.146030	0.016892	0.000000	0.000000	0.000000	0.000000	0.146959	0.000000	1.000000	MANILA BARANGAY 657
0.330996	0.113073	0.096461	0.033028	0.000000	0.006429	0.000000	0.002385	0.003473	0.393185	0.020970	1.000000	MANILA BARANGAY 658
0.121966	0.029296	0.136736	0.038144	0.012400	0.003410	0.003100	0.001019	0.000252	0.646590	0.007086	1.000000	MANILA BARANGAY 689
0.120157	0.062583	0.257740	0.138783	0.000000	0.000207	0.000000	0.000000	0.000000	0.420530	0.000000	1.000000	MANILA BARANGAY 690
0.577456	0.302393	0.000000	0.000000	0.000000	0.000353	0.000000	0.000705	0.000705	0.118388	0.000000	1.000000	MANILA BARANGAY 691
0.625386	0.336066	0.000000	0.000000	0.000000	0.000028	0.000000	0.000056	0.000056	0.038407	0.000000	1.000000	MANILA BARANGAY 692
0.628530	0.338439	0.011082	0.005967	0.000000	0.000000	0.000000	0.000000	0.000000	0.015983	0.000000	1.000000	MANILA BARANGAY 693
0.555603	0.282897	0.078680	0.042366	0.000781	0.001679	0.000000	0.000672	0.001007	0.035143	0.001171	1.000000	MANILA BARANGAY 694
0.312578	0.157439	0.305976	0.164756	0.000000	0.001063	0.000000	0.000000	0.000000	0.058188	0.000000	1.000000	MANILA BARANGAY 695
0.494052	0.266028	0.113888	0.061324	0.000000	0.000000	0.000000	0.000000	0.000000	0.064709	0.000000	1.000000	MANILA BARANGAY 696
0.587342	0.111816	0.069228	0.016889	0.000000	0.020168	0.000000	0.001406	0.002108	0.180153	0.010888	1.000000	MANILA BARANGAY 697
0.243318	0.106730	0.166567	0.086072	0.000576	0.001756	0.000144	0.000681	0.000681	0.393474	0.000000	1.000000	MANILA BARANGAY 698
0.304035	0.121235	0.300939	0.164063	0.008030	0.003176	0.000000	0.002996	0.000080	0.095445	0.000000	1.000000	MANILA BARANGAY 699
0.389466	0.209713	0.206293	0.111081	0.000000	0.000000	0.000000	0.000000	0.000000	0.083447	0.000000	1.000000	MANILA BARANGAY 700
0.715431	0.081222	0.049537	0.026674	0.012015	0.029746	0.002746	0.000233	0.000350	0.080673	0.001373	1.000000	MANILA BARANGAY 713
0.069485	0.033712	0.383129	0.195797	0.002554	0.000362	0.000000	0.000000	0.000000	0.313955	0.001005	1.000000	MANILA BARANGAY 702
0.331190	0.178333	0.309524	0.166667	0.006429	0.000000	0.000000	0.000000	0.000000	0.007857	0.000000	1.000000	MANILA BARANGAY 703
0.065687	0.035370	0.397252	0.210198	0.005262	0.000000	0.000393	0.000000	0.000000	0.285837	0.000000	1.000000	MANILA BARANGAY 704
0.212210	0.014659	0.580445	0.003640	0.001289	0.009762	0.000000	0.001289	0.001450	0.175258	0.000000	1.000000	MANILA BARANGAY 705
0.200333	0.107871	0.396563	0.053548	0.000000	0.000000	0.000000	0.000000	0.000000	0.241685	0.000000	1.000000	MANILA BARANGAY 706
0.350333	0.188641	0.266302	0.143394	0.006844	0.000000	0.001711	0.000000	0.000000	0.042776	0.000000	1.000000	MANILA BARANGAY 707
0.414244	0.223055	0.177653	0.095659	0.000000	0.000000	0.000000	0.000000	0.000000	0.084244	0.005145	1.000000	MANILA BARANGAY 708
0.544278	0.282526	0.111907	0.060258	0.000000	0.001031	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 709
0.479468	0.258175	0.135437	0.072928	0.019772	0.000000	0.000000	0.000000	0.000000	0.034221	0.000000	1.000000	MANILA BARANGAY 710
0.302786	0.133662	0.255107	0.138450	0.000000	0.002252	0.000000	0.002635	0.001439	0.143355	0.020313	1.000000	MANILA BARANGAY 711
0.146993	0.079150	0.375131	0.201993	0.001569	0.000000	0.000392	0.000000	0.000000	0.194771	0.000000	1.000000	MANILA BARANGAY 712
0.312191	0.118287	0.154012	0.078349	0.000000	0.004792	0.000000	0.002145	0.002292	0.327932	0.000000	1.000000	MANILA BARANGAY 713
0.256632	0.134645	0.228233	0.122895	0.003302	0.000358	0.000000	0.000088	0.000132	0.096313	0.157402	1.000000	MANILA BARANGAY 714

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.169630	0.091339	0.253695	0.136605	0.004388	0.000000	0.000000	0.000000	0.000000	0.344342	0.000000	1.000000	MANILA BARANGAY 715
0.250610	0.134944	0.193082	0.103967	0.000000	0.000000	0.000000	0.000000	0.000000	0.317396	0.000000	1.000000	MANILA BARANGAY 716
0.444344	0.239262	0.026639	0.014344	0.018361	0.000000	0.004590	0.000000	0.000000	0.252459	0.000000	1.000000	MANILA BARANGAY 717
0.057384	0.026646	0.307127	0.111992	0.000000	0.000000	0.000000	0.000000	0.000000	0.471093	0.025758	1.000000	MANILA BARANGAY 718
0.544042	0.234249	0.089175	0.010883	0.009009	0.005696	0.000000	0.000000	0.000000	0.084278	0.022668	1.000000	MANILA BARANGAY 719
0.275100	0.148131	0.177303	0.042991	0.000000	0.000000	0.000000	0.000000	0.000000	0.356475	0.000000	1.000000	MANILA BARANGAY 720
0.284140	0.139247	0.264593	0.142473	0.003840	0.001344	0.000000	0.000000	0.000000	0.164363	0.000000	1.000000	MANILA BARANGAY 721
0.327824	0.176521	0.254395	0.136982	0.000000	0.000000	0.000000	0.000000	0.000000	0.104278	0.000000	1.000000	MANILA BARANGAY 722
0.328426	0.168747	0.185979	0.096246	0.003392	0.000791	0.000000	0.000000	0.000000	0.198779	0.017639	1.000000	MANILA BARANGAY 723
0.577424	0.056101	0.132404	0.091451	0.000000	0.006432	0.000000	0.058580	0.000000	0.060396	0.017212	1.000000	MANILA BARANGAY 724
0.420022	0.226166	0.134234	0.072280	0.062176	0.000000	0.000000	0.000000	0.000000	0.085122	0.000000	1.000000	MANILA BARANGAY 725
0.539247	0.262727	0.100286	0.054000	0.000000	0.002701	0.000000	0.000000	0.000000	0.041039	0.000000	1.000000	MANILA BARANGAY 726
0.590062	0.317726	0.027329	0.014716	0.020354	0.000000	0.002580	0.000000	0.000000	0.014333	0.012900	1.000000	MANILA BARANGAY 727
0.253501	0.099406	0.170079	0.097160	0.005945	0.000647	0.000000	0.008692	0.000634	0.319022	0.044914	1.000000	MANILA BARANGAY 728
0.521764	0.213511	0.082565	0.044458	0.000000	0.006837	0.000000	0.002864	0.004215	0.117314	0.006472	1.000000	MANILA BARANGAY 729
0.097446	0.049886	0.498014	0.265891	0.011659	0.000259	0.000454	0.000052	0.000078	0.068802	0.007459	1.000000	MANILA BARANGAY 730
0.368136	0.198227	0.194632	0.104802	0.021177	0.000000	0.000000	0.000000	0.000000	0.111056	0.001970	1.000000	MANILA BARANGAY 731
0.276643	0.143250	0.172786	0.093162	0.021111	0.000507	0.005278	0.000218	0.000061	0.285714	0.001269	1.000000	MANILA BARANGAY 732
0.153184	0.070859	0.415200	0.143506	0.029026	0.000905	0.000000	0.000458	0.000325	0.173429	0.013109	1.000000	MANILA BARANGAY 733
0.378497	0.166779	0.224993	0.121503	0.026094	0.003396	0.000752	0.000703	0.000236	0.077047	0.000000	1.000000	MANILA BARANGAY 738
0.486255	0.121826	0.162854	0.049004	0.010818	0.014174	0.001909	0.006163	0.008276	0.127903	0.010818	1.000000	MANILA BARANGAY 739
0.389262	0.075029	0.323049	0.089493	0.010136	0.013068	0.000932	0.000196	0.000000	0.090485	0.008350	1.000000	MANILA BARANGAY 740
0.233055	0.116179	0.276393	0.109740	0.065460	0.000673	0.000000	0.000506	0.000223	0.178737	0.019034	1.000000	MANILA BARANGAY 741
0.432087	0.140827	0.203189	0.109409	0.000000	0.005701	0.000000	0.004787	0.004787	0.099213	0.000000	1.000000	MANILA BARANGAY 742
0.097361	0.049523	0.483745	0.251123	0.003481	0.000000	0.000449	0.000898	0.000000	0.073554	0.039865	1.000000	MANILA BARANGAY 743
0.497508	0.261707	0.111197	0.059875	0.052115	0.000604	0.000000	0.000000	0.000000	0.013973	0.003021	1.000000	MANILA BARANGAY 688
0.274687	0.113956	0.333260	0.101257	0.050885	0.003374	0.000000	0.001427	0.001685	0.078540	0.040929	1.000000	MANILA BARANGAY 735
0.320415	0.145666	0.254101	0.135992	0.007163	0.002235	0.000000	0.001039	0.001225	0.126433	0.005731	1.000000	MANILA BARANGAY 736
0.018874	0.006225	0.607164	0.260425	0.018182	0.000395	0.001581	0.000079	0.000119	0.078063	0.008893	1.000000	MANILA BARANGAY 737
0.118578	0.061356	0.152811	0.081036	0.074972	0.000000	0.000000	0.000772	0.000000	0.471885	0.038589	1.000000	MANILA BARANGAY 734
0.051760	0.003778	0.393923	0.146105	0.007743	0.001187	0.000000	0.005659	0.001061	0.365321	0.023463	1.000000	MANILA BARANGAY 662
0.495677	0.264474	0.097650	0.036372	0.000000	0.000000	0.000000	0.000564	0.000000	0.105263	0.000000	1.000000	MANILA BARANGAY 664-A
0.006532	0.003517	0.634044	0.330419	0.022661	0.000000	0.002287	0.000541	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 671
0.175978	0.094758	0.303127	0.158585	0.211084	0.000000	0.005355	0.000000	0.000000	0.030893	0.020221	1.000000	MANILA BARANGAY 672
0.014402	0.007755	0.603523	0.314021	0.007882	0.000000	0.001380	0.000000	0.000000	0.034326	0.016709	1.000000	MANILA BARANGAY 673
0.495586	0.255969	0.104665	0.037900	0.000592	0.000696	0.000000	0.001214	0.000000	0.086197	0.017180	1.000000	MANILA BARANGAY 674
0.459252	0.245276	0.137620	0.074103	0.000000	0.000197	0.000000	0.000000	0.000000	0.083552	0.000000	1.000000	MANILA BARANGAY 675
0.493564	0.259032	0.142980	0.076989	0.001167	0.000633	0.000000	0.000037	0.000037	0.024946	0.000614	1.000000	MANILA BARANGAY 676

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.376773	0.184211	0.153043	0.082151	0.028238	0.001121	0.002471	0.002059	0.000183	0.122609	0.047140	1.000000	MANILA BARANGAY 677
0.401575	0.123958	0.310391	0.114151	0.001220	0.008918	0.000305	0.001220	0.001677	0.036585	0.000000	1.000000	MANILA BARANGAY 678
0.038846	0.020917	0.483771	0.234415	0.140134	0.000000	0.000000	0.000000	0.000000	0.042761	0.039155	1.000000	MANILA BARANGAY 679
0.276877	0.013083	0.629750	0.010531	0.006487	0.013454	0.000000	0.004767	0.007053	0.033055	0.004943	1.000000	MANILA BARANGAY 680
0.020692	0.009973	0.950023	0.019313	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 681
0.341153	0.071965	0.330872	0.175241	0.009762	0.010921	0.000000	0.000293	0.000000	0.059793	0.000000	1.000000	MANILA BARANGAY 682
0.181510	0.077778	0.303478	0.157337	0.013910	0.001696	0.003053	0.000000	0.000000	0.238338	0.022901	1.000000	MANILA BARANGAY 683
0.126416	0.064793	0.235630	0.103547	0.001916	0.000042	0.000338	0.000682	0.000025	0.456748	0.009862	1.000000	MANILA BARANGAY 684
0.431184	0.194639	0.158255	0.085441	0.000588	0.003569	0.000000	0.000458	0.000132	0.123384	0.002350	1.000000	MANILA BARANGAY 685
0.329217	0.177271	0.284186	0.153023	0.006463	0.000000	0.001616	0.000000	0.000000	0.048225	0.000000	1.000000	MANILA BARANGAY 809
0.511849	0.174393	0.125620	0.042947	0.001388	0.009643	0.000347	0.000694	0.000000	0.122707	0.010412	1.000000	MANILA BARANGAY 810
0.307408	0.165527	0.316910	0.170644	0.001976	0.000000	0.000000	0.000000	0.000000	0.034374	0.003161	1.000000	MANILA BARANGAY 811
0.372513	0.198952	0.358207	0.038763	0.002525	0.000000	0.000000	0.000505	0.000000	0.026515	0.002020	1.000000	MANILA BARANGAY 812
0.239864	0.123371	0.384593	0.143009	0.059502	0.000566	0.000000	0.000000	0.000000	0.038235	0.010860	1.000000	MANILA BARANGAY 813
0.151327	0.072245	0.482879	0.218817	0.012901	0.000571	0.000000	0.000442	0.000000	0.060818	0.000000	1.000000	MANILA BARANGAY 814
0.348847	0.186157	0.267953	0.065607	0.004010	0.000120	0.001002	0.000000	0.000000	0.122294	0.004010	1.000000	MANILA BARANGAY 815
0.191282	0.074667	0.661436	0.066769	0.000000	0.004533	0.000000	0.000656	0.000656	0.000000	0.000000	1.000000	MANILA BARANGAY 816
0.122617	0.061495	0.394766	0.169252	0.032710	0.000000	0.000000	0.001402	0.000000	0.194393	0.023364	1.000000	MANILA BARANGAY 817
0.073693	0.020067	0.523721	0.283249	0.001349	0.001349	0.000337	0.001799	0.000000	0.094435	0.000000	1.000000	MANILA BARANGAY 818
0.103286	0.034362	0.817999	0.013855	0.002146	0.002320	0.000000	0.001505	0.000386	0.019850	0.004292	1.000000	MANILA BARANGAY 819
0.240189	0.071475	0.305015	0.165022	0.000000	0.004731	0.000000	0.001999	0.000814	0.187500	0.023256	1.000000	MANILA BARANGAY 820
0.057490	0.025996	0.373797	0.185573	0.021992	0.000000	0.000000	0.001544	0.000000	0.330290	0.003320	1.000000	MANILA BARANGAY 821
0.103642	0.039589	0.406598	0.188496	0.005227	0.001585	0.000000	0.000450	0.000000	0.249272	0.005141	1.000000	MANILA BARANGAY 822
0.020055	0.010799	0.041139	0.022152	0.000000	0.000000	0.000000	0.000000	0.000000	0.872627	0.033228	1.000000	MANILA BARANGAY 823
0.011661	0.006279	0.323654	0.165887	0.006246	0.000000	0.000399	0.000159	0.000000	0.482392	0.003322	1.000000	MANILA BARANGAY 824
0.000000	0.000000	0.010291	0.005541	0.000000	0.000000	0.000000	0.000000	0.000000	0.984168	0.000000	1.000000	MANILA BARANGAY 825
0.171167	0.054636	0.380943	0.162450	0.000000	0.003508	0.000000	0.000069	0.000104	0.221914	0.005209	1.000000	MANILA BARANGAY 826
0.135431	0.007065	0.699359	0.001627	0.007599	0.007528	0.000000	0.000439	0.000606	0.139872	0.000475	1.000000	MANILA BARANGAY 827
0.206880	0.103492	0.387593	0.179421	0.002972	0.000773	0.000000	0.000000	0.000000	0.116493	0.002377	1.000000	MANILA BARANGAY 828
0.326697	0.128094	0.196499	0.103197	0.003253	0.002168	0.000283	0.004180	0.003663	0.231259	0.000707	1.000000	MANILA BARANGAY 829
0.460442	0.247930	0.191907	0.098326	0.000000	0.000000	0.000000	0.000000	0.000000	0.001395	0.000000	1.000000	MANILA BARANGAY 830
0.219286	0.117099	0.414894	0.221121	0.021542	0.000000	0.000000	0.000000	0.000000	0.005385	0.000673	1.000000	MANILA BARANGAY 831
0.067207	0.030728	0.500869	0.270869	0.000000	0.000000	0.000000	0.001690	0.000000	0.128638	0.000000	1.000000	MANILA BARANGAY 832
0.294524	0.154855	0.225103	0.121210	0.005111	0.000365	0.000000	0.000000	0.000000	0.198832	0.000000	1.000000	MANILA BARANGAY 686
0.305175	0.163606	0.309098	0.161464	0.000000	0.000000	0.000000	0.000000	0.000000	0.058431	0.002226	1.000000	MANILA BARANGAY 687
0.153851	0.074933	0.431787	0.232501	0.021112	0.000773	0.000000	0.000000	0.000000	0.080583	0.004460	1.000000	MANILA BARANGAY 833
0.114954	0.061899	0.370221	0.199350	0.000000	0.000000	0.000000	0.000000	0.000000	0.253576	0.000000	1.000000	MANILA BARANGAY 834
0.358915	0.193262	0.193522	0.104204	0.008765	0.000000	0.001643	0.000000	0.000000	0.138866	0.000822	1.000000	MANILA BARANGAY 835

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.194130	0.101899	0.359848	0.193764	0.021101	0.000196	0.003985	0.000106	0.000113	0.122276	0.002580	1.000000	MANILA BARANGAY 836
0.232088	0.098316	0.307562	0.165783	0.000000	0.002527	0.000000	0.000249	0.000000	0.184935	0.008541	1.000000	MANILA BARANGAY 837
0.222556	0.119370	0.337316	0.181632	0.016220	0.000048	0.003331	0.000019	0.000029	0.117548	0.001931	1.000000	MANILA BARANGAY 838
0.049172	0.023687	0.409300	0.216133	0.019137	0.000084	0.000000	0.000406	0.000168	0.252275	0.029638	1.000000	MANILA BARANGAY 839
0.046939	0.018959	0.566881	0.291270	0.000000	0.000617	0.000000	0.000000	0.000000	0.075334	0.000000	1.000000	MANILA BARANGAY 840
0.448254	0.028372	0.065059	0.000000	0.000000	0.020942	0.000000	0.000931	0.001397	0.000000	0.435045	1.000000	MANILA BARANGAY 841
0.537158	0.259867	0.056173	0.030318	0.033858	0.002839	0.000342	0.000103	0.000000	0.077633	0.001710	1.000000	MANILA BARANGAY 842
0.285945	0.137152	0.237407	0.123189	0.020674	0.001587	0.000858	0.000377	0.000296	0.172970	0.019546	1.000000	MANILA BARANGAY 843
0.125111	0.060118	0.316209	0.164573	0.003137	0.000256	0.000784	0.000829	0.000094	0.325229	0.003660	1.000000	MANILA BARANGAY 844
0.105000	0.052895	0.417556	0.225150	0.001692	0.000226	0.000000	0.000541	0.000135	0.186654	0.010150	1.000000	MANILA BARANGAY 845
0.289303	0.153234	0.106716	0.057463	0.064303	0.000249	0.007836	0.000000	0.000000	0.319030	0.001866	1.000000	MANILA BARANGAY 846
0.269250	0.134637	0.266163	0.140888	0.002495	0.000891	0.000544	0.000534	0.000657	0.177543	0.006398	1.000000	MANILA BARANGAY 847
0.152060	0.081273	0.288639	0.153808	0.000000	0.000062	0.000000	0.000025	0.000037	0.314107	0.009988	1.000000	MANILA BARANGAY 848
0.483208	0.260189	0.000000	0.000000	0.001006	0.000000	0.000252	0.000000	0.000000	0.255346	0.000000	1.000000	MANILA BARANGAY 849
0.085062	0.013502	0.851136	0.023793	0.004715	0.002246	0.000000	0.002799	0.000887	0.011144	0.004715	1.000000	MANILA BARANGAY 850
0.322084	0.173430	0.244030	0.131401	0.000000	0.000000	0.000000	0.000000	0.000000	0.129055	0.000000	1.000000	MANILA BARANGAY 851
0.128614	0.062306	0.506213	0.199522	0.000000	0.000000	0.000000	0.000597	0.000000	0.102748	0.000000	1.000000	MANILA BARANGAY 852
0.088387	0.042539	0.491516	0.162154	0.020457	0.000000	0.000000	0.000000	0.000000	0.194946	0.000000	1.000000	MANILA BARANGAY 853
0.272019	0.138048	0.253538	0.121154	0.007231	0.000817	0.000115	0.000000	0.000000	0.207077	0.000000	1.000000	MANILA BARANGAY 855
0.294263	0.156564	0.249724	0.124344	0.000000	0.000194	0.000000	0.000078	0.000117	0.174716	0.000000	1.000000	MANILA BARANGAY 856
0.271125	0.145324	0.309338	0.166567	0.002709	0.000065	0.000417	0.000000	0.000000	0.104454	0.000000	1.000000	MANILA BARANGAY 857
0.154690	0.083295	0.453909	0.244412	0.000000	0.000000	0.000000	0.000000	0.000000	0.054430	0.009265	1.000000	MANILA BARANGAY 858
0.332604	0.178131	0.216361	0.116502	0.023070	0.000094	0.000000	0.000000	0.000000	0.116290	0.016949	1.000000	MANILA BARANGAY 859
0.199320	0.107326	0.424611	0.227971	0.000000	0.000000	0.000000	0.000000	0.000000	0.040771	0.000000	1.000000	MANILA BARANGAY 860
0.000000	0.000000	0.636875	0.342933	0.015889	0.000000	0.000000	0.000000	0.000000	0.004303	0.000000	1.000000	MANILA BARANGAY 861
0.294977	0.150309	0.300992	0.142628	0.000000	0.000666	0.000000	0.000057	0.000000	0.110371	0.000000	1.000000	MANILA BARANGAY 862
0.478288	0.256820	0.167671	0.090284	0.005091	0.000117	0.000000	0.000013	0.000019	0.000000	0.001697	1.000000	MANILA BARANGAY 863
0.372222	0.188889	0.301270	0.128889	0.006349	0.001190	0.000000	0.000476	0.000714	0.000000	0.000000	1.000000	MANILA BARANGAY 864
0.135206	0.057678	0.383240	0.190730	0.006742	0.001498	0.001685	0.000150	0.000225	0.222846	0.000000	1.000000	MANILA BARANGAY 865
0.083654	0.045044	0.497387	0.265434	0.010010	0.000000	0.002318	0.000000	0.000000	0.074704	0.021450	1.000000	MANILA BARANGAY 867
0.188107	0.099784	0.295858	0.159631	0.029607	0.000000	0.001331	0.000466	0.000000	0.220559	0.004657	1.000000	MANILA BARANGAY 868
0.019502	0.010501	0.619996	0.329510	0.000000	0.000000	0.000000	0.000000	0.000000	0.002927	0.017563	1.000000	MANILA BARANGAY 870
0.208099	0.097317	0.180257	0.096999	0.003011	0.000911	0.000146	0.000855	0.000799	0.398737	0.012870	1.000000	MANILA BARANGAY 871
0.057613	0.030464	0.419482	0.219482	0.012095	0.000000	0.000000	0.000173	0.000000	0.258099	0.002592	1.000000	MANILA BARANGAY 872
0.188938	0.086637	0.382809	0.118365	0.000000	0.000070	0.000000	0.000028	0.000042	0.223109	0.000000	1.000000	MANILA BARANGAY 869
0.056434	0.022499	0.065717	0.012957	0.270232	0.000222	0.001205	0.000122	0.000039	0.545763	0.024811	1.000000	MANILA BARANGAY 649
0.027312	0.012043	0.095161	0.040358	0.068029	0.000000	0.001147	0.000036	0.000000	0.747312	0.008602	1.000000	MANILA BARANGAY 650
0.045231	0.019385	0.088308	0.019231	0.057231	0.000000	0.000000	0.000154	0.000000	0.770462	0.000000	1.000000	MANILA BARANGAY 652

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.026423	0.014228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.959350	0.000000	1.000000	MANILA BARANGAY 653	
0.436010	0.165089	0.075190	0.041716	0.005072	0.006298	0.000000	0.002130	0.000533	0.267963	0.000000	1.000000	MANILA BARANGAY 383
0.531868	0.162238	0.048402	0.023327	0.025225	0.012008	0.000300	0.000220	0.000160	0.179770	0.016484	1.000000	MANILA BARANGAY 384
0.224011	0.071325	0.244872	0.131854	0.006623	0.004901	0.000568	0.000624	0.000937	0.314286	0.000000	1.000000	MANILA BARANGAY 385
0.105499	0.056807	0.073811	0.039744	0.039239	0.000000	0.000000	0.000000	0.000000	0.528537	0.156361	1.000000	MANILA BARANGAY 386
0.120585	0.064733	0.399511	0.209829	0.003059	0.000000	0.000000	0.000000	0.000000	0.202284	0.000000	1.000000	MANILA BARANGAY 387
0.215147	0.102117	0.345812	0.180945	0.025407	0.001396	0.001117	0.000409	0.000614	0.127036	0.000000	1.000000	MANILA BARANGAY 388
0.450178	0.242403	0.015647	0.008425	0.000000	0.000000	0.000000	0.000000	0.000000	0.278611	0.004736	1.000000	MANILA BARANGAY 389
0.270453	0.063411	0.298620	0.017657	0.005662	0.008033	0.000000	0.000694	0.000722	0.331210	0.003539	1.000000	MANILA BARANGAY 390
0.232930	0.109478	0.325385	0.172414	0.004998	0.001619	0.000000	0.000648	0.000971	0.150613	0.000943	1.000000	MANILA BARANGAY 391
0.112857	0.032703	0.821544	0.012432	0.000000	0.002896	0.000000	0.001158	0.001737	0.002317	0.012355	1.000000	MANILA BARANGAY 392
0.152310	0.015017	0.547383	0.033923	0.000000	0.005634	0.000000	0.001523	0.000929	0.236209	0.007072	1.000000	MANILA BARANGAY 393
0.000000	0.000000	0.798204	0.008002	0.043549	0.000000	0.000000	0.000000	0.000000	0.149156	0.001089	1.000000	MANILA BARANGAY 394
0.293463	0.006328	0.011127	0.003338	0.002782	0.013366	0.000000	0.004006	0.002170	0.616134	0.047288	1.000000	MANILA BARANGAY 306
0.305873	0.000000	0.497619	0.010071	0.019048	0.014841	0.000000	0.003833	0.001095	0.143651	0.003968	1.000000	MANILA BARANGAY 307
0.137766	0.013230	0.417251	0.018254	0.004124	0.010172	0.000000	0.000522	0.000742	0.369072	0.028866	1.000000	MANILA BARANGAY 308
0.121785	0.045537	0.455825	0.171997	0.024508	0.001286	0.000000	0.000091	0.000000	0.169894	0.009077	1.000000	MANILA BARANGAY 309
0.212918	0.059036	0.556359	0.102142	0.003213	0.005288	0.000803	0.000000	0.000000	0.050870	0.009371	1.000000	MANILA BARANGAY 395
0.009125	0.000000	0.760393	0.071381	0.000000	0.000507	0.000000	0.001128	0.000304	0.157161	0.000000	1.000000	MANILA BARANGAY 396
0.395839	0.166087	0.172050	0.062319	0.004969	0.004617	0.000000	0.000133	0.000199	0.193789	0.000000	1.000000	MANILA BARANGAY 397
0.363421	0.112816	0.277136	0.090924	0.004290	0.007811	0.000000	0.001415	0.000528	0.141657	0.000000	1.000000	MANILA BARANGAY 398
0.100836	0.049234	0.599304	0.159234	0.008078	0.000000	0.001671	0.000167	0.000000	0.064763	0.016713	1.000000	MANILA BARANGAY 399
0.246341	0.008763	0.512374	0.000000	0.000000	0.011858	0.000000	0.000077	0.000077	0.220510	0.000000	1.000000	MANILA BARANGAY 400
0.193885	0.048513	0.193129	0.040420	0.007338	0.005899	0.001055	0.005683	0.000000	0.493525	0.010552	1.000000	MANILA BARANGAY 413
0.036899	0.014891	0.678104	0.020802	0.004009	0.000450	0.000000	0.000072	0.000061	0.244713	0.000000	1.000000	MANILA BARANGAY 402
0.443122	0.238604	0.241574	0.061472	0.012335	0.000000	0.000000	0.000000	0.000000	0.001371	0.001523	1.000000	MANILA BARANGAY 403
0.222838	0.050439	0.665476	0.046930	0.007519	0.006798	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 404
0.285959	0.153978	0.289509	0.155889	0.054602	0.000000	0.000000	0.000000	0.000000	0.060062	0.000000	1.000000	MANILA BARANGAY 405
0.146323	0.073669	0.197359	0.019057	0.000000	0.000000	0.000000	0.000000	0.000000	0.563592	0.000000	1.000000	MANILA BARANGAY 406
0.471343	0.253800	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.267648	0.007209	1.000000	MANILA BARANGAY 407
0.243801	0.126183	0.280723	0.140538	0.001631	0.000000	0.000000	0.001577	0.000000	0.205546	0.000000	1.000000	MANILA BARANGAY 408
0.118562	0.037596	0.314906	0.170049	0.005598	0.002344	0.000000	0.000700	0.000000	0.331351	0.018894	1.000000	MANILA BARANGAY 409
0.128165	0.052669	0.331063	0.038307	0.018149	0.000000	0.000000	0.000381	0.000000	0.408388	0.022877	1.000000	MANILA BARANGAY 410
0.034544	0.018183	0.605023	0.319862	0.000000	0.000000	0.000000	0.000000	0.000000	0.021814	0.000574	1.000000	MANILA BARANGAY 411
0.147506	0.079426	0.255270	0.137453	0.003001	0.000000	0.000000	0.000000	0.000000	0.377344	0.000000	1.000000	MANILA BARANGAY 412
0.462258	0.000236	0.219921	0.108489	0.000000	0.002259	0.000000	0.069843	0.000255	0.002698	0.134041	1.000000	MANILA BARANGAY 413
0.170343	0.084953	0.481839	0.238766	0.013504	0.000698	0.003376	0.000279	0.000419	0.000000	0.005821	1.000000	MANILA BARANGAY 414
0.176869	0.089681	0.446486	0.240415	0.036805	0.000543	0.009201	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 415

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.150122	0.039154	0.459703	0.256464	0.017882	0.000000	0.000000	0.012901	0.000000	0.063772	0.000000	1.000000	MANILA BARANGAY 416
0.245093	0.131973	0.271783	0.146345	0.000000	0.000000	0.000000	0.000000	0.000000	0.204807	0.000000	1.000000	MANILA BARANGAY 417
0.166816	0.069562	0.379314	0.195554	0.010358	0.001925	0.001759	0.000000	0.000000	0.165918	0.008794	1.000000	MANILA BARANGAY 418
0.487333	0.255119	0.004538	0.002443	0.000000	0.000713	0.000000	0.000000	0.000000	0.249273	0.000582	1.000000	MANILA BARANGAY 419
0.169128	0.041860	0.468305	0.138364	0.037743	0.007276	0.001620	0.002754	0.000607	0.129374	0.002970	1.000000	MANILA BARANGAY 420
0.205953	0.099067	0.323890	0.174402	0.009461	0.001156	0.000000	0.000000	0.000000	0.177661	0.008410	1.000000	MANILA BARANGAY 421
0.217094	0.001729	0.544179	0.043221	0.000000	0.006841	0.000000	0.024490	0.000000	0.150710	0.011736	1.000000	MANILA BARANGAY 422
0.319720	0.126262	0.228660	0.109626	0.047477	0.000467	0.000000	0.012461	0.000000	0.132586	0.022741	1.000000	MANILA BARANGAY 423
0.208553	0.095175	0.435028	0.181559	0.053589	0.001974	0.009410	0.000478	0.000678	0.003190	0.010367	1.000000	MANILA BARANGAY 424
0.470989	0.252376	0.082958	0.039591	0.003920	0.000000	0.000902	0.000054	0.000000	0.148690	0.000520	1.000000	MANILA BARANGAY 425
0.270839	0.145379	0.420715	0.143980	0.012075	0.000000	0.000850	0.000142	0.000000	0.006020	0.000000	1.000000	MANILA BARANGAY 426
0.167602	0.090247	0.372994	0.200843	0.031395	0.000000	0.000000	0.000000	0.000000	0.136919	0.000000	1.000000	MANILA BARANGAY 427
0.092688	0.010218	0.836354	0.006682	0.000000	0.005839	0.000000	0.000137	0.000099	0.047982	0.000000	1.000000	MANILA BARANGAY 428
0.228447	0.108061	0.285185	0.089729	0.004980	0.000965	0.001245	0.000031	0.000000	0.281357	0.000000	1.000000	MANILA BARANGAY 429
0.006742	0.000000	0.991854	0.001404	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 430
0.051080	0.000000	0.897051	0.008430	0.004153	0.002450	0.000000	0.000781	0.001171	0.010797	0.024086	1.000000	MANILA BARANGAY 431
0.232968	0.122300	0.251212	0.135268	0.011378	0.000307	0.002318	0.000000	0.000000	0.241440	0.002809	1.000000	MANILA BARANGAY 432
0.103381	0.055667	0.262197	0.141183	0.000000	0.000000	0.000000	0.000000	0.000000	0.437572	0.000000	1.000000	MANILA BARANGAY 433
0.352042	0.189561	0.093419	0.050303	0.000000	0.000000	0.000000	0.000000	0.000000	0.314675	0.000000	1.000000	MANILA BARANGAY 434
0.227628	0.122569	0.345296	0.185265	0.000000	0.000000	0.000000	0.000664	0.000000	0.118577	0.000000	1.000000	MANILA BARANGAY 435
0.435254	0.226100	0.187215	0.100808	0.000000	0.000808	0.000000	0.000000	0.000000	0.047695	0.002120	1.000000	MANILA BARANGAY 436
0.221897	0.014527	0.507545	0.014251	0.010240	0.009356	0.002560	0.005884	0.006602	0.185415	0.021722	1.000000	MANILA BARANGAY 437
0.129631	0.065077	0.284645	0.154283	0.018802	0.000000	0.000000	0.001462	0.000000	0.346100	0.000000	1.000000	MANILA BARANGAY 438
0.186533	0.056089	0.390045	0.016343	0.014942	0.003661	0.000000	0.001464	0.002196	0.328726	0.000000	1.000000	MANILA BARANGAY 439
0.164420	0.024412	0.150396	0.073460	0.007488	0.003922	0.000000	0.004553	0.004812	0.365426	0.201113	1.000000	MANILA BARANGAY 440
0.080427	0.037991	0.602244	0.139218	0.003419	0.000449	0.000000	0.000513	0.000269	0.077350	0.058120	1.000000	MANILA BARANGAY 441
0.268763	0.093711	0.361404	0.169598	0.000000	0.004854	0.000000	0.000418	0.000000	0.101253	0.000000	1.000000	MANILA BARANGAY 442
0.180631	0.060902	0.677731	0.037341	0.001270	0.004361	0.000000	0.001050	0.001575	0.023709	0.011431	1.000000	MANILA BARANGAY 443
0.083030	0.040773	0.672809	0.148782	0.000000	0.000000	0.000000	0.000000	0.000000	0.017922	0.036684	1.000000	MANILA BARANGAY 444
0.213604	0.115017	0.461096	0.132417	0.000000	0.000000	0.000000	0.000245	0.000000	0.076287	0.001334	1.000000	MANILA BARANGAY 445
0.128012	0.068373	0.444664	0.239200	0.013339	0.000000	0.000430	0.000129	0.000000	0.100688	0.005164	1.000000	MANILA BARANGAY 446
0.038770	0.010540	0.601662	0.258877	0.014429	0.000847	0.000000	0.000339	0.000508	0.074028	0.000000	1.000000	MANILA BARANGAY 447
0.414169	0.195196	0.162205	0.070308	0.015710	0.002719	0.000000	0.000115	0.000000	0.137764	0.001813	1.000000	MANILA BARANGAY 448
0.558465	0.295125	0.062253	0.020735	0.000000	0.000231	0.000000	0.000478	0.000461	0.050066	0.012187	1.000000	MANILA BARANGAY 449
0.442115	0.234196	0.119835	0.055878	0.005632	0.000000	0.000000	0.001197	0.000000	0.141147	0.000000	1.000000	MANILA BARANGAY 450
0.503608	0.271174	0.037732	0.020317	0.000000	0.000000	0.000000	0.000000	0.000000	0.167169	0.000000	1.000000	MANILA BARANGAY 451
0.371085	0.096494	0.241851	0.130227	0.000000	0.010631	0.000000	0.004041	0.006061	0.139609	0.000000	1.000000	MANILA BARANGAY 452
0.150540	0.078734	0.194751	0.058998	0.003839	0.000240	0.000960	0.000096	0.000144	0.511698	0.000000	1.000000	MANILA BARANGAY 453

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.210206	0.107247	0.422016	0.209980	0.004012	0.000201	0.000000	0.001204	0.000000	0.045135	0.000000	1.000000	MANILA BARANGAY 454
0.027761	0.000000	0.882306	0.001863	0.007095	0.002927	0.000000	0.000000	0.000000	0.078049	0.000000	1.000000	MANILA BARANGAY 455
0.266306	0.073011	0.408724	0.110913	0.020908	0.003860	0.000000	0.006510	0.002821	0.087719	0.019226	1.000000	MANILA BARANGAY 456
0.193099	0.094068	0.303753	0.163559	0.000000	0.000969	0.000000	0.000000	0.000000	0.244552	0.000000	1.000000	MANILA BARANGAY 457
0.119071	0.057281	0.357565	0.192535	0.003173	0.000668	0.000000	0.000000	0.000000	0.255010	0.014696	1.000000	MANILA BARANGAY 458
0.670805	0.283641	0.000000	0.000000	0.000000	0.006812	0.000000	0.001124	0.001124	0.036493	0.000000	1.000000	MANILA BARANGAY 459
0.235912	0.127029	0.367588	0.186529	0.003765	0.000000	0.000941	0.000000	0.000000	0.078235	0.000000	1.000000	MANILA BARANGAY 460
0.286234	0.152682	0.289601	0.138290	0.045888	0.000149	0.000000	0.000060	0.000089	0.076281	0.010727	1.000000	MANILA BARANGAY 461
0.362378	0.184194	0.284194	0.153028	0.000000	0.001069	0.000000	0.000000	0.000000	0.008014	0.007124	1.000000	MANILA BARANGAY 462
0.364173	0.178543	0.154640	0.083268	0.000000	0.001715	0.000000	0.000000	0.000000	0.217660	0.000000	1.000000	MANILA BARANGAY 463
0.002609	0.000000	0.781014	0.053768	0.000000	0.000145	0.000000	0.000058	0.000087	0.162319	0.000000	1.000000	MANILA BARANGAY 464
0.330983	0.149194	0.134488	0.064706	0.000000	0.002458	0.000000	0.001628	0.001475	0.315068	0.000000	1.000000	MANILA BARANGAY 465
0.251667	0.035449	0.485641	0.152590	0.002564	0.010000	0.000000	0.003077	0.003885	0.052564	0.002564	1.000000	MANILA BARANGAY 466
0.295059	0.150791	0.311726	0.167852	0.000000	0.000791	0.000000	0.000000	0.000000	0.073781	0.000000	1.000000	MANILA BARANGAY 467
0.236916	0.127570	0.393721	0.212004	0.000000	0.000000	0.000000	0.000000	0.000000	0.029790	0.000000	1.000000	MANILA BARANGAY 468
0.169008	0.087099	0.466412	0.251145	0.012214	0.000382	0.000000	0.000000	0.000000	0.013740	0.000000	1.000000	MANILA BARANGAY 469
0.245832	0.121360	0.532435	0.017835	0.000000	0.000539	0.000000	0.001535	0.000000	0.080465	0.000000	1.000000	MANILA BARANGAY 470
0.203144	0.089465	0.323561	0.166068	0.000000	0.001695	0.000000	0.000678	0.001017	0.214373	0.000000	1.000000	MANILA BARANGAY 471
0.383267	0.206375	0.198406	0.088446	0.000000	0.000000	0.000000	0.000000	0.000000	0.116107	0.007399	1.000000	MANILA BARANGAY 472
0.038298	0.000000	0.688201	0.092392	0.000000	0.000000	0.000000	0.006383	0.000000	0.174726	0.000000	1.000000	MANILA BARANGAY 473
0.088123	0.013362	0.825451	0.008537	0.004242	0.003075	0.000000	0.002344	0.001845	0.010604	0.042418	1.000000	MANILA BARANGAY 474
0.010590	0.005702	0.574438	0.292978	0.015281	0.000000	0.002697	0.000000	0.000000	0.091573	0.006742	1.000000	MANILA BARANGAY 475
0.055189	0.019144	0.683748	0.201385	0.011220	0.000982	0.002805	0.000112	0.000168	0.025245	0.000000	1.000000	MANILA BARANGAY 476
0.111538	0.059829	0.486182	0.261254	0.000000	0.000000	0.000000	0.000000	0.000000	0.081197	0.000000	1.000000	MANILA BARANGAY 477
0.375728	0.192043	0.171637	0.092420	0.029116	0.001004	0.000000	0.000000	0.000000	0.135542	0.002510	1.000000	MANILA BARANGAY 478
0.488831	0.193243	0.026889	0.014479	0.000000	0.006839	0.000000	0.000000	0.000000	0.236073	0.033646	1.000000	MANILA BARANGAY 479
0.387717	0.180996	0.254929	0.137206	0.004217	0.002715	0.000000	0.000063	0.000000	0.032156	0.000000	1.000000	MANILA BARANGAY 480
0.599362	0.322733	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.077904	1.000000	MANILA BARANGAY 481
0.551115	0.208337	0.080441	0.041226	0.057683	0.008846	0.000000	0.000000	0.000000	0.034416	0.017935	1.000000	MANILA BARANGAY 482
0.294716	0.145663	0.175413	0.094242	0.033042	0.001190	0.000000	0.000486	0.000146	0.246113	0.008989	1.000000	MANILA BARANGAY 483
0.055913	0.027968	0.302306	0.100205	0.012237	0.000183	0.000000	0.000073	0.000110	0.495525	0.005479	1.000000	MANILA BARANGAY 484
0.218347	0.080556	0.168114	0.090523	0.012325	0.003618	0.003081	0.000000	0.000000	0.423436	0.000000	1.000000	MANILA BARANGAY 485
0.223533	0.116155	0.356555	0.186917	0.000000	0.000000	0.000000	0.001097	0.000000	0.115743	0.000000	1.000000	MANILA BARANGAY 486
0.116860	0.000000	0.613919	0.001432	0.005418	0.006940	0.000000	0.002642	0.002531	0.214396	0.035862	1.000000	MANILA BARANGAY 487
0.255626	0.137645	0.126933	0.068349	0.017015	0.000000	0.003094	0.000000	0.000000	0.391338	0.000000	1.000000	MANILA BARANGAY 488
0.042139	0.017837	0.542356	0.229127	0.021008	0.000474	0.001898	0.000000	0.000000	0.136758	0.008403	1.000000	MANILA BARANGAY 489
0.612439	0.094733	0.031605	0.017018	0.000000	0.022974	0.000000	0.000000	0.000000	0.221232	0.000000	1.000000	MANILA BARANGAY 490
0.147243	0.000000	0.584816	0.027904	0.000000	0.006691	0.000000	0.004868	0.000904	0.227574	0.000000	1.000000	MANILA BARANGAY 491

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.072726	0.039160	0.524816	0.257995	0.029423	0.000000	0.000000	0.000000	0.000000	0.075881	0.000000	1.000000	MANILA BARANGAY 492
0.015084	0.007466	0.658481	0.274276	0.038446	0.000000	0.005587	0.000000	0.000000	0.000660	0.000000	1.000000	MANILA BARANGAY 493
0.311464	0.156588	0.331141	0.154873	0.006005	0.000340	0.001191	0.001514	0.000159	0.034739	0.001985	1.000000	MANILA BARANGAY 494
0.207786	0.100255	0.436569	0.212668	0.008098	0.000845	0.000000	0.000925	0.000000	0.024757	0.008098	1.000000	MANILA BARANGAY 495
0.172767	0.091573	0.451483	0.203397	0.036186	0.000000	0.003228	0.000450	0.000000	0.025150	0.015766	1.000000	MANILA BARANGAY 496
0.308729	0.126715	0.318957	0.164471	0.000000	0.003863	0.000000	0.000000	0.000000	0.077264	0.000000	1.000000	MANILA BARANGAY 497
0.292273	0.149066	0.363290	0.121812	0.000000	0.000584	0.000000	0.000334	0.000334	0.063965	0.008343	1.000000	MANILA BARANGAY 498
0.103660	0.022972	0.444104	0.217764	0.005265	0.002506	0.001154	0.002214	0.000865	0.192643	0.006852	1.000000	MANILA BARANGAY 499
0.386083	0.185034	0.273527	0.137108	0.005766	0.002234	0.000000	0.000000	0.000000	0.008969	0.001281	1.000000	MANILA BARANGAY 500
0.513366	0.269746	0.125694	0.067681	0.004899	0.000653	0.000000	0.000000	0.000000	0.008164	0.009797	1.000000	MANILA BARANGAY 513
0.307917	0.165802	0.308509	0.157983	0.000000	0.000000	0.000000	0.000000	0.000000	0.051905	0.007884	1.000000	MANILA BARANGAY 502
0.141519	0.068703	0.462492	0.248157	0.004276	0.000733	0.000000	0.000000	0.000000	0.074119	0.000000	1.000000	MANILA BARANGAY 503
0.208104	0.070655	0.447104	0.159801	0.000000	0.003803	0.000000	0.002926	0.002282	0.105325	0.000000	1.000000	MANILA BARANGAY 504
0.351448	0.177357	0.258249	0.100168	0.000000	0.001195	0.000000	0.000458	0.000687	0.100673	0.009764	1.000000	MANILA BARANGAY 505
0.253411	0.136452	0.274183	0.144576	0.000000	0.000000	0.000000	0.000000	0.000000	0.191378	0.000000	1.000000	MANILA BARANGAY 506
0.154089	0.077336	0.414603	0.223248	0.002670	0.000551	0.000000	0.000000	0.000000	0.125167	0.002336	1.000000	MANILA BARANGAY 507
0.329682	0.169432	0.043474	0.023409	0.000000	0.000813	0.000000	0.000174	0.000260	0.432755	0.000000	1.000000	MANILA BARANGAY 508
0.152851	0.082304	0.451940	0.243352	0.015330	0.000000	0.003833	0.000000	0.000000	0.050390	0.000000	1.000000	MANILA BARANGAY 509
0.274582	0.145151	0.151648	0.057860	0.000000	0.000000	0.000000	0.000000	0.000000	0.370760	0.000000	1.000000	MANILA BARANGAY 510
0.194750	0.102119	0.437099	0.233617	0.000000	0.000283	0.000000	0.000113	0.000170	0.031849	0.000000	1.000000	MANILA BARANGAY 511
0.194841	0.104914	0.284872	0.153393	0.018888	0.000000	0.000000	0.000000	0.000000	0.243092	0.000000	1.000000	MANILA BARANGAY 512
0.160537	0.072434	0.411189	0.215914	0.025326	0.001380	0.000000	0.000079	0.000119	0.113022	0.000000	1.000000	MANILA BARANGAY 513
0.168481	0.089728	0.441253	0.230081	0.001405	0.000000	0.000351	0.000000	0.000000	0.060799	0.007902	1.000000	MANILA BARANGAY 514
0.361068	0.185945	0.003197	0.001722	0.007355	0.000855	0.000375	0.000201	0.000302	0.425861	0.013118	1.000000	MANILA BARANGAY 515
0.293051	0.148378	0.269005	0.144849	0.000000	0.000921	0.000000	0.000000	0.000000	0.143797	0.000000	1.000000	MANILA BARANGAY 516
0.090630	0.044083	0.492044	0.259705	0.000000	0.000487	0.000000	0.000195	0.000292	0.112565	0.000000	1.000000	MANILA BARANGAY 517
0.420296	0.217233	0.165542	0.074299	0.000723	0.000578	0.000000	0.000092	0.000139	0.119364	0.001734	1.000000	MANILA BARANGAY 518
0.548841	0.295530	0.000000	0.000000	0.004967	0.000000	0.000000	0.000000	0.000000	0.143803	0.006859	1.000000	MANILA BARANGAY 519
0.592567	0.319074	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.088359	0.000000	1.000000	MANILA BARANGAY 520
0.233084	0.100329	0.337512	0.181737	0.002873	0.002464	0.000718	0.000020	0.000030	0.138839	0.002394	1.000000	MANILA BARANGAY 521
0.184906	0.088092	0.446600	0.240477	0.000000	0.001121	0.000000	0.000000	0.000000	0.038804	0.000000	1.000000	MANILA BARANGAY 522
0.243458	0.131093	0.364442	0.196238	0.002617	0.000000	0.000000	0.000000	0.000000	0.018973	0.043180	1.000000	MANILA BARANGAY 523
0.141704	0.076302	0.442135	0.231200	0.013798	0.000000	0.000000	0.000000	0.000000	0.081062	0.013798	1.000000	MANILA BARANGAY 524
0.210893	0.081321	0.359304	0.187352	0.000000	0.000865	0.000000	0.007722	0.000000	0.152542	0.000000	1.000000	MANILA BARANGAY 525
0.403372	0.160689	0.242324	0.118508	0.032281	0.005524	0.000000	0.000000	0.000000	0.028694	0.008608	1.000000	MANILA BARANGAY 526
0.324251	0.155894	0.252882	0.136122	0.004187	0.001079	0.000000	0.001140	0.001095	0.123349	0.000000	1.000000	MANILA BARANGAY 527
0.171477	0.065811	0.507704	0.251082	0.000000	0.002377	0.000000	0.001104	0.000446	0.000000	0.000000	1.000000	MANILA BARANGAY 528
0.414573	0.215053	0.182024	0.098013	0.000000	0.000799	0.000000	0.000000	0.000000	0.089539	0.000000	1.000000	MANILA BARANGAY 529

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.353690	0.190448	0.294966	0.158828	0.000000	0.000000	0.000000	0.000000	0.000000	0.002069	1.000000	MANILA BARANGAY 530	
0.272921	0.139949	0.317715	0.171077	0.009761	0.000723	0.000000	0.000289	0.000434	0.087129	0.000000	1.000000	MANILA BARANGAY 531
0.259696	0.124573	0.372236	0.178632	0.018996	0.000524	0.004007	0.001949	0.001049	0.038338	0.000000	1.000000	MANILA BARANGAY 532
0.164428	0.088538	0.414734	0.214045	0.026789	0.000000	0.000000	0.000000	0.000000	0.091466	0.000000	1.000000	MANILA BARANGAY 533
0.323680	0.149313	0.270011	0.145390	0.001808	0.002477	0.000000	0.000268	0.000401	0.106652	0.000000	1.000000	MANILA BARANGAY 534
0.222305	0.110350	0.294945	0.158816	0.005750	0.000958	0.000000	0.000335	0.000503	0.206037	0.000000	1.000000	MANILA BARANGAY 535
0.362644	0.171031	0.165725	0.086936	0.011125	0.002418	0.000000	0.000595	0.000552	0.198973	0.000000	1.000000	MANILA BARANGAY 536
0.264788	0.104134	0.248453	0.129973	0.000000	0.003758	0.000000	0.000000	0.000000	0.241821	0.007073	1.000000	MANILA BARANGAY 537
0.262692	0.141449	0.342899	0.184638	0.000000	0.000000	0.000000	0.000000	0.000000	0.053830	0.014493	1.000000	MANILA BARANGAY 538
0.362194	0.194316	0.226727	0.120424	0.003303	0.000000	0.000000	0.000000	0.000000	0.093036	0.000000	1.000000	MANILA BARANGAY 539
0.272428	0.143247	0.369753	0.159330	0.002020	0.000355	0.000000	0.000426	0.000213	0.050355	0.001871	1.000000	MANILA BARANGAY 540
0.343099	0.184746	0.274165	0.147627	0.000000	0.000000	0.000000	0.000000	0.000000	0.050363	0.000000	1.000000	MANILA BARANGAY 541
0.293853	0.018783	0.525771	0.048999	0.032839	0.015439	0.000000	0.004517	0.000529	0.034842	0.024429	1.000000	MANILA BARANGAY 542
0.388171	0.187121	0.209436	0.098735	0.013619	0.002140	0.000000	0.000000	0.000000	0.100778	0.000000	1.000000	MANILA BARANGAY 543
0.220785	0.115359	0.500229	0.131559	0.009373	0.000255	0.000306	0.000153	0.000076	0.020377	0.001528	1.000000	MANILA BARANGAY 544
0.099903	0.052540	0.499353	0.250243	0.000000	0.000129	0.000000	0.000052	0.000078	0.097703	0.000000	1.000000	MANILA BARANGAY 545
0.067385	0.027148	0.557151	0.297684	0.000000	0.000943	0.000000	0.000377	0.000566	0.048748	0.000000	1.000000	MANILA BARANGAY 546
0.073260	0.037970	0.557038	0.285798	0.015650	0.000102	0.003659	0.000041	0.000061	0.026423	0.000000	1.000000	MANILA BARANGAY 547
0.106265	0.054586	0.528274	0.283399	0.000736	0.000257	0.000000	0.000000	0.000000	0.026484	0.000000	1.000000	MANILA BARANGAY 548
0.162861	0.075476	0.628334	0.030292	0.008372	0.001111	0.000000	0.000583	0.000303	0.090358	0.002309	1.000000	MANILA BARANGAY 549
0.047811	0.020794	0.790567	0.042245	0.070878	0.000896	0.017719	0.000050	0.000075	0.001668	0.007296	1.000000	MANILA BARANGAY 550
0.252270	0.125760	0.311499	0.167730	0.000000	0.000985	0.000000	0.000000	0.000000	0.141756	0.000000	1.000000	MANILA BARANGAY 551
0.197034	0.106095	0.378930	0.204039	0.000000	0.000000	0.000000	0.000000	0.000000	0.085153	0.028748	1.000000	MANILA BARANGAY 552
0.218761	0.110605	0.301043	0.159314	0.000000	0.000703	0.000000	0.000034	0.000000	0.209540	0.000000	1.000000	MANILA BARANGAY 553
0.183178	0.093741	0.467532	0.127986	0.000820	0.000478	0.000000	0.000000	0.000000	0.119705	0.006559	1.000000	MANILA BARANGAY 554
0.326589	0.135363	0.234362	0.115206	0.000000	0.003240	0.000000	0.002078	0.000470	0.173077	0.009615	1.000000	MANILA BARANGAY 555
0.367551	0.197912	0.199793	0.107581	0.000000	0.000000	0.000000	0.000000	0.000000	0.127163	0.000000	1.000000	MANILA BARANGAY 556
0.286337	0.083725	0.381592	0.140796	0.004602	0.006491	0.001151	0.002723	0.003418	0.083413	0.005753	1.000000	MANILA BARANGAY 557
0.312990	0.148910	0.235942	0.092306	0.000872	0.002005	0.000000	0.000663	0.000994	0.198344	0.006975	1.000000	MANILA BARANGAY 558
0.412890	0.196692	0.197966	0.106403	0.000000	0.002068	0.000000	0.000833	0.000639	0.077947	0.004563	1.000000	MANILA BARANGAY 559
0.299780	0.158015	0.292029	0.157246	0.011419	0.000351	0.001757	0.000141	0.000211	0.079051	0.000000	1.000000	MANILA BARANGAY 560
0.032261	0.017371	0.604354	0.312925	0.009651	0.000000	0.000000	0.000000	0.000000	0.023438	0.000000	1.000000	MANILA BARANGAY 561
0.364539	0.178068	0.170446	0.091368	0.001524	0.001791	0.000381	0.000076	0.000114	0.190930	0.000762	1.000000	MANILA BARANGAY 562
0.062441	0.027572	0.531533	0.276474	0.049247	0.000624	0.010159	0.000250	0.000375	0.041326	0.000000	1.000000	MANILA BARANGAY 563
0.301343	0.162261	0.332120	0.178834	0.000000	0.000000	0.000000	0.000000	0.000000	0.021908	0.003534	1.000000	MANILA BARANGAY 564
0.397244	0.211094	0.170077	0.074301	0.001317	0.000274	0.000329	0.000000	0.000000	0.144542	0.000823	1.000000	MANILA BARANGAY 565
0.293653	0.142696	0.263682	0.141982	0.000000	0.001508	0.000000	0.000000	0.000000	0.154034	0.002445	1.000000	MANILA BARANGAY 566
0.380774	0.199505	0.204131	0.109917	0.001126	0.000540	0.000000	0.000000	0.000000	0.091625	0.012382	1.000000	MANILA BARANGAY 567

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.282359	0.152039	0.308369	0.166045	0.000000	0.000000	0.000000	0.000000	0.091189	0.000000	1.000000	MANILA BARANGAY 568	
0.237439	0.113252	0.325252	0.084915	0.000702	0.000597	0.000000	0.000304	0.000358	0.237181	0.000000	1.000000	MANILA BARANGAY 569
0.091412	0.045737	0.412460	0.215772	0.001733	0.000321	0.000363	0.000022	0.000034	0.232145	0.000000	1.000000	MANILA BARANGAY 570
0.312850	0.168160	0.259771	0.118713	0.040192	0.000000	0.000000	0.000018	0.000000	0.100295	0.000000	1.000000	MANILA BARANGAY 571
0.082946	0.032678	0.455329	0.151132	0.011003	0.001132	0.000000	0.000720	0.000679	0.251808	0.012575	1.000000	MANILA BARANGAY 572
0.121755	0.057587	0.566339	0.184118	0.015356	0.000823	0.002925	0.000329	0.000494	0.050274	0.000000	1.000000	MANILA BARANGAY 573
0.358483	0.184730	0.288992	0.009283	0.032195	0.001104	0.000000	0.000213	0.000000	0.109464	0.015536	1.000000	MANILA BARANGAY 574
0.535125	0.237814	0.087532	0.047133	0.032770	0.004163	0.000512	0.001106	0.001106	0.052739	0.000000	1.000000	MANILA BARANGAY 575
0.176842	0.043629	0.700443	0.013313	0.032964	0.004238	0.000000	0.001717	0.002476	0.012742	0.011634	1.000000	MANILA BARANGAY 576
0.307561	0.163490	0.311367	0.167659	0.000000	0.000207	0.000000	0.000000	0.000000	0.049715	0.000000	1.000000	MANILA BARANGAY 577
0.235253	0.122415	0.411954	0.209490	0.001388	0.000416	0.000347	0.000000	0.000000	0.008675	0.010062	1.000000	MANILA BARANGAY 578
0.337955	0.181976	0.239948	0.129203	0.010168	0.000000	0.002542	0.000000	0.000000	0.098209	0.000000	1.000000	MANILA BARANGAY 579
0.223023	0.111573	0.339456	0.182784	0.003707	0.000865	0.000000	0.000247	0.000371	0.137974	0.000000	1.000000	MANILA BARANGAY 580
0.538810	0.289644	0.067046	0.033959	0.066705	0.000047	0.000000	0.000000	0.000000	0.001327	0.002464	1.000000	MANILA BARANGAY 581
0.011408	0.006143	0.268077	0.141829	0.003120	0.000000	0.000000	0.000000	0.000000	0.569423	0.000000	1.000000	MANILA BARANGAY 582
0.168902	0.059176	0.434957	0.166199	0.000000	0.003179	0.000000	0.000561	0.000841	0.166185	0.000000	1.000000	MANILA BARANGAY 583
0.228619	0.027347	0.410041	0.099897	0.022839	0.008803	0.000849	0.002779	0.002609	0.174297	0.021920	1.000000	MANILA BARANGAY 584
0.580983	0.248481	0.152966	0.000000	0.005732	0.006478	0.000000	0.002144	0.003216	0.000000	0.000000	1.000000	MANILA BARANGAY 585
0.372428	0.194361	0.231572	0.124693	0.004486	0.000604	0.000000	0.000000	0.000000	0.071857	0.000000	1.000000	MANILA BARANGAY 586
0.509444	0.273273	0.047387	0.025516	0.000000	0.000102	0.000000	0.000000	0.000000	0.144277	0.000000	1.000000	MANILA BARANGAY 587
0.256292	0.138003	0.314094	0.169128	0.004474	0.000000	0.000000	0.000000	0.000000	0.118009	0.000000	1.000000	MANILA BARANGAY 587-A
0.506830	0.271020	0.119289	0.062990	0.009691	0.000185	0.000000	0.000000	0.000000	0.029995	0.000000	1.000000	MANILA BARANGAY 588
0.419806	0.226049	0.147364	0.079350	0.000000	0.000000	0.000000	0.000000	0.000000	0.108495	0.018936	1.000000	MANILA BARANGAY 589
0.258464	0.120827	0.243763	0.083468	0.000000	0.001736	0.000000	0.001373	0.000942	0.261214	0.028214	1.000000	MANILA BARANGAY 590
0.197886	0.090177	0.425735	0.194233	0.001409	0.001620	0.000000	0.000149	0.000223	0.080113	0.008454	1.000000	MANILA BARANGAY 591
0.190543	0.089578	0.401392	0.175819	0.009670	0.001239	0.000923	0.000577	0.000410	0.124552	0.005296	1.000000	MANILA BARANGAY 592
0.159673	0.073850	0.301209	0.160147	0.005690	0.001209	0.000474	0.000180	0.000270	0.295875	0.001422	1.000000	MANILA BARANGAY 593
0.388249	0.177838	0.252069	0.115856	0.025157	0.002896	0.000000	0.000609	0.000914	0.014565	0.021847	1.000000	MANILA BARANGAY 594
0.281316	0.124540	0.352961	0.099844	0.001182	0.001845	0.000000	0.002584	0.001012	0.130252	0.004464	1.000000	MANILA BARANGAY 595
0.046846	0.004717	0.752615	0.038518	0.003504	0.001712	0.000000	0.001951	0.000272	0.130189	0.019677	1.000000	MANILA BARANGAY 596
0.284188	0.146441	0.360391	0.177227	0.011838	0.000664	0.000885	0.000266	0.000398	0.014383	0.003319	1.000000	MANILA BARANGAY 597
0.401065	0.212602	0.158334	0.085023	0.017941	0.000323	0.001759	0.000017	0.000000	0.094673	0.028265	1.000000	MANILA BARANGAY 598
0.337508	0.154015	0.261299	0.067416	0.003067	0.002130	0.000767	0.001559	0.000780	0.156124	0.015335	1.000000	MANILA BARANGAY 599
0.281128	0.134718	0.259173	0.130056	0.004366	0.001520	0.000421	0.000841	0.000875	0.177710	0.009192	1.000000	MANILA BARANGAY 600
0.383329	0.144621	0.229721	0.087901	0.026973	0.006741	0.001370	0.001649	0.001868	0.067795	0.048031	1.000000	MANILA BARANGAY 613
0.404760	0.217948	0.137569	0.074070	0.005240	0.000000	0.001310	0.000006	0.000000	0.149345	0.009753	1.000000	MANILA BARANGAY 602
0.635437	0.246019	0.071974	0.016214	0.012945	0.009275	0.000000	0.000265	0.000104	0.000000	0.007767	1.000000	MANILA BARANGAY 603
0.212841	0.103074	0.235176	0.121195	0.042439	0.000476	0.009122	0.001051	0.000952	0.266733	0.006941	1.000000	MANILA BARANGAY 604

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.280579	0.151081	0.269835	0.145296	0.000000	0.000000	0.000000	0.000000	0.000000	0.153210	0.000000	1.000000	MANILA BARANGAY 605
0.322182	0.173483	0.239053	0.128721	0.000000	0.000000	0.000000	0.000000	0.000000	0.136561	0.000000	1.000000	MANILA BARANGAY 606
0.084984	0.045761	0.332528	0.172227	0.050079	0.000000	0.012520	0.000000	0.000000	0.285261	0.016640	1.000000	MANILA BARANGAY 607
0.218213	0.095739	0.505515	0.177646	0.000000	0.002165	0.000000	0.000289	0.000433	0.000000	0.000000	1.000000	MANILA BARANGAY 608
0.299534	0.158787	0.342400	0.184369	0.000000	0.000244	0.000000	0.000000	0.000000	0.014665	0.000000	1.000000	MANILA BARANGAY 609
0.196742	0.006764	0.727167	0.013142	0.005522	0.013528	0.000000	0.002319	0.000580	0.034235	0.000000	1.000000	MANILA BARANGAY 610
0.120864	0.004136	0.696455	0.025455	0.000000	0.006727	0.000000	0.000000	0.000000	0.110909	0.035455	1.000000	MANILA BARANGAY 611
0.129320	0.005103	0.844465	0.000567	0.000000	0.006371	0.000000	0.000486	0.000729	0.012959	0.000000	1.000000	MANILA BARANGAY 612
0.331860	0.169650	0.323444	0.174162	0.000000	0.000884	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 613
0.222362	0.067597	0.501665	0.075128	0.053074	0.006711	0.002766	0.001434	0.002152	0.012295	0.054816	1.000000	MANILA BARANGAY 614
0.074290	0.022099	0.771606	0.009136	0.032755	0.001993	0.000000	0.000118	0.000000	0.055643	0.032360	1.000000	MANILA BARANGAY 615
0.490913	0.150148	0.264877	0.059383	0.000000	0.010334	0.000000	0.002908	0.000304	0.017751	0.003381	1.000000	MANILA BARANGAY 616
0.351240	0.175074	0.289786	0.111517	0.037411	0.000963	0.000000	0.000748	0.000895	0.032367	0.000000	1.000000	MANILA BARANGAY 617
0.033639	0.018113	0.617170	0.228113	0.005930	0.000000	0.000000	0.000000	0.000000	0.071698	0.025337	1.000000	MANILA BARANGAY 618
0.055697	0.014421	0.571157	0.135543	0.027732	0.000932	0.000000	0.001698	0.000559	0.192261	0.000000	1.000000	MANILA BARANGAY 619
0.361329	0.007155	0.558646	0.013373	0.000000	0.019165	0.000000	0.007300	0.010886	0.017888	0.004259	1.000000	MANILA BARANGAY 620
0.143691	0.031378	0.304566	0.026209	0.002767	0.002905	0.000000	0.004167	0.001195	0.477034	0.006087	1.000000	MANILA BARANGAY 621
0.447846	0.241148	0.168323	0.090636	0.009386	0.000000	0.000000	0.000000	0.000000	0.042662	0.000000	1.000000	MANILA BARANGAY 622
0.234510	0.126275	0.397166	0.209251	0.000000	0.000000	0.000000	0.000000	0.000000	0.032799	0.000000	1.000000	MANILA BARANGAY 623
0.168007	0.088370	0.452032	0.234090	0.009079	0.000086	0.000000	0.000173	0.000173	0.047990	0.000000	1.000000	MANILA BARANGAY 624
0.133665	0.061118	0.462091	0.242153	0.007515	0.001061	0.000000	0.000000	0.000000	0.092396	0.000000	1.000000	MANILA BARANGAY 625
0.252345	0.015604	0.692834	0.022094	0.000000	0.011443	0.000000	0.000396	0.000000	0.000000	0.005284	1.000000	MANILA BARANGAY 626
0.023563	0.000000	0.966411	0.005875	0.000000	0.000192	0.000000	0.003321	0.000000	0.000639	0.000000	1.000000	MANILA BARANGAY 627
0.425238	0.184393	0.196310	0.103051	0.005320	0.004345	0.000756	0.000038	0.000000	0.076497	0.004051	1.000000	MANILA BARANGAY 628
0.114693	0.047588	0.525439	0.256360	0.004020	0.001462	0.000000	0.000585	0.000877	0.048977	0.000000	1.000000	MANILA BARANGAY 629
0.160952	0.081335	0.243480	0.127386	0.061392	0.000281	0.000625	0.000616	0.000153	0.313835	0.009943	1.000000	MANILA BARANGAY 630
0.225913	0.121645	0.416071	0.224038	0.001233	0.000000	0.000000	0.000000	0.000000	0.009127	0.001973	1.000000	MANILA BARANGAY 631
0.417613	0.209766	0.048915	0.025710	0.015860	0.001461	0.000000	0.000083	0.000125	0.280467	0.000000	1.000000	MANILA BARANGAY 632
0.152169	0.038600	0.366047	0.068569	0.076208	0.003073	0.000000	0.001890	0.002243	0.267658	0.023544	1.000000	MANILA BARANGAY 633
0.026689	0.003359	0.856357	0.008976	0.010796	0.000420	0.000000	0.002239	0.000000	0.091164	0.000000	1.000000	MANILA BARANGAY 634
0.531570	0.286230	0.065592	0.035319	0.000000	0.000000	0.000000	0.000000	0.000000	0.077786	0.003504	1.000000	MANILA BARANGAY 635
0.460614	0.248023	0.049962	0.006673	0.000000	0.000000	0.000000	0.000025	0.000000	0.160161	0.074540	1.000000	MANILA BARANGAY 636
0.687454	0.296792	0.005578	0.003004	0.000000	0.007172	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 268
0.634146	0.311052	0.031707	0.017073	0.000000	0.002973	0.000000	0.000000	0.000000	0.003049	0.000000	1.000000	MANILA BARANGAY 269
0.468256	0.182302	0.055628	0.020548	0.163513	0.007132	0.000000	0.002931	0.004347	0.071325	0.024017	1.000000	MANILA BARANGAY 270
0.660354	0.311356	0.000000	0.000000	0.004322	0.000000	0.000000	0.000000	0.000000	0.023969	0.000000	1.000000	MANILA BARANGAY 271
0.166667	0.063866	0.264905	0.109079	0.000000	0.002529	0.000000	0.000000	0.000000	0.392954	0.000000	1.000000	MANILA BARANGAY 272
0.271034	0.103515	0.487594	0.047792	0.002905	0.000000	0.000000	0.000000	0.000000	0.084253	0.002905	1.000000	MANILA BARANGAY 273

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.429936	0.160602	0.286160	0.040762	0.036651	0.004262	0.001433	0.002643	0.000528	0.035165	0.001858	1.000000	MANILA BARANGAY 274
0.107389	0.045787	0.400070	0.104782	0.022746	0.001186	0.001249	0.000298	0.000222	0.312034	0.004238	1.000000	MANILA BARANGAY 275
0.225951	0.117704	0.272592	0.143335	0.052471	0.000533	0.000853	0.000114	0.000171	0.186278	0.000000	1.000000	MANILA BARANGAY 276
0.646938	0.130067	0.016428	0.000954	0.000000	0.021336	0.000000	0.000000	0.000000	0.184276	0.000000	1.000000	MANILA BARANGAY 281
0.696892	0.188108	0.013320	0.000000	0.038610	0.018243	0.000000	0.000324	0.000486	0.037838	0.006178	1.000000	MANILA BARANGAY 282
0.283341	0.139719	0.023060	0.009054	0.042551	0.001115	0.000446	0.000000	0.000000	0.500714	0.000000	1.000000	MANILA BARANGAY 283
0.664869	0.043628	0.081709	0.043806	0.001933	0.030794	0.000000	0.000555	0.000832	0.131366	0.000509	1.000000	MANILA BARANGAY 284
0.643804	0.346664	0.001496	0.000805	0.001534	0.000000	0.000000	0.000000	0.000000	0.005478	0.000219	1.000000	MANILA BARANGAY 285
0.145434	0.037987	0.099551	0.047156	0.101198	0.003705	0.002096	0.000000	0.000000	0.551647	0.011228	1.000000	MANILA BARANGAY 286
0.410798	0.217773	0.136384	0.073259	0.012500	0.000335	0.003125	0.000179	0.000000	0.145647	0.000000	1.000000	MANILA BARANGAY 637
0.469095	0.252590	0.151452	0.045063	0.000000	0.000000	0.000000	0.000000	0.000000	0.071636	0.010165	1.000000	MANILA BARANGAY 638
0.317450	0.157759	0.331487	0.178493	0.000000	0.001288	0.000000	0.000000	0.000000	0.013522	0.000000	1.000000	MANILA BARANGAY 639
0.361724	0.185716	0.239354	0.123138	0.006827	0.000885	0.000000	0.000000	0.000000	0.059953	0.022402	1.000000	MANILA BARANGAY 640
0.290462	0.156403	0.347525	0.187129	0.000000	0.000000	0.000000	0.000000	0.000000	0.018482	0.000000	1.000000	MANILA BARANGAY 641
0.198799	0.097963	0.295692	0.143473	0.023812	0.000914	0.005953	0.000198	0.000298	0.232898	0.000000	1.000000	MANILA BARANGAY 642
0.191017	0.100879	0.388876	0.207760	0.015902	0.000000	0.003976	0.000612	0.000000	0.090979	0.000000	1.000000	MANILA BARANGAY 643
0.205772	0.067886	0.461711	0.033591	0.000000	0.004195	0.000000	0.000000	0.000000	0.226846	0.000000	1.000000	MANILA BARANGAY 644
0.119251	0.064212	0.460188	0.243023	0.002067	0.000000	0.000517	0.000000	0.000000	0.110742	0.000000	1.000000	MANILA BARANGAY 645
0.338069	0.157295	0.207759	0.111870	0.000000	0.002418	0.000000	0.000000	0.000000	0.182588	0.000000	1.000000	MANILA BARANGAY 646
0.194265	0.059042	0.450945	0.231916	0.002429	0.004453	0.000000	0.000000	0.000000	0.032659	0.024291	1.000000	MANILA BARANGAY 647
0.127888	0.039611	0.519132	0.071255	0.020544	0.002797	0.004809	0.000753	0.000980	0.210141	0.002091	1.000000	MANILA BARANGAY 648
0.150647	0.068627	0.563433	0.163559	0.016688	0.001252	0.004172	0.000601	0.000150	0.030872	0.000000	1.000000	MANILA BARANGAY 745
0.368604	0.198479	0.169276	0.011319	0.000000	0.000000	0.000000	0.000000	0.000000	0.252321	0.000000	1.000000	MANILA BARANGAY 746
0.259634	0.112055	0.427026	0.087895	0.000000	0.001877	0.000000	0.001838	0.000978	0.103755	0.004941	1.000000	MANILA BARANGAY 747
0.088306	0.036694	0.614718	0.206519	0.019265	0.001120	0.000000	0.000448	0.000672	0.032258	0.000000	1.000000	MANILA BARANGAY 748
0.402028	0.216477	0.133238	0.071744	0.000000	0.000000	0.000000	0.000000	0.000000	0.176512	0.000000	1.000000	MANILA BARANGAY 749
0.062656	0.009570	0.442422	0.030187	0.004219	0.000820	0.000000	0.000437	0.000000	0.445000	0.004687	1.000000	MANILA BARANGAY 750
0.523258	0.280962	0.106379	0.053582	0.000654	0.000164	0.000000	0.000000	0.000000	0.035002	0.000000	1.000000	MANILA BARANGAY 751
0.152364	0.075651	0.526246	0.215471	0.012416	0.000852	0.002380	0.000187	0.000280	0.010293	0.003860	1.000000	MANILA BARANGAY 752
0.215405	0.115987	0.354447	0.190286	0.000000	0.000000	0.000000	0.000000	0.000000	0.123875	0.000000	1.000000	MANILA BARANGAY 753
0.216848	0.116764	0.408634	0.220034	0.000000	0.000000	0.000000	0.000000	0.000000	0.037720	0.000000	1.000000	MANILA BARANGAY 755
0.422892	0.214744	0.204518	0.110125	0.032190	0.001311	0.006938	0.000331	0.000496	0.000000	0.006454	1.000000	MANILA BARANGAY 756
0.465287	0.244586	0.155551	0.083758	0.009554	0.000614	0.000000	0.000246	0.000369	0.000000	0.040036	1.000000	MANILA BARANGAY 757
0.432878	0.233088	0.146113	0.078676	0.109244	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 758
0.353041	0.180483	0.215149	0.115850	0.004423	0.000940	0.000000	0.000000	0.000000	0.091043	0.039071	1.000000	MANILA BARANGAY 759
0.390286	0.195584	0.227659	0.122585	0.000000	0.001503	0.000000	0.000601	0.000902	0.060879	0.000000	1.000000	MANILA BARANGAY 760
0.257912	0.138876	0.385564	0.207611	0.000000	0.000000	0.000000	0.000000	0.000000	0.010037	0.000000	1.000000	MANILA BARANGAY 761
0.314534	0.169364	0.335466	0.180636	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 762

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.237356	0.127807	0.369540	0.198930	0.000000	0.000000	0.000000	0.000053	0.000000	0.066313	0.000000	1.000000	MANILA BARANGAY 763
0.524026	0.282099	0.050418	0.026756	0.017559	0.000000	0.000000	0.000000	0.000000	0.098287	0.000857	1.000000	MANILA BARANGAY 764
0.304484	0.141737	0.420822	0.036407	0.000000	0.001963	0.000000	0.000929	0.000784	0.090807	0.002068	1.000000	MANILA BARANGAY 765
0.137529	0.073111	0.191306	0.101647	0.217734	0.000092	0.000000	0.000000	0.000000	0.270981	0.007600	1.000000	MANILA BARANGAY 766
0.146476	0.060440	0.311124	0.150538	0.052174	0.002586	0.000000	0.000508	0.000663	0.254979	0.020512	1.000000	MANILA BARANGAY 767
0.111014	0.031398	0.603210	0.184808	0.001352	0.001567	0.000184	0.004406	0.000618	0.057143	0.004301	1.000000	MANILA BARANGAY 768
0.000000	0.000000	0.477455	0.233854	0.000000	0.000000	0.000000	0.000000	0.000000	0.288690	0.000000	1.000000	MANILA BARANGAY 769
0.250894	0.106695	0.233534	0.102832	0.016965	0.002326	0.001813	0.001134	0.000720	0.277778	0.005310	1.000000	MANILA BARANGAY 770
0.048727	0.003948	0.743023	0.122088	0.000000	0.001370	0.000000	0.006400	0.000000	0.074444	0.000000	1.000000	MANILA BARANGAY 771
0.239788	0.125098	0.305136	0.161872	0.004635	0.000393	0.001060	0.000000	0.000000	0.161430	0.000589	1.000000	MANILA BARANGAY 772
0.248838	0.130722	0.344777	0.180314	0.002899	0.000066	0.000725	0.000646	0.000133	0.089976	0.000906	1.000000	MANILA BARANGAY 773
0.193260	0.103104	0.271061	0.145956	0.022558	0.000099	0.001682	0.000040	0.000059	0.262182	0.000000	1.000000	MANILA BARANGAY 774
0.116881	0.035511	0.117015	0.042302	0.012336	0.001853	0.002168	0.001863	0.000517	0.499733	0.169822	1.000000	MANILA BARANGAY 775
0.113804	0.036518	0.387077	0.150501	0.000915	0.001657	0.000000	0.001914	0.000942	0.279573	0.027100	1.000000	MANILA BARANGAY 776
0.121885	0.046979	0.417724	0.180470	0.015045	0.001681	0.000235	0.000865	0.000494	0.212271	0.002351	1.000000	MANILA BARANGAY 777
0.094283	0.035389	0.334754	0.145283	0.014823	0.001509	0.000000	0.000397	0.000349	0.370566	0.002647	1.000000	MANILA BARANGAY 778
0.155423	0.069378	0.301882	0.159425	0.016877	0.001150	0.003927	0.001031	0.000584	0.284479	0.005844	1.000000	MANILA BARANGAY 779
0.089767	0.038981	0.470257	0.243370	0.000786	0.000760	0.000000	0.000294	0.000126	0.143868	0.011792	1.000000	MANILA BARANGAY 780
0.216693	0.077177	0.235022	0.085329	0.001605	0.003218	0.000000	0.003353	0.002000	0.373395	0.002207	1.000000	MANILA BARANGAY 781
0.471826	0.252913	0.069333	0.037252	0.000000	0.000072	0.000000	0.000139	0.000058	0.160580	0.007826	1.000000	MANILA BARANGAY 782
0.258042	0.134394	0.218095	0.117436	0.000000	0.000445	0.000000	0.000000	0.000000	0.271589	0.000000	1.000000	MANILA BARANGAY 783
0.323110	0.111532	0.193940	0.100733	0.002708	0.002397	0.000677	0.011939	0.000199	0.221395	0.031370	1.000000	MANILA BARANGAY 784
0.307400	0.149431	0.148861	0.059772	0.000000	0.000304	0.000000	0.000607	0.000607	0.321632	0.011385	1.000000	MANILA BARANGAY 785
0.526623	0.276515	0.031403	0.017334	0.104257	0.000523	0.000000	0.000823	0.000314	0.038240	0.003968	1.000000	MANILA BARANGAY 786
0.195392	0.067131	0.640999	0.026601	0.014841	0.003844	0.000000	0.002039	0.002114	0.047040	0.000000	1.000000	MANILA BARANGAY 787
0.636959	0.264256	0.008131	0.002957	0.002640	0.007814	0.000000	0.000908	0.001362	0.062302	0.012672	1.000000	MANILA BARANGAY 788
0.329154	0.154663	0.199936	0.107243	0.003029	0.002073	0.000000	0.000345	0.000419	0.190105	0.013035	1.000000	MANILA BARANGAY 789
0.354688	0.188988	0.254949	0.130379	0.022260	0.000121	0.000000	0.000108	0.000108	0.043170	0.005228	1.000000	MANILA BARANGAY 790
0.318097	0.153427	0.231005	0.123584	0.005605	0.001075	0.000744	0.001163	0.000858	0.164441	0.000000	1.000000	MANILA BARANGAY 791
0.214578	0.100762	0.298887	0.155410	0.042391	0.000784	0.000000	0.001214	0.001162	0.182068	0.002745	1.000000	MANILA BARANGAY 792
0.223916	0.120181	0.181165	0.095811	0.004177	0.000000	0.001044	0.000213	0.000000	0.373494	0.000000	1.000000	MANILA BARANGAY 793
0.115812	0.029202	0.641392	0.164672	0.013919	0.002768	0.000000	0.000065	0.000098	0.000733	0.031339	1.000000	MANILA BARANGAY 794
0.070552	0.028372	0.590459	0.186801	0.000000	0.000430	0.000000	0.000000	0.000000	0.123386	0.000000	1.000000	MANILA BARANGAY 795
0.000000	0.000000	0.505283	0.272075	0.032604	0.000000	0.000000	0.000000	0.000000	0.153057	0.036981	1.000000	MANILA BARANGAY 796
0.171968	0.086024	0.441968	0.170056	0.000000	0.000643	0.000000	0.000024	0.000000	0.111647	0.017671	1.000000	MANILA BARANGAY 797
0.185465	0.093095	0.428130	0.175846	0.006448	0.000699	0.000000	0.000279	0.000419	0.109618	0.000000	1.000000	MANILA BARANGAY 798
0.241932	0.130271	0.268728	0.144700	0.030624	0.000000	0.000000	0.000000	0.000000	0.154299	0.029446	1.000000	MANILA BARANGAY 799
0.098316	0.020632	0.216526	0.109789	0.205263	0.003158	0.000000	0.000000	0.000000	0.327368	0.018947	1.000000	MANILA BARANGAY 800

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.344541	0.185522	0.247035	0.133019	0.003283	0.000000	0.000000	0.000000	0.000000	0.086600	0.000000	1.000000	MANILA BARANGAY 802
0.361896	0.194867	0.256953	0.121005	0.003476	0.000000	0.000869	0.000098	0.000000	0.049430	0.011407	1.000000	MANILA BARANGAY 803
0.406882	0.218470	0.169334	0.080282	0.011524	0.000000	0.000000	0.000192	0.000000	0.108195	0.005122	1.000000	MANILA BARANGAY 804
0.086337	0.013091	0.560927	0.303484	0.000000	0.002321	0.000000	0.002519	0.000408	0.030912	0.000000	1.000000	MANILA BARANGAY 805
0.144684	0.001890	0.757222	0.007540	0.000000	0.007256	0.000000	0.002028	0.001417	0.077962	0.000000	1.000000	MANILA BARANGAY 806
0.109544	0.050106	0.509040	0.274056	0.006363	0.000875	0.000000	0.000095	0.000080	0.049841	0.000000	1.000000	MANILA BARANGAY 807
0.122984	0.008957	0.762735	0.010729	0.000000	0.004611	0.000000	0.002441	0.000386	0.074360	0.012796	1.000000	MANILA BARANGAY 866
0.070998	0.006330	0.635131	0.020810	0.000000	0.002445	0.000000	0.000898	0.000161	0.263228	0.000000	1.000000	MANILA BARANGAY 873
0.202549	0.094796	0.362073	0.188017	0.006239	0.001395	0.000000	0.000000	0.000000	0.144931	0.000000	1.000000	MANILA BARANGAY 874
0.181278	0.097611	0.345562	0.186072	0.000000	0.000000	0.000000	0.000000	0.000000	0.189477	0.000000	1.000000	MANILA BARANGAY 876
0.072455	0.036877	0.449988	0.242759	0.000000	0.000000	0.000000	0.000661	0.000000	0.197260	0.000000	1.000000	MANILA BARANGAY 877
0.188316	0.077657	0.342674	0.165678	0.009843	0.002925	0.000000	0.000456	0.000135	0.171260	0.041057	1.000000	MANILA BARANGAY 878
0.596030	0.055578	0.275154	0.000000	0.000000	0.026865	0.000000	0.009788	0.014682	0.021903	0.000000	1.000000	MANILA BARANGAY 879
0.126774	0.068263	0.475087	0.240050	0.006948	0.000000	0.000000	0.000000	0.000000	0.082878	0.000000	1.000000	MANILA BARANGAY 880
0.371060	0.193093	0.178515	0.094881	0.001442	0.000692	0.000000	0.000277	0.000415	0.159625	0.000000	1.000000	MANILA BARANGAY 881
0.214013	0.109492	0.359674	0.183993	0.015333	0.000562	0.000674	0.000000	0.000000	0.105027	0.011233	1.000000	MANILA BARANGAY 882
0.104009	0.043298	0.504931	0.266589	0.044220	0.001242	0.002263	0.000000	0.000000	0.031481	0.001968	1.000000	MANILA BARANGAY 883
0.292906	0.071863	0.345117	0.117691	0.008605	0.008675	0.000000	0.004024	0.002029	0.136882	0.012207	1.000000	MANILA BARANGAY 884
0.418706	0.218867	0.101181	0.054482	0.011272	0.000644	0.000000	0.000000	0.000000	0.194847	0.000000	1.000000	MANILA BARANGAY 885
0.012844	0.006916	0.843428	0.100730	0.018557	0.000000	0.004639	0.000000	0.000000	0.000000	0.012887	1.000000	MANILA BARANGAY 886
0.043477	0.020326	0.801631	0.133930	0.000000	0.000318	0.000000	0.000127	0.000191	0.000000	0.000000	1.000000	MANILA BARANGAY 887
0.636176	0.336732	0.001062	0.000572	0.000000	0.000542	0.000000	0.000039	0.000039	0.024837	0.000000	1.000000	MANILA BARANGAY 888
0.537025	0.289167	0.051324	0.027636	0.028406	0.000000	0.000000	0.000000	0.000000	0.066442	0.000000	1.000000	MANILA BARANGAY 889
0.004151	0.002235	0.708675	0.209367	0.000000	0.000000	0.000000	0.000000	0.000000	0.073976	0.001597	1.000000	MANILA BARANGAY 890
0.090404	0.016861	0.686946	0.005377	0.085082	0.002720	0.000000	0.000482	0.000629	0.001166	0.110334	1.000000	MANILA BARANGAY 891
0.149164	0.009712	0.783689	0.020687	0.008004	0.006652	0.000000	0.003209	0.003052	0.000178	0.015653	1.000000	MANILA BARANGAY 892
0.192529	0.103670	0.319463	0.172018	0.016252	0.000000	0.004063	0.000000	0.000000	0.192005	0.000000	1.000000	MANILA BARANGAY 893
0.274566	0.119461	0.285823	0.147560	0.017066	0.002979	0.000000	0.000150	0.000000	0.152395	0.000000	1.000000	MANILA BARANGAY 894
0.050406	0.026158	0.443420	0.224281	0.018846	0.000203	0.000650	0.000049	0.000000	0.234768	0.001219	1.000000	MANILA BARANGAY 895
0.279105	0.150287	0.235612	0.126868	0.000000	0.000000	0.000000	0.000000	0.000000	0.208128	0.000000	1.000000	MANILA BARANGAY 896
0.130242	0.069041	0.476902	0.256333	0.007292	0.000000	0.001349	0.000253	0.000000	0.058588	0.000000	1.000000	MANILA BARANGAY 897
0.330649	0.178042	0.262113	0.136024	0.002580	0.000000	0.000287	0.000000	0.000000	0.084573	0.005734	1.000000	MANILA BARANGAY 898
0.118120	0.063603	0.513240	0.273191	0.021322	0.000000	0.005331	0.000000	0.000000	0.001038	0.004154	1.000000	MANILA BARANGAY 899
0.054813	0.026637	0.456996	0.167697	0.007873	0.000167	0.000239	0.000091	0.000029	0.281761	0.003698	1.000000	MANILA BARANGAY 900
0.002960	0.000000	0.000000	0.000000	0.000000	0.000156	0.000000	0.000000	0.000000	0.000000	0.996885	1.000000	MANILA BARANGAY 902
0.294718	0.145569	0.225474	0.121684	0.001725	0.000662	0.000000	0.001190	0.000699	0.207201	0.001078	1.000000	MANILA BARANGAY 903
0.355586	0.166732	0.165120	0.088911	0.000000	0.002418	0.000000	0.000000	0.000000	0.221234	0.000000	1.000000	MANILA BARANGAY 904
0.159249	0.068994	0.347356	0.160631	0.043802	0.001893	0.001246	0.000086	0.000129	0.205112	0.011502	1.000000	MANILA BARANGAY 905

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.213429	0.102756	0.222788	0.115676	0.000000	0.000952	0.000000	0.000510	0.000298	0.331090	0.012500	1.000000	MANILA BARANGAY 754
0.527148	0.265006	0.076081	0.041550	0.000000	0.001345	0.000000	0.001314	0.000528	0.084784	0.002246	1.000000	MANILA BARANGAY 808
0.785624	0.012447	0.094017	0.051522	0.000000	0.039723	0.000000	0.001296	0.000000	0.015371	0.000000	1.000000	MANILA BARANGAY 297
0.513804	0.223557	0.006355	0.003422	0.000000	0.005191	0.000000	0.000000	0.000000	0.177374	0.070298	1.000000	MANILA BARANGAY 298
0.573584	0.205663	0.029356	0.000169	0.000000	0.010443	0.000000	0.002711	0.004066	0.168441	0.005566	1.000000	MANILA BARANGAY 299
0.154619	0.034036	0.130308	0.080713	0.051864	0.000000	0.012966	0.015235	0.000000	0.520259	0.000000	1.000000	MANILA BARANGAY 300
0.444705	0.232726	0.020313	0.010938	0.000000	0.000694	0.000000	0.000278	0.000417	0.289931	0.000000	1.000000	MANILA BARANGAY 313
0.728269	0.203256	0.012043	0.006485	0.000000	0.019481	0.000000	0.007740	0.011609	0.011117	0.000000	1.000000	MANILA BARANGAY 302
0.440244	0.148405	0.196623	0.073546	0.000000	0.008724	0.000000	0.000450	0.000675	0.131332	0.000000	1.000000	MANILA BARANGAY 303
0.755792	0.141312	0.000000	0.000000	0.000000	0.027257	0.000000	0.009813	0.014719	0.047700	0.003407	1.000000	MANILA BARANGAY 304
0.315188	0.003621	0.099843	0.053762	0.008464	0.016348	0.000000	0.000859	0.001288	0.170533	0.330094	1.000000	MANILA BARANGAY 305
0.185648	0.073949	0.380007	0.134529	0.008762	0.002857	0.001788	0.000356	0.000382	0.202784	0.008938	1.000000	MANILA BARANGAY 310
0.220561	0.074156	0.137718	0.074156	0.008715	0.004548	0.000000	0.001427	0.002141	0.476580	0.000000	1.000000	MANILA BARANGAY 311
0.047632	0.003259	0.402287	0.041470	0.000810	0.001680	0.000000	0.001206	0.000036	0.500000	0.001619	1.000000	MANILA BARANGAY 312
0.537678	0.012164	0.006635	0.003697	0.012638	0.027172	0.000000	0.001643	0.001848	0.235387	0.161137	1.000000	MANILA BARANGAY 313
0.237372	0.015328	0.238978	0.090774	0.002920	0.010905	0.000000	0.005285	0.007197	0.391241	0.000000	1.000000	MANILA BARANGAY 314
0.498406	0.216388	0.161928	0.089897	0.005141	0.003869	0.000000	0.004072	0.000247	0.020051	0.000000	1.000000	MANILA BARANGAY 315
0.167123	0.059827	0.162597	0.087552	0.010006	0.002948	0.001906	0.000000	0.000000	0.508041	0.000000	1.000000	MANILA BARANGAY 316
0.308278	0.150485	0.284203	0.153032	0.000000	0.001516	0.000000	0.000000	0.000000	0.102486	0.000000	1.000000	MANILA BARANGAY 317
0.142148	0.017655	0.549038	0.013354	0.030369	0.004862	0.000832	0.003567	0.001045	0.236089	0.001040	1.000000	MANILA BARANGAY 318
0.287112	0.037658	0.536479	0.015817	0.006214	0.010731	0.000000	0.003838	0.001346	0.100806	0.000000	1.000000	MANILA BARANGAY 319
0.288406	0.043274	0.371988	0.198936	0.000000	0.010938	0.000000	0.000344	0.000516	0.085598	0.000000	1.000000	MANILA BARANGAY 320
0.097222	0.052350	0.416667	0.224359	0.057692	0.000000	0.000000	0.000000	0.000000	0.151709	0.000000	1.000000	MANILA BARANGAY 321
0.312564	0.168304	0.253699	0.136607	0.005102	0.000000	0.000000	0.000000	0.000000	0.123724	0.000000	1.000000	MANILA BARANGAY 322
0.219912	0.054615	0.430857	0.232000	0.008791	0.006264	0.000000	0.000211	0.000316	0.047033	0.000000	1.000000	MANILA BARANGAY 323
0.040154	0.021622	0.484921	0.261111	0.055942	0.000000	0.012698	0.000000	0.000000	0.123552	0.000000	1.000000	MANILA BARANGAY 324
0.167729	0.026672	0.467535	0.251750	0.000000	0.006221	0.000000	0.000000	0.000000	0.080093	0.000000	1.000000	MANILA BARANGAY 325
0.192083	0.097708	0.103472	0.018889	0.011806	0.001181	0.000000	0.000556	0.000000	0.574306	0.000000	1.000000	MANILA BARANGAY 326
0.112720	0.012329	0.323973	0.037671	0.053425	0.004795	0.000000	0.001448	0.002172	0.451468	0.000000	1.000000	MANILA BARANGAY 327
0.438446	0.125590	0.143572	0.078153	0.000000	0.010415	0.000000	0.001221	0.000000	0.202604	0.000000	1.000000	MANILA BARANGAY 328
0.555353	0.029897	0.093223	0.052563	0.000000	0.025228	0.000000	0.003417	0.000000	0.166856	0.073462	1.000000	MANILA BARANGAY 329
0.267873	0.135202	0.201537	0.104036	0.001281	0.000698	0.000000	0.000500	0.000596	0.285714	0.002562	1.000000	MANILA BARANGAY 330
0.257736	0.138781	0.335348	0.180572	0.000000	0.000000	0.000000	0.000000	0.000000	0.087562	0.000000	1.000000	MANILA BARANGAY 331
0.314407	0.169296	0.305259	0.164370	0.037333	0.000000	0.009333	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 332
0.218034	0.010910	0.392017	0.210401	0.006107	0.010433	0.001527	0.000178	0.000267	0.148855	0.001272	1.000000	MANILA BARANGAY 333
0.362633	0.150625	0.365392	0.035072	0.024383	0.004389	0.000000	0.000951	0.001390	0.051509	0.003657	1.000000	MANILA BARANGAY 334
0.063492	0.000000	0.591841	0.099073	0.000000	0.002921	0.000000	0.001759	0.000914	0.231111	0.008889	1.000000	MANILA BARANGAY 335
0.244724	0.131774	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.623502	0.000000	1.000000	MANILA BARANGAY 336

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.316897	0.000000	0.184551	0.007085	0.000000	0.016728	0.000000	0.001989	0.002201	0.457085	0.013463	1.000000	MANILA BARANGAY 337
0.489273	0.223045	0.037167	0.016561	0.024061	0.003379	0.000000	0.001945	0.000145	0.191697	0.012727	1.000000	MANILA BARANGAY 338
0.116195	0.054933	0.706141	0.059013	0.003747	0.000437	0.000000	0.000000	0.000000	0.044963	0.014571	1.000000	MANILA BARANGAY 339
0.264703	0.131713	0.306842	0.160983	0.017160	0.001086	0.004290	0.000217	0.000326	0.109422	0.003258	1.000000	MANILA BARANGAY 340
0.410134	0.220148	0.218832	0.064174	0.001074	0.000000	0.000000	0.000000	0.000000	0.082953	0.002685	1.000000	MANILA BARANGAY 341
0.392391	0.208534	0.222474	0.071415	0.022839	0.000000	0.000000	0.000000	0.000000	0.063112	0.019235	1.000000	MANILA BARANGAY 342
0.048505	0.024896	0.549363	0.274440	0.000830	0.000111	0.000000	0.000000	0.000000	0.101024	0.000830	1.000000	MANILA BARANGAY 343
0.086768	0.041540	0.417980	0.226010	0.019091	0.000076	0.002121	0.001364	0.000000	0.205051	0.000000	1.000000	MANILA BARANGAY 344
0.035369	0.009611	0.905533	0.021516	0.000000	0.000922	0.000000	0.000000	0.000000	0.027049	0.000000	1.000000	MANILA BARANGAY 345
0.151994	0.050574	0.468517	0.251419	0.044338	0.003174	0.000000	0.000893	0.001340	0.026794	0.000957	1.000000	MANILA BARANGAY 346
0.161493	0.039762	0.706869	0.002774	0.073712	0.004029	0.000000	0.001849	0.000000	0.000264	0.009247	1.000000	MANILA BARANGAY 347
0.243602	0.129258	0.334199	0.131512	0.000000	0.000000	0.000000	0.000228	0.000000	0.161202	0.000000	1.000000	MANILA BARANGAY 348
0.127717	0.068771	0.241848	0.130226	0.000000	0.000000	0.000000	0.000000	0.000000	0.423077	0.008361	1.000000	MANILA BARANGAY 349
0.036318	0.013007	0.743328	0.187416	0.000000	0.000676	0.000000	0.000270	0.000405	0.018581	0.000000	1.000000	MANILA BARANGAY 350
0.057968	0.026779	0.605773	0.219189	0.011862	0.000433	0.001486	0.000000	0.000000	0.076510	0.000000	1.000000	MANILA BARANGAY 351
0.093218	0.011176	0.535868	0.156162	0.000000	0.003573	0.000000	0.002210	0.001461	0.188113	0.008220	1.000000	MANILA BARANGAY 352
0.278578	0.087119	0.362959	0.195784	0.000000	0.005989	0.000000	0.000498	0.000000	0.065339	0.003734	1.000000	MANILA BARANGAY 353
0.282702	0.010517	0.629919	0.000711	0.000000	0.014241	0.000000	0.005127	0.007659	0.047818	0.001307	1.000000	MANILA BARANGAY 354
0.294425	0.075358	0.454666	0.079273	0.000000	0.009245	0.000000	0.000280	0.000419	0.086333	0.000000	1.000000	MANILA BARANGAY 355
0.224675	0.116540	0.428254	0.223590	0.006508	0.000434	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 356
0.164662	0.069876	0.470172	0.253169	0.001185	0.001836	0.000000	0.000000	0.000000	0.039100	0.000000	1.000000	MANILA BARANGAY 357
0.281639	0.122573	0.348465	0.187635	0.000000	0.002842	0.000000	0.000000	0.000000	0.056846	0.000000	1.000000	MANILA BARANGAY 358
0.343341	0.172711	0.091974	0.049524	0.000000	0.001189	0.000000	0.000000	0.000000	0.341260	0.000000	1.000000	MANILA BARANGAY 359
0.279480	0.145677	0.326456	0.175784	0.000000	0.000470	0.000000	0.000000	0.000000	0.062724	0.009409	1.000000	MANILA BARANGAY 360
0.338919	0.182495	0.250361	0.134810	0.000000	0.000000	0.000000	0.000000	0.000000	0.093415	0.000000	1.000000	MANILA BARANGAY 361
0.148056	0.056637	0.740981	0.038004	0.000000	0.002382	0.000000	0.000953	0.001429	0.003152	0.008406	1.000000	MANILA BARANGAY 362
0.132712	0.066836	0.284237	0.153051	0.000000	0.000452	0.000000	0.000000	0.000000	0.362712	0.000000	1.000000	MANILA BARANGAY 363
0.075862	0.013462	0.426459	0.225902	0.100796	0.002241	0.000000	0.000796	0.000637	0.139257	0.014589	1.000000	MANILA BARANGAY 364
0.128289	0.060099	0.255281	0.131748	0.046016	0.000494	0.000000	0.000692	0.000296	0.369055	0.008030	1.000000	MANILA BARANGAY 365
0.157347	0.001485	0.504881	0.051459	0.000000	0.010186	0.000000	0.005199	0.001273	0.099735	0.168435	1.000000	MANILA BARANGAY 366
0.117152	0.003396	0.618555	0.055793	0.011642	0.010603	0.002911	0.002020	0.000520	0.039155	0.138254	1.000000	MANILA BARANGAY 367
0.350102	0.188517	0.236726	0.127468	0.000000	0.000000	0.000000	0.000000	0.000000	0.097187	0.000000	1.000000	MANILA BARANGAY 368
0.066715	0.035923	0.559441	0.270018	0.022983	0.000000	0.005746	0.000000	0.000000	0.039175	0.000000	1.000000	MANILA BARANGAY 369
0.234622	0.110721	0.418409	0.169288	0.000000	0.000527	0.000000	0.003163	0.000000	0.063269	0.000000	1.000000	MANILA BARANGAY 370
0.159283	0.080614	0.445032	0.215254	0.000000	0.000532	0.000000	0.000213	0.000319	0.098754	0.000000	1.000000	MANILA BARANGAY 371
0.276413	0.140254	0.175326	0.081920	0.142391	0.000543	0.004493	0.000072	0.000109	0.162536	0.015942	1.000000	MANILA BARANGAY 372
0.222023	0.119551	0.331132	0.178260	0.003253	0.000000	0.000325	0.000042	0.000000	0.145413	0.000000	1.000000	MANILA BARANGAY 373
0.179695	0.095094	0.392156	0.201949	0.005069	0.000154	0.000691	0.000000	0.000000	0.123656	0.001536	1.000000	MANILA BARANGAY 374

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.146745	0.076278	0.345977	0.165479	0.007097	0.000224	0.000447	0.000140	0.000000	0.248114	0.009500	1.000000	MANILA BARANGAY 375
0.386965	0.208366	0.176621	0.095104	0.026459	0.000000	0.004021	0.000000	0.000000	0.102464	0.000000	1.000000	MANILA BARANGAY 376
0.510045	0.196875	0.203795	0.082812	0.000000	0.006473	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 377
0.650000	0.350000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 378
0.219065	0.114536	0.374215	0.071585	0.000000	0.000000	0.000000	0.000000	0.000000	0.220599	0.000000	1.000000	MANILA BARANGAY 379
0.109225	0.002691	0.806182	0.026163	0.018578	0.006086	0.000000	0.001710	0.002460	0.005125	0.021781	1.000000	MANILA BARANGAY 380
0.360833	0.156598	0.110956	0.024224	0.001764	0.003282	0.000000	0.001863	0.000677	0.299929	0.039873	1.000000	MANILA BARANGAY 381
0.321351	0.094270	0.342430	0.142054	0.019657	0.007737	0.000000	0.001430	0.001644	0.069427	0.000000	1.000000	MANILA BARANGAY 382
0.352143	0.136917	0.109012	0.029552	0.003095	0.005488	0.000000	0.000107	0.000114	0.361667	0.001905	1.000000	MANILA BARANGAY 1
0.547121	0.290227	0.002567	0.001382	0.012833	0.000428	0.000000	0.000000	0.000000	0.145443	0.000000	1.000000	MANILA BARANGAY 2
0.648916	0.324205	0.011272	0.006069	0.000000	0.001040	0.000000	0.002081	0.002081	0.000000	0.004335	1.000000	MANILA BARANGAY 3
0.417444	0.165008	0.180448	0.097944	0.008434	0.005526	0.000314	0.001430	0.000456	0.113829	0.009167	1.000000	MANILA BARANGAY 4
0.480799	0.247052	0.117531	0.063286	0.004121	0.001002	0.000853	0.000227	0.000227	0.082060	0.002842	1.000000	MANILA BARANGAY 5
0.334060	0.117684	0.509465	0.008717	0.000000	0.010149	0.000000	0.000747	0.001121	0.018057	0.000000	1.000000	MANILA BARANGAY 6
0.480602	0.163142	0.175100	0.031167	0.000000	0.008824	0.000000	0.001661	0.000000	0.139504	0.000000	1.000000	MANILA BARANGAY 7
0.046329	0.024306	0.002778	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.920635	0.005952	1.000000	MANILA BARANGAY 8
0.071802	0.038663	0.090698	0.048837	0.000000	0.000000	0.000000	0.000000	0.000000	0.750000	0.000000	1.000000	MANILA BARANGAY 9
0.068796	0.037044	0.097263	0.052372	0.000000	0.000000	0.000000	0.000000	0.000000	0.744526	0.000000	1.000000	MANILA BARANGAY 10
0.209122	0.021231	0.316591	0.158959	0.002445	0.006034	0.000000	0.005364	0.004744	0.270982	0.004527	1.000000	MANILA BARANGAY 11
0.129413	0.062226	0.236486	0.123564	0.000000	0.000676	0.000000	0.000000	0.000000	0.445524	0.002111	1.000000	MANILA BARANGAY 12
0.176260	0.088051	0.443366	0.185531	0.010866	0.000571	0.002126	0.000315	0.000000	0.088189	0.004724	1.000000	MANILA BARANGAY 13
0.207681	0.109866	0.302247	0.151305	0.025319	0.000000	0.000000	0.000000	0.000000	0.199939	0.003643	1.000000	MANILA BARANGAY 14
0.028302	0.015239	0.603459	0.324940	0.000000	0.000000	0.000000	0.000000	0.000000	0.028060	0.000000	1.000000	MANILA BARANGAY 15
0.392689	0.211448	0.120774	0.065032	0.028174	0.000000	0.000000	0.000000	0.000000	0.176177	0.005706	1.000000	MANILA BARANGAY 16
0.532724	0.286851	0.092215	0.049654	0.003164	0.000000	0.000791	0.000000	0.000000	0.034602	0.000000	1.000000	MANILA BARANGAY 17
0.160092	0.044274	0.394731	0.208648	0.007698	0.003802	0.000751	0.000939	0.000000	0.139873	0.039193	1.000000	MANILA BARANGAY 18
0.140483	0.053485	0.683579	0.028905	0.000000	0.001229	0.000000	0.002377	0.000576	0.080429	0.008937	1.000000	MANILA BARANGAY 19
0.056191	0.025846	0.230717	0.066495	0.081049	0.000433	0.000936	0.000341	0.000028	0.518358	0.019606	1.000000	MANILA BARANGAY 20
0.177162	0.086503	0.583584	0.058816	0.001390	0.001112	0.000000	0.000392	0.000133	0.083403	0.007506	1.000000	MANILA BARANGAY 25
0.210104	0.102750	0.321424	0.172345	0.001448	0.000428	0.000000	0.001587	0.000857	0.189056	0.000000	1.000000	MANILA BARANGAY 26
0.403514	0.214990	0.174992	0.091304	0.001854	0.000101	0.000000	0.000000	0.000000	0.113246	0.000000	1.000000	MANILA BARANGAY 28
0.351756	0.176343	0.206686	0.111426	0.035342	0.001170	0.008212	0.000318	0.000152	0.071949	0.036646	1.000000	MANILA BARANGAY 29
0.086809	0.042701	0.203910	0.100365	0.010010	0.000000	0.002503	0.000000	0.000000	0.553702	0.000000	1.000000	MANILA BARANGAY 30
0.295303	0.110321	0.129373	0.067101	0.019963	0.004759	0.000742	0.000065	0.000000	0.369901	0.002472	1.000000	MANILA BARANGAY 31
0.339523	0.182820	0.228980	0.123297	0.000000	0.000000	0.000000	0.000000	0.000000	0.120174	0.005206	1.000000	MANILA BARANGAY 32
0.271640	0.054550	0.477300	0.101139	0.022688	0.008237	0.001726	0.002370	0.000178	0.054501	0.005672	1.000000	MANILA BARANGAY 33
0.353250	0.186437	0.285857	0.150896	0.000000	0.000369	0.000000	0.000000	0.000000	0.018623	0.004568	1.000000	MANILA BARANGAY 34
0.360710	0.190922	0.297001	0.097532	0.031497	0.000388	0.001550	0.000000	0.000000	0.015912	0.004488	1.000000	MANILA BARANGAY 35

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.304540	0.129635	0.358026	0.177155	0.000000	0.003353	0.000000	0.001006	0.001040	0.018463	0.006782	1.000000	MANILA BARANGAY 36
0.328211	0.113448	0.333319	0.172026	0.010345	0.005711	0.002586	0.001966	0.000491	0.027586	0.004310	1.000000	MANILA BARANGAY 37
0.322893	0.170943	0.318935	0.171734	0.004524	0.000302	0.000000	0.000121	0.000181	0.007352	0.003016	1.000000	MANILA BARANGAY 38
0.191905	0.088077	0.133810	0.060823	0.003696	0.001377	0.000264	0.000202	0.000268	0.057699	0.011879	1.000000	MANILA BARANGAY 39
0.247927	0.107854	0.272062	0.139354	0.000000	0.002536	0.000000	0.000316	0.000335	0.175075	0.054540	1.000000	MANILA BARANGAY 41
0.625939	0.337044	0.014008	0.004101	0.010652	0.000000	0.000000	0.000000	0.000000	0.008256	0.000000	1.000000	MANILA BARANGAY 42
0.319369	0.113970	0.222606	0.119865	0.000000	0.005697	0.000000	0.000211	0.000317	0.212682	0.005284	1.000000	MANILA BARANGAY 43
0.100363	0.050332	0.124894	0.067251	0.267069	0.000363	0.000000	0.000000	0.000000	0.350453	0.039275	1.000000	MANILA BARANGAY 44
0.416231	0.220303	0.180258	0.089821	0.000000	0.000374	0.000000	0.000000	0.000000	0.081434	0.011580	1.000000	MANILA BARANGAY 45
0.282891	0.083310	0.300367	0.068095	0.006991	0.006326	0.000000	0.001409	0.000000	0.236631	0.013981	1.000000	MANILA BARANGAY 46
0.290970	0.144333	0.339711	0.182315	0.001447	0.001192	0.000000	0.000086	0.000129	0.037674	0.002144	1.000000	MANILA BARANGAY 47
0.303746	0.135952	0.243105	0.127043	0.000937	0.002716	0.000234	0.000375	0.000457	0.137439	0.047998	1.000000	MANILA BARANGAY 48
0.187490	0.094209	0.291220	0.145713	0.007914	0.000660	0.000660	0.000000	0.000000	0.253998	0.018137	1.000000	MANILA BARANGAY 49
0.413158	0.049229	0.246512	0.130767	0.010232	0.016363	0.000432	0.002309	0.002450	0.121631	0.006917	1.000000	MANILA BARANGAY 50
0.290257	0.121513	0.332319	0.142705	0.007715	0.003165	0.000198	0.000742	0.000000	0.097923	0.003462	1.000000	MANILA BARANGAY 51
0.040496	0.004260	0.871504	0.018109	0.002497	0.002606	0.000000	0.000643	0.000272	0.049938	0.009675	1.000000	MANILA BARANGAY 52
0.160457	0.075904	0.407468	0.164776	0.010366	0.000875	0.002591	0.000191	0.000286	0.168447	0.008638	1.000000	MANILA BARANGAY 53
0.460460	0.235251	0.111312	0.059937	0.003586	0.001240	0.000000	0.000000	0.000000	0.103706	0.024507	1.000000	MANILA BARANGAY 54
0.133487	0.063154	0.444397	0.158710	0.001784	0.000713	0.000000	0.000383	0.000285	0.179845	0.017241	1.000000	MANILA BARANGAY 55
0.288540	0.084270	0.221791	0.118595	0.000000	0.006951	0.000000	0.000279	0.000419	0.275115	0.004040	1.000000	MANILA BARANGAY 56
0.397242	0.209062	0.004098	0.002206	0.003152	0.000473	0.000788	0.000000	0.000000	0.303388	0.079590	1.000000	MANILA BARANGAY 57
0.199907	0.103483	0.302134	0.160948	0.002659	0.000311	0.000532	0.000290	0.000011	0.225339	0.004387	1.000000	MANILA BARANGAY 58
0.045374	0.001385	0.635403	0.120925	0.007125	0.002152	0.001781	0.000198	0.000104	0.185552	0.000000	1.000000	MANILA BARANGAY 59
0.108088	0.021693	0.205003	0.017854	0.001251	0.002421	0.000000	0.001929	0.000156	0.635214	0.006392	1.000000	MANILA BARANGAY 60
0.137843	0.053360	0.336705	0.169256	0.027457	0.001586	0.000000	0.001048	0.000708	0.258671	0.013367	1.000000	MANILA BARANGAY 61
0.392749	0.210281	0.237570	0.127922	0.000000	0.000124	0.000000	0.000049	0.000074	0.029685	0.001546	1.000000	MANILA BARANGAY 62
0.168360	0.081832	0.414814	0.223361	0.001533	0.000862	0.000383	0.000000	0.000000	0.108854	0.000000	1.000000	MANILA BARANGAY 63
0.236368	0.108741	0.375045	0.201947	0.000000	0.001812	0.000000	0.000000	0.000000	0.058877	0.017210	1.000000	MANILA BARANGAY 64
0.305557	0.146426	0.326279	0.175689	0.000000	0.001787	0.000000	0.000131	0.000197	0.041967	0.001967	1.000000	MANILA BARANGAY 65
0.370586	0.196316	0.235368	0.126737	0.001083	0.000316	0.000120	0.000000	0.000000	0.069474	0.000000	1.000000	MANILA BARANGAY 66
0.290776	0.111381	0.393457	0.054119	0.005776	0.004630	0.001444	0.000966	0.000989	0.127798	0.008664	1.000000	MANILA BARANGAY 67
0.298784	0.155207	0.294345	0.158493	0.000000	0.000555	0.000000	0.000000	0.000000	0.080666	0.011950	1.000000	MANILA BARANGAY 68
0.197019	0.078376	0.239551	0.114665	0.000000	0.002699	0.000000	0.000663	0.000670	0.365272	0.001084	1.000000	MANILA BARANGAY 69
0.429817	0.228999	0.046253	0.024906	0.002519	0.000252	0.000000	0.000101	0.000151	0.261965	0.005038	1.000000	MANILA BARANGAY 70
0.256827	0.117039	0.337976	0.181742	0.017552	0.002154	0.000000	0.000584	0.000875	0.067016	0.018236	1.000000	MANILA BARANGAY 71
0.388176	0.198319	0.164243	0.088439	0.001192	0.001013	0.000000	0.000048	0.000048	0.158522	0.000000	1.000000	MANILA BARANGAY 72
0.328614	0.168269	0.231466	0.124635	0.000000	0.000895	0.000000	0.000358	0.000537	0.145225	0.000000	1.000000	MANILA BARANGAY 73
0.434717	0.215946	0.175995	0.094767	0.018203	0.001274	0.004551	0.000728	0.000728	0.053091	0.000000	1.000000	MANILA BARANGAY 74

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.284793	0.152126	0.358451	0.141444	0.000000	0.000126	0.000000	0.000051	0.000076	0.062934	0.000000	1.000000	MANILA BARANGAY 75
0.481862	0.161248	0.206927	0.020864	0.028566	0.007754	0.000000	0.006853	0.000898	0.042942	0.042086	1.000000	MANILA BARANGAY 76
0.252490	0.114408	0.439442	0.147003	0.034578	0.002213	0.000000	0.000811	0.001217	0.004610	0.003227	1.000000	MANILA BARANGAY 77
0.099750	0.027764	0.178482	0.037758	0.000000	0.002514	0.000000	0.001056	0.001209	0.641474	0.009994	1.000000	MANILA BARANGAY 78
0.500730	0.266927	0.089958	0.044523	0.008346	0.000000	0.000000	0.000835	0.000000	0.064163	0.024517	1.000000	MANILA BARANGAY 79
0.386152	0.200652	0.188759	0.101640	0.003161	0.000711	0.000000	0.000000	0.000000	0.118925	0.000000	1.000000	MANILA BARANGAY 80
0.447997	0.093727	0.264694	0.142528	0.015287	0.014418	0.000000	0.000000	0.000000	0.020822	0.000527	1.000000	MANILA BARANGAY 81
0.077830	0.002908	0.839813	0.000582	0.037092	0.003011	0.000000	0.000270	0.000405	0.014829	0.023261	1.000000	MANILA BARANGAY 82
0.072322	0.005805	0.822287	0.034064	0.003455	0.000587	0.000000	0.003870	0.000249	0.044921	0.012440	1.000000	MANILA BARANGAY 83
0.040941	0.000968	0.758068	0.030194	0.000000	0.000622	0.000000	0.000553	0.000373	0.165975	0.002305	1.000000	MANILA BARANGAY 84
0.304435	0.144585	0.284266	0.139806	0.002765	0.001736	0.000691	0.000609	0.000138	0.120968	0.000000	1.000000	MANILA BARANGAY 85
0.182484	0.077245	0.432850	0.233073	0.000000	0.002054	0.000000	0.000000	0.000000	0.072293	0.000000	1.000000	MANILA BARANGAY 86
0.326332	0.175717	0.281926	0.150041	0.000000	0.000000	0.000000	0.000000	0.000000	0.065984	0.000000	1.000000	MANILA BARANGAY 87
0.249155	0.113314	0.399789	0.171302	0.029586	0.001479	0.000000	0.000761	0.000803	0.033812	0.000000	1.000000	MANILA BARANGAY 88
0.318041	0.131459	0.300548	0.151311	0.000000	0.003932	0.000000	0.000324	0.000486	0.093899	0.000000	1.000000	MANILA BARANGAY 89
0.260940	0.108228	0.314150	0.098671	0.015552	0.001718	0.000000	0.003689	0.001031	0.155335	0.040687	1.000000	MANILA BARANGAY 90
0.210137	0.108273	0.254833	0.115763	0.009555	0.000498	0.002140	0.000162	0.000243	0.292677	0.005719	1.000000	MANILA BARANGAY 91
0.252083	0.122297	0.339781	0.159032	0.000527	0.001332	0.000000	0.000295	0.000443	0.117089	0.007120	1.000000	MANILA BARANGAY 92
0.215762	0.108170	0.272761	0.147156	0.005301	0.000669	0.000618	0.000535	0.000185	0.244210	0.004632	1.000000	MANILA BARANGAY 93
0.133042	0.047972	0.727238	0.000734	0.018182	0.002343	0.000000	0.000224	0.000336	0.069930	0.000000	1.000000	MANILA BARANGAY 94
0.134935	0.063800	0.407424	0.212307	0.074298	0.000791	0.000237	0.000237	0.000000	0.093713	0.012258	1.000000	MANILA BARANGAY 95
0.238164	0.098989	0.422407	0.189344	0.006990	0.002824	0.000000	0.000431	0.000419	0.035896	0.004534	1.000000	MANILA BARANGAY 96
0.253000	0.125839	0.354960	0.188758	0.003135	0.001065	0.000784	0.000377	0.000566	0.071516	0.000000	1.000000	MANILA BARANGAY 97
0.011860	0.001936	0.902075	0.003873	0.036929	0.000726	0.001107	0.000000	0.000000	0.031812	0.009682	1.000000	MANILA BARANGAY 98
0.030308	0.016320	0.004600	0.002477	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.946295	1.000000	MANILA BARANGAY 99
0.367260	0.137354	0.237938	0.122246	0.015175	0.005614	0.001223	0.001840	0.001290	0.108671	0.001390	1.000000	MANILA BARANGAY 100
0.363721	0.173578	0.232366	0.121557	0.013790	0.001234	0.003448	0.001536	0.001391	0.079057	0.008322	1.000000	MANILA BARANGAY 102
0.417509	0.133474	0.230141	0.092599	0.001474	0.006945	0.000369	0.004135	0.003847	0.108432	0.001075	1.000000	MANILA BARANGAY 103
0.228181	0.118867	0.332943	0.166754	0.010438	0.000400	0.001676	0.000181	0.000103	0.138171	0.002286	1.000000	MANILA BARANGAY 104
0.176236	0.021623	0.417781	0.047375	0.022099	0.001237	0.000118	0.000734	0.000524	0.309037	0.003236	1.000000	MANILA BARANGAY 105
0.322354	0.151055	0.177745	0.095328	0.015298	0.001863	0.001517	0.000682	0.000396	0.231124	0.002638	1.000000	MANILA BARANGAY 106
0.185439	0.079511	0.250698	0.103165	0.047315	0.002034	0.002041	0.000530	0.000669	0.325644	0.002954	1.000000	MANILA BARANGAY 107
0.178745	0.067762	0.375931	0.170502	0.003219	0.002731	0.000000	0.000808	0.000718	0.199584	0.000000	1.000000	MANILA BARANGAY 108
0.376790	0.197385	0.248311	0.104975	0.056047	0.000778	0.000000	0.000300	0.000129	0.006704	0.008581	1.000000	MANILA BARANGAY 109
0.339681	0.120954	0.214384	0.092717	0.001856	0.005679	0.000000	0.001088	0.001295	0.222346	0.000000	1.000000	MANILA BARANGAY 110
0.356045	0.182170	0.245619	0.074799	0.008114	0.000454	0.002028	0.001083	0.000276	0.129412	0.000000	1.000000	MANILA BARANGAY 111
0.190438	0.102049	0.408255	0.205994	0.001507	0.000000	0.000377	0.000000	0.000000	0.091380	0.000000	1.000000	MANILA BARANGAY 112
0.312661	0.149293	0.284433	0.136324	0.002994	0.001554	0.000619	0.000841	0.000204	0.105399	0.005678	1.000000	MANILA BARANGAY 116

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.271013	0.123468	0.275308	0.110709	0.000779	0.001738	0.000000	0.001892	0.000594	0.208262	0.006235	1.000000	MANILA BARANGAY 117
0.441020	0.148059	0.265770	0.073836	0.004249	0.007339	0.000000	0.004133	0.000280	0.047901	0.007414	1.000000	MANILA BARANGAY 118
0.233963	0.078141	0.346475	0.187669	0.008946	0.003719	0.000000	0.003154	0.000264	0.136066	0.001602	1.000000	MANILA BARANGAY 119
0.225667	0.109804	0.360511	0.184008	0.003472	0.000948	0.000707	0.000694	0.000077	0.098682	0.015429	1.000000	MANILA BARANGAY 120
0.165091	0.075743	0.424594	0.216558	0.000650	0.001413	0.000000	0.000156	0.000000	0.112426	0.003368	1.000000	MANILA BARANGAY 121
0.076084	0.032236	0.556342	0.287999	0.015759	0.000389	0.002557	0.001279	0.000052	0.025920	0.001382	1.000000	MANILA BARANGAY 122
0.058221	0.016488	0.462796	0.189297	0.008611	0.001333	0.001581	0.000546	0.000208	0.258319	0.002600	1.000000	MANILA BARANGAY 123
0.239592	0.107262	0.302007	0.162619	0.006803	0.002126	0.000680	0.000000	0.000000	0.178912	0.000000	1.000000	MANILA BARANGAY 124
0.375835	0.201559	0.148696	0.080067	0.004836	0.000080	0.001209	0.000000	0.000000	0.183901	0.003818	1.000000	MANILA BARANGAY 125
0.323765	0.169987	0.267312	0.137158	0.047812	0.000425	0.003022	0.000000	0.000000	0.037299	0.013220	1.000000	MANILA BARANGAY 126
0.424012	0.228314	0.196085	0.103915	0.002713	0.000000	0.000000	0.000000	0.000000	0.006977	0.037984	1.000000	MANILA BARANGAY 127
0.207213	0.086975	0.436508	0.103802	0.081905	0.002443	0.000106	0.000970	0.001418	0.067549	0.011111	1.000000	MANILA BARANGAY 129
0.078307	0.037153	0.479804	0.258356	0.014807	0.000517	0.001524	0.000207	0.000310	0.117583	0.011432	1.000000	MANILA BARANGAY 130
0.202183	0.103373	0.490278	0.108929	0.008192	0.000567	0.000000	0.000227	0.000340	0.084495	0.001417	1.000000	MANILA BARANGAY 131
0.371195	0.154312	0.302614	0.121465	0.000533	0.004179	0.000133	0.002214	0.001728	0.040959	0.000666	1.000000	MANILA BARANGAY 132
0.254308	0.118426	0.257529	0.138300	0.018406	0.002154	0.001371	0.000231	0.000347	0.199530	0.009399	1.000000	MANILA BARANGAY 133
0.429217	0.219333	0.188033	0.093900	0.000000	0.000983	0.000000	0.000533	0.000000	0.068000	0.000000	1.000000	MANILA BARANGAY 134
0.340524	0.183359	0.177491	0.094466	0.000000	0.000000	0.000000	0.000000	0.000000	0.202876	0.001284	1.000000	MANILA BARANGAY 135
0.334538	0.178850	0.237162	0.127703	0.003017	0.000126	0.000754	0.000000	0.000000	0.117850	0.000000	1.000000	MANILA BARANGAY 136
0.219517	0.105351	0.393263	0.169565	0.000000	0.001266	0.000000	0.000076	0.000115	0.110846	0.000000	1.000000	MANILA BARANGAY 137
0.226139	0.113650	0.379533	0.202307	0.000000	0.000793	0.000000	0.000000	0.000000	0.077579	0.000000	1.000000	MANILA BARANGAY 138
0.430556	0.198045	0.192147	0.103464	0.002058	0.002346	0.000000	0.001399	0.001399	0.068587	0.000000	1.000000	MANILA BARANGAY 139
0.336926	0.178063	0.282330	0.152024	0.000000	0.000328	0.000000	0.000000	0.000000	0.028446	0.021882	1.000000	MANILA BARANGAY 140
0.008748	0.003223	0.709853	0.245009	0.000000	0.000000	0.000000	0.001860	0.000000	0.022099	0.009208	1.000000	MANILA BARANGAY 141
0.260370	0.128279	0.332490	0.176165	0.006158	0.001165	0.000000	0.000000	0.000000	0.095373	0.000000	1.000000	MANILA BARANGAY 142
0.017166	0.009243	0.624304	0.254311	0.000000	0.000000	0.000000	0.000757	0.000000	0.035689	0.058530	1.000000	MANILA BARANGAY 143
0.306650	0.165119	0.293193	0.157873	0.005458	0.000000	0.000000	0.000000	0.000000	0.057277	0.014429	1.000000	MANILA BARANGAY 144
0.020403	0.006442	0.618310	0.308066	0.018337	0.000469	0.004584	0.000188	0.000281	0.000000	0.022921	1.000000	MANILA BARANGAY 145
0.259934	0.138991	0.206638	0.098677	0.005103	0.000035	0.000992	0.000189	0.000000	0.288259	0.001181	1.000000	MANILA BARANGAY 146
0.109285	0.025974	0.596340	0.195463	0.026931	0.003828	0.003291	0.002844	0.000786	0.027199	0.008059	1.000000	MANILA BARANGAY 147
0.045356	0.010313	0.590239	0.263981	0.013944	0.001105	0.000000	0.000403	0.000205	0.068140	0.006314	1.000000	MANILA BARANGAY 148
0.137429	0.030650	0.497552	0.222787	0.056999	0.008945	0.014250	0.000000	0.000000	0.031387	0.000000	1.000000	MANILA BARANGAY 149
0.316362	0.141480	0.286851	0.152792	0.000000	0.001817	0.000000	0.003182	0.000000	0.096489	0.001026	1.000000	MANILA BARANGAY 150
0.517677	0.278749	0.079660	0.041702	0.002791	0.000000	0.000102	0.000000	0.000000	0.077447	0.001872	1.000000	MANILA BARANGAY 151
0.117744	0.053339	0.355212	0.158846	0.003596	0.000621	0.000471	0.000295	0.000372	0.306079	0.003425	1.000000	MANILA BARANGAY 152
0.289872	0.138458	0.190688	0.102678	0.004133	0.001781	0.000000	0.000440	0.000661	0.254160	0.017129	1.000000	MANILA BARANGAY 153
0.327939	0.169033	0.311170	0.166183	0.008753	0.000738	0.000000	0.000000	0.000000	0.016183	0.000000	1.000000	MANILA BARANGAY 154
0.041828	0.020824	0.171930	0.090087	0.029712	0.000000	0.003809	0.000381	0.000000	0.638346	0.003084	1.000000	MANILA BARANGAY 155

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.179574	0.065789	0.293630	0.158459	0.008772	0.002444	0.000000	0.002356	0.000338	0.285297	0.003342	1.000000	MANILA BARANGAY 156
0.430033	0.071596	0.167459	0.085961	0.024365	0.015635	0.002997	0.000000	0.000000	0.200000	0.001954	1.000000	MANILA BARANGAY 157
0.187238	0.097793	0.220567	0.118767	0.000000	0.000296	0.000000	0.000000	0.000000	0.375339	0.000000	1.000000	MANILA BARANGAY 158
0.231449	0.084707	0.145168	0.073892	0.007979	0.003125	0.000887	0.001995	0.000000	0.445479	0.005319	1.000000	MANILA BARANGAY 159
0.050648	0.022159	0.416953	0.178738	0.000000	0.000076	0.000000	0.000000	0.000000	0.323417	0.008009	1.000000	MANILA BARANGAY 160
0.045516	0.010228	0.750300	0.002102	0.000000	0.000717	0.000000	0.001994	0.000592	0.188551	0.000000	1.000000	MANILA BARANGAY 161
0.027390	0.000000	0.733285	0.094105	0.000000	0.000000	0.000000	0.000000	0.000000	0.133717	0.011503	1.000000	MANILA BARANGAY 162
0.168017	0.054145	0.514671	0.031303	0.002556	0.000684	0.000639	0.002981	0.000192	0.224248	0.000564	1.000000	MANILA BARANGAY 163
0.224704	0.109813	0.320856	0.168306	0.000729	0.000956	0.000182	0.000383	0.000574	0.173497	0.000000	1.000000	MANILA BARANGAY 164
0.184943	0.085673	0.277844	0.149609	0.008664	0.000574	0.000731	0.001148	0.001148	0.288100	0.001566	1.000000	MANILA BARANGAY 165
0.322683	0.147882	0.245084	0.127547	0.000000	0.002001	0.000000	0.001526	0.000655	0.152622	0.000000	1.000000	MANILA BARANGAY 166
0.329169	0.110685	0.339950	0.183050	0.000000	0.006529	0.000000	0.000172	0.000259	0.030187	0.000000	1.000000	MANILA BARANGAY 167
0.224947	0.108883	0.398876	0.211722	0.028815	0.001207	0.005962	0.000076	0.000114	0.019399	0.000000	1.000000	MANILA BARANGAY 168
0.188992	0.101765	0.445845	0.235450	0.000000	0.000000	0.000000	0.000000	0.000000	0.027948	0.000000	1.000000	MANILA BARANGAY 169
0.324260	0.161165	0.273567	0.143069	0.000000	0.001386	0.000000	0.000555	0.000832	0.095167	0.000000	1.000000	MANILA BARANGAY 170
0.232931	0.107335	0.378319	0.203710	0.000000	0.001821	0.000000	0.000402	0.000602	0.074881	0.000000	1.000000	MANILA BARANGAY 171
0.289994	0.149686	0.253859	0.138079	0.089022	0.000000	0.000000	0.002001	0.000000	0.070497	0.006861	1.000000	MANILA BARANGAY 172
0.315772	0.158230	0.274102	0.147593	0.000000	0.001154	0.000000	0.000000	0.000000	0.078971	0.024179	1.000000	MANILA BARANGAY 173
0.282235	0.141172	0.285934	0.154563	0.000000	0.000783	0.000000	0.000864	0.000000	0.130130	0.004320	1.000000	MANILA BARANGAY 174
0.202391	0.081116	0.374218	0.201502	0.000000	0.002759	0.000000	0.000270	0.000405	0.130901	0.006438	1.000000	MANILA BARANGAY 175
0.172321	0.068940	0.433007	0.208163	0.002624	0.002331	0.000000	0.000000	0.000000	0.112614	0.000000	1.000000	MANILA BARANGAY 176
0.076765	0.014536	0.435048	0.018639	0.001154	0.002778	0.000000	0.001186	0.001578	0.440932	0.007383	1.000000	MANILA BARANGAY 177
0.332322	0.177869	0.059903	0.032255	0.015773	0.000111	0.002393	0.000044	0.000066	0.379265	0.000000	1.000000	MANILA BARANGAY 178
0.505838	0.240196	0.194608	0.006506	0.012923	0.003231	0.000000	0.001337	0.001939	0.033422	0.000000	1.000000	MANILA BARANGAY 179
0.144019	0.036130	0.718077	0.008708	0.000795	0.003762	0.000000	0.001632	0.002257	0.081438	0.003181	1.000000	MANILA BARANGAY 180
0.127791	0.061312	0.655716	0.071600	0.008195	0.000431	0.001603	0.000125	0.000187	0.073040	0.000000	1.000000	MANILA BARANGAY 181
0.116734	0.047950	0.474197	0.149900	0.007286	0.000949	0.000000	0.001441	0.000353	0.183530	0.017662	1.000000	MANILA BARANGAY 182
0.303678	0.155653	0.329915	0.155271	0.000000	0.000492	0.000000	0.000990	0.000119	0.047717	0.006166	1.000000	MANILA BARANGAY 183
0.147728	0.016449	0.760666	0.011008	0.000000	0.002272	0.000000	0.000781	0.000000	0.057702	0.003394	1.000000	MANILA BARANGAY 184
0.248176	0.103929	0.326988	0.133372	0.027553	0.002565	0.002212	0.001494	0.000416	0.140118	0.013176	1.000000	MANILA BARANGAY 185
0.256549	0.132666	0.402581	0.076695	0.019183	0.000000	0.002773	0.001695	0.000000	0.095532	0.012327	1.000000	MANILA BARANGAY 186
0.233646	0.113332	0.331360	0.121392	0.020825	0.001245	0.000000	0.000282	0.000294	0.177624	0.000000	1.000000	MANILA BARANGAY 187
0.257442	0.136047	0.358870	0.119535	0.013953	0.000266	0.000000	0.000106	0.000159	0.113621	0.000000	1.000000	MANILA BARANGAY 188
0.215935	0.115159	0.367844	0.193741	0.009905	0.000115	0.000000	0.000046	0.000069	0.097186	0.000000	1.000000	MANILA BARANGAY 189
0.094622	0.050950	0.533672	0.286199	0.000000	0.000000	0.000000	0.000000	0.000000	0.034557	0.000000	1.000000	MANILA BARANGAY 190
0.114280	0.052360	0.270640	0.132320	0.028000	0.000000	0.000000	0.001600	0.000000	0.400800	0.000000	1.000000	MANILA BARANGAY 191
0.175867	0.094698	0.383387	0.202097	0.000000	0.000000	0.000000	0.000000	0.000000	0.128629	0.015323	1.000000	MANILA BARANGAY 192
0.451404	0.241067	0.042416	0.020955	0.000000	0.000000	0.000000	0.000337	0.000000	0.211236	0.032584	1.000000	MANILA BARANGAY 193

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.306159	0.164855	0.220435	0.108551	0.003478	0.000000	0.000870	0.000000	0.000000	0.189855	0.005797	1.000000	MANILA BARANGAY 194
0.103566	0.055766	0.177693	0.081791	0.003642	0.000000	0.000910	0.000000	0.000000	0.570561	0.006070	1.000000	MANILA BARANGAY 195
0.085732	0.004686	0.617950	0.217029	0.004686	0.004979	0.001172	0.000736	0.001105	0.051883	0.010042	1.000000	MANILA BARANGAY 196
0.039008	0.009822	0.574930	0.277343	0.011974	0.001123	0.002993	0.000748	0.000674	0.081384	0.000000	1.000000	MANILA BARANGAY 197
0.292893	0.135671	0.406503	0.082769	0.007941	0.002020	0.000713	0.000812	0.000305	0.061339	0.009035	1.000000	MANILA BARANGAY 198
0.174340	0.090744	0.289551	0.106208	0.023652	0.000295	0.000169	0.000202	0.000177	0.314663	0.000000	1.000000	MANILA BARANGAY 199
0.174551	0.092860	0.403013	0.208206	0.039015	0.000150	0.000266	0.000020	0.000030	0.063915	0.017976	1.000000	MANILA BARANGAY 200
0.543567	0.292690	0.082762	0.044564	0.005316	0.000000	0.001329	0.000000	0.000000	0.029771	0.000000	1.000000	MANILA BARANGAY 201
0.218263	0.057977	0.444442	0.211300	0.015881	0.006084	0.000000	0.005783	0.002646	0.034693	0.002932	1.000000	MANILA BARANGAY 202
0.326848	0.011996	0.325370	0.029530	0.013978	0.014852	0.002823	0.006485	0.008038	0.260081	0.000000	1.000000	MANILA BARANGAY 202-A
0.190127	0.070900	0.587937	0.038701	0.038181	0.002886	0.000619	0.000928	0.001164	0.064985	0.003571	1.000000	MANILA BARANGAY 203
0.290529	0.112446	0.433690	0.105744	0.000000	0.004433	0.000000	0.001188	0.001773	0.042432	0.007767	1.000000	MANILA BARANGAY 204
0.351045	0.184352	0.141639	0.076267	0.012779	0.000473	0.003195	0.000126	0.000189	0.229935	0.000000	1.000000	MANILA BARANGAY 205
0.156551	0.056551	0.478121	0.112159	0.009265	0.001772	0.000000	0.003056	0.000634	0.173114	0.008778	1.000000	MANILA BARANGAY 206
0.197078	0.083105	0.438356	0.112356	0.001826	0.000000	0.000000	0.000155	0.000000	0.162557	0.004566	1.000000	MANILA BARANGAY 207
0.277984	0.138739	0.168356	0.090653	0.000000	0.001070	0.000000	0.000000	0.000000	0.323198	0.000000	1.000000	MANILA BARANGAY 208
0.248615	0.083947	0.415019	0.108953	0.023150	0.003416	0.000000	0.001520	0.000581	0.112144	0.002657	1.000000	MANILA BARANGAY 209
0.292226	0.155627	0.234453	0.090902	0.000000	0.000169	0.000000	0.000006	0.000000	0.222018	0.004600	1.000000	MANILA BARANGAY 210
0.013583	0.006944	0.582526	0.312514	0.014651	0.000000	0.003663	0.000114	0.000000	0.064098	0.001908	1.000000	MANILA BARANGAY 211
0.433510	0.203308	0.201125	0.059120	0.000992	0.001902	0.000000	0.000946	0.000850	0.097585	0.000662	1.000000	MANILA BARANGAY 212
0.448723	0.223561	0.192680	0.057637	0.004971	0.001975	0.000136	0.000095	0.000082	0.069459	0.000681	1.000000	MANILA BARANGAY 213
0.387964	0.208365	0.134647	0.065853	0.000000	0.000000	0.000000	0.000000	0.000000	0.196913	0.006258	1.000000	MANILA BARANGAY 214
0.143593	0.070867	0.410411	0.204715	0.003143	0.000592	0.000000	0.000459	0.000355	0.157729	0.008136	1.000000	MANILA BARANGAY 215
0.075303	0.022932	0.774807	0.092219	0.011824	0.001952	0.001853	0.000907	0.000774	0.012354	0.005074	1.000000	MANILA BARANGAY 216
0.085901	0.031070	0.737903	0.023455	0.051349	0.001218	0.000870	0.000487	0.000731	0.056571	0.010444	1.000000	MANILA BARANGAY 217
0.059038	0.028266	0.494607	0.238076	0.020867	0.000325	0.000000	0.000114	0.000171	0.158537	0.000000	1.000000	MANILA BARANGAY 218
0.555151	0.250448	0.088886	0.042133	0.000000	0.006271	0.000000	0.000000	0.000000	0.057111	0.000000	1.000000	MANILA BARANGAY 219
0.263210	0.085001	0.283949	0.108725	0.057225	0.005682	0.002423	0.001113	0.001670	0.191001	0.000000	1.000000	MANILA BARANGAY 220
0.280937	0.150779	0.218667	0.117850	0.055260	0.000000	0.000000	0.000153	0.000000	0.152605	0.023749	1.000000	MANILA BARANGAY 221
0.523949	0.274459	0.033150	0.017850	0.001224	0.000694	0.000000	0.000082	0.000082	0.123215	0.025296	1.000000	MANILA BARANGAY 222
0.261615	0.082209	0.166574	0.089694	0.000000	0.005734	0.000000	0.000000	0.000000	0.389012	0.005162	1.000000	MANILA BARANGAY 223
0.489763	0.051637	0.063077	0.033964	0.001183	0.020730	0.000000	0.000000	0.000000	0.323471	0.016174	1.000000	MANILA BARANGAY 224
0.264535	0.138173	0.252936	0.094437	0.000000	0.000000	0.000000	0.000000	0.000000	0.248613	0.001305	1.000000	MANILA BARANGAY 225
0.229342	0.117814	0.256375	0.099753	0.004707	0.000536	0.000953	0.000167	0.000214	0.273756	0.016384	1.000000	MANILA BARANGAY 226
0.232930	0.090754	0.342745	0.126214	0.006259	0.003363	0.000853	0.000173	0.000000	0.186954	0.009754	1.000000	MANILA BARANGAY 227
0.004288	0.000000	0.296453	0.054923	0.001059	0.000132	0.000000	0.001456	0.000079	0.635786	0.005823	1.000000	MANILA BARANGAY 228
0.510349	0.261559	0.034834	0.015211	0.000000	0.001210	0.000000	0.000484	0.000726	0.172043	0.003584	1.000000	MANILA BARANGAY 229
0.315495	0.158271	0.196050	0.105565	0.006373	0.001135	0.001048	0.000000	0.000000	0.195111	0.020952	1.000000	MANILA BARANGAY 230

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.187718	0.093997	0.358396	0.192964	0.003596	0.000653	0.000464	0.000310	0.000070	0.151682	0.010151	1.000000	MANILA BARANGAY 231
0.227923	0.110042	0.265342	0.141917	0.000445	0.001247	0.000000	0.000053	0.000080	0.244044	0.008907	1.000000	MANILA BARANGAY 232
0.104499	0.050512	0.530022	0.280134	0.005702	0.000356	0.001425	0.000855	0.000214	0.026281	0.000000	1.000000	MANILA BARANGAY 233
0.332972	0.179292	0.200825	0.108137	0.000943	0.000000	0.000000	0.000000	0.000000	0.177830	0.000000	1.000000	MANILA BARANGAY 234
0.356452	0.189119	0.204321	0.110019	0.002873	0.000275	0.000718	0.000000	0.000000	0.136222	0.000000	1.000000	MANILA BARANGAY 235
0.340593	0.183396	0.096023	0.051705	0.003788	0.000000	0.000000	0.000000	0.000000	0.273990	0.050505	1.000000	MANILA BARANGAY 236
0.356108	0.191751	0.121159	0.065239	0.003023	0.000000	0.000756	0.000000	0.000000	0.259446	0.002519	1.000000	MANILA BARANGAY 237
0.341434	0.095173	0.318831	0.123725	0.000000	0.008668	0.000000	0.000000	0.000000	0.112169	0.000000	1.000000	MANILA BARANGAY 238
0.328702	0.167322	0.258470	0.124985	0.001523	0.000899	0.000000	0.000195	0.000293	0.104205	0.013406	1.000000	MANILA BARANGAY 239
0.742350	0.109016	0.049727	0.026776	0.000000	0.028415	0.000000	0.000000	0.000000	0.043716	0.000000	1.000000	MANILA BARANGAY 240
0.221942	0.119507	0.348486	0.184768	0.002375	0.000000	0.000594	0.000000	0.000000	0.111639	0.010689	1.000000	MANILA BARANGAY 241
0.525431	0.282925	0.124569	0.067075	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 242
0.152589	0.082163	0.447021	0.238794	0.000000	0.000000	0.000000	0.000000	0.000000	0.079433	0.000000	1.000000	MANILA BARANGAY 243
0.222512	0.119814	0.309023	0.166397	0.000000	0.000000	0.000000	0.000000	0.000000	0.182254	0.000000	1.000000	MANILA BARANGAY 244
0.253069	0.136268	0.212843	0.109806	0.000000	0.000000	0.000000	0.000452	0.000000	0.287561	0.000000	1.000000	MANILA BARANGAY 245
0.727294	0.033951	0.092885	0.049645	0.000549	0.035003	0.000137	0.000329	0.000494	0.050103	0.009609	1.000000	MANILA BARANGAY 246
0.296382	0.017654	0.484430	0.118202	0.000000	0.010088	0.000000	0.012982	0.001053	0.059211	0.000000	1.000000	MANILA BARANGAY 247
0.152847	0.082302	0.384530	0.207054	0.000000	0.000000	0.000000	0.000000	0.000000	0.173267	0.000000	1.000000	MANILA BARANGAY 248
0.289454	0.104653	0.302016	0.162624	0.027667	0.004169	0.000248	0.001489	0.001600	0.106079	0.000000	1.000000	MANILA BARANGAY 249
0.304828	0.131524	0.181837	0.096086	0.009186	0.003158	0.000209	0.000084	0.000125	0.260960	0.012004	1.000000	MANILA BARANGAY 250
0.284036	0.134250	0.314750	0.171607	0.000000	0.000857	0.000000	0.003071	0.000000	0.091429	0.000000	1.000000	MANILA BARANGAY 251
0.335238	0.158667	0.000000	0.000000	0.000000	0.001562	0.000000	0.000838	0.000838	0.396190	0.106667	1.000000	MANILA BARANGAY 252
0.270124	0.141683	0.305094	0.133357	0.000000	0.000251	0.000000	0.000094	0.000100	0.143955	0.005344	1.000000	MANILA BARANGAY 253
0.110418	0.058652	0.254625	0.135231	0.002984	0.000000	0.000497	0.000000	0.000000	0.436101	0.001492	1.000000	MANILA BARANGAY 254
0.233539	0.121490	0.243474	0.131102	0.003703	0.000417	0.000000	0.000000	0.000000	0.266276	0.000000	1.000000	MANILA BARANGAY 255
0.221825	0.119444	0.294563	0.158440	0.020794	0.000000	0.000952	0.000171	0.000000	0.182222	0.001587	1.000000	MANILA BARANGAY 256
0.344499	0.113805	0.200420	0.107919	0.088297	0.007008	0.002803	0.000000	0.000000	0.135249	0.000000	1.000000	MANILA BARANGAY 257
0.210870	0.070861	0.224089	0.114480	0.023715	0.004172	0.000000	0.000035	0.000000	0.351779	0.000000	1.000000	MANILA BARANGAY 258
0.335270	0.009627	0.282012	0.082085	0.022258	0.016305	0.000000	0.000000	0.000000	0.249186	0.003257	1.000000	MANILA BARANGAY 259
0.795655	0.058877	0.013092	0.007050	0.000000	0.036255	0.000000	0.001015	0.001522	0.071429	0.015106	1.000000	MANILA BARANGAY 260
0.697487	0.024119	0.054223	0.029197	0.000000	0.034352	0.000000	0.000000	0.000000	0.160622	0.000000	1.000000	MANILA BARANGAY 261
0.331695	0.000000	0.202301	0.086402	0.000941	0.017678	0.000000	0.000000	0.000000	0.355230	0.005753	1.000000	MANILA BARANGAY 262
0.812783	0.009206	0.064190	0.034564	0.000831	0.041878	0.000000	0.000000	0.000000	0.026857	0.009691	1.000000	MANILA BARANGAY 263
0.428249	0.038843	0.109728	0.059085	0.001264	0.018743	0.000000	0.000000	0.000000	0.344088	0.000000	1.000000	MANILA BARANGAY 264
0.117649	0.056374	0.470014	0.253084	0.101439	0.000720	0.000000	0.000288	0.000432	0.000000	0.000000	1.000000	MANILA BARANGAY 265
0.509738	0.274474	0.125930	0.043683	0.046175	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	MANILA BARANGAY 266
0.012171	0.002357	0.590860	0.316774	0.000000	0.000433	0.000000	0.000173	0.000260	0.074407	0.002566	1.000000	MANILA BARANGAY 267
0.387692	0.193908	0.192006	0.062299	0.071700	0.001402	0.013124	0.000457	0.000418	0.074285	0.002709	1.000000	MARIKINA BARANGKA

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.396533	0.202994	0.227859	0.068019	0.011745	0.001126	0.001252	0.000174	0.000184	0.082847	0.007267	1.000000	MARIKINA CALUMPANG
0.366758	0.179800	0.295361	0.071868	0.014530	0.001568	0.000619	0.000772	0.000523	0.063802	0.004398	1.000000	MARIKINA MALANDAY
0.367627	0.193008	0.269365	0.064849	0.017417	0.000554	0.001184	0.000103	0.000078	0.076730	0.009083	1.000000	MARIKINA NANGKA
0.407758	0.214382	0.205077	0.104585	0.014900	0.000512	0.000890	0.000125	0.000135	0.041769	0.009867	1.000000	MARIKINA SAN ROQUE
0.376437	0.200063	0.222939	0.087610	0.040439	0.000235	0.001469	0.000107	0.000138	0.060653	0.009910	1.000000	MARIKINA SANTA ELENA (POB.)
0.625233	0.325677	0.009235	0.002615	0.022501	0.001045	0.000098	0.000178	0.000101	0.008440	0.004877	1.000000	MARIKINA CONCEPCION DOS
0.388941	0.083843	0.332081	0.082950	0.006975	0.011783	0.000820	0.007571	0.006006	0.064917	0.014114	1.000000	MARIKINA INDUSTRIAL VALLEY
0.362439	0.168578	0.182129	0.052017	0.021438	0.002801	0.000831	0.000837	0.000757	0.153133	0.055040	1.000000	MUNTINLUPA ALABANG
0.247989	0.123500	0.335571	0.105046	0.013036	0.000927	0.000436	0.000491	0.000254	0.162013	0.010737	1.000000	MUNTINLUPA BAYANAN
0.208998	0.107695	0.357817	0.138314	0.031416	0.000736	0.005826	0.000120	0.000111	0.130113	0.018854	1.000000	MUNTINLUPA BULI
0.410537	0.180957	0.166195	0.052816	0.019419	0.003822	0.000440	0.001118	0.000858	0.148845	0.014994	1.000000	MUNTINLUPA CUPANG
0.288635	0.138858	0.351732	0.090585	0.034623	0.001508	0.000692	0.000991	0.000577	0.076754	0.015045	1.000000	MUNTINLUPA POBLACION
0.482725	0.247795	0.107405	0.030810	0.030880	0.001138	0.000826	0.000278	0.000252	0.087921	0.009969	1.000000	MUNTINLUPA PUTATAN
0.385216	0.187819	0.199408	0.064703	0.034406	0.001776	0.001662	0.001157	0.000381	0.108018	0.015454	1.000000	MUNTINLUPA SUCAT
0.495731	0.220185	0.159791	0.026828	0.019173	0.004406	0.000777	0.001950	0.001843	0.057470	0.011845	1.000000	MUNTINLUPA TUNASAN
0.690912	0.231082	0.017604	0.005475	0.027198	0.013607	0.004305	0.001395	0.000933	0.000000	0.007488	1.000000	MUNTINLUPA NEW ALABANG VILLAGE
0.197529	0.078607	0.363654	0.102939	0.045305	0.001957	0.004938	0.001610	0.000284	0.164468	0.038707	1.000000	NAVOTAS SIPAC-ALMACEN
0.249862	0.128918	0.176586	0.087280	0.012177	0.000470	0.000593	0.000055	0.000065	0.253448	0.090546	1.000000	NAVOTAS BAGUMBAYAN NORTH
0.239375	0.126283	0.151591	0.077890	0.031547	0.000259	0.000550	0.000126	0.000133	0.347568	0.024678	1.000000	NAVOTAS BAGUMBAYAN SOUTH
0.231293	0.117025	0.285227	0.112891	0.011713	0.001320	0.000326	0.000237	0.000344	0.216346	0.023278	1.000000	NAVOTAS BANGCULASI
0.228230	0.097321	0.347288	0.078272	0.010648	0.001670	0.000804	0.000832	0.000194	0.192001	0.042741	1.000000	NAVOTAS DAANGHARI
0.308016	0.154105	0.256081	0.137884	0.000865	0.000988	0.000000	0.000329	0.000329	0.136064	0.005338	1.000000	NAVOTAS NAVOTAS EAST
0.255654	0.133138	0.152977	0.080782	0.001365	0.000681	0.000131	0.000071	0.000050	0.362584	0.012567	1.000000	NAVOTAS NAVOTAS WEST
0.197910	0.073630	0.396554	0.093371	0.014559	0.002473	0.000475	0.000823	0.000376	0.188233	0.031598	1.000000	NAVOTAS SAN JOSE (POB.)
0.335232	0.196313	0.193741	0.103092	0.004621	0.001520	0.000238	0.000524	0.000610	0.080981	0.083128	1.000000	NAVOTAS SAN RAFAEL VILLAGE
0.276928	0.125657	0.304295	0.067753	0.014188	0.001923	0.000606	0.000802	0.000750	0.195451	0.011646	1.000000	NAVOTAS SAN ROQUE
0.169801	0.076470	0.283924	0.106079	0.011779	0.001086	0.001010	0.000349	0.000181	0.338637	0.010685	1.000000	NAVOTAS TANGOS
0.169489	0.135447	0.288691	0.036802	0.009060	0.002539	0.000079	0.000874	0.000455	0.197143	0.159421	1.000000	NAVOTAS TANZA
0.182152	0.065817	0.403875	0.136866	0.023360	0.002440	0.001156	0.002318	0.000631	0.145305	0.036079	1.000000	PARAÑAQUE BACLRAN
0.209031	0.098714	0.398099	0.140675	0.014755	0.000925	0.000203	0.001253	0.000336	0.129610	0.006398	1.000000	PARAÑAQUE DON GALO
0.198957	0.105860	0.336096	0.118922	0.110592	0.000066	0.000114	0.000132	0.000046	0.113350	0.015866	1.000000	PARAÑAQUE LA HUERTA
0.187263	0.085976	0.440134	0.116860	0.016113	0.000658	0.000849	0.000480	0.000257	0.138990	0.012420	1.000000	PARAÑAQUE SAN DIONISIO
0.357343	0.155725	0.196027	0.060862	0.039897	0.003534	0.007487	0.001235	0.000407	0.171744	0.005738	1.000000	PARAÑAQUE TAMBO
0.568890	0.252585	0.094394	0.027765	0.013568	0.005094	0.000165	0.000701	0.000395	0.029609	0.006834	1.000000	PARAÑAQUE B. F. HOMES
0.565891	0.293371	0.059412	0.007356	0.028377	0.001063	0.000100	0.000231	0.000160	0.038165	0.005874	1.000000	PARAÑAQUE DON BOSCO
0.557873	0.289781	0.075944	0.020593	0.014905	0.000886	0.000393	0.000230	0.000168	0.033694	0.005534	1.000000	PARAÑAQUE MARCELO GREEN VILLAGE
0.530838	0.275596	0.043528	0.020030	0.029589	0.000917	0.001186	0.000314	0.000097	0.079470	0.018435	1.000000	PARAÑAQUE MERVILLE
0.496608	0.232902	0.106380	0.028767	0.021810	0.003365	0.000917	0.000742	0.000178	0.102724	0.005608	1.000000	PARAÑAQUE MOONWALK

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.525457	0.279293	0.040873	0.018543	0.014295	0.000370	0.000660	0.000139	0.000195	0.104759	0.015415	1.000000	PARADAQUE SAN ANTONIO
0.502941	0.265433	0.089707	0.038391	0.012600	0.000491	0.000940	0.000223	0.000102	0.076547	0.012624	1.000000	PARADAQUE SAN MARTIN DE PORRES
0.426966	0.191565	0.162039	0.047429	0.024828	0.003581	0.000764	0.000725	0.000441	0.130347	0.011314	1.000000	PARADAQUE SUN VALLEY
0.463475	0.182979	0.227296	0.017617	0.012059	0.005881	0.000771	0.002043	0.001150	0.075275	0.011454	1.000000	PARADAQUE VITALEZ
0.188433	0.092453	0.366120	0.163659	0.000000	0.000328	0.000000	0.000131	0.000197	0.176374	0.012305	1.000000	PASAY BARANGAY 1
0.099082	0.053352	0.383360	0.206425	0.005587	0.000000	0.000000	0.000000	0.000000	0.249002	0.003192	1.000000	PASAY BARANGAY 2
0.128728	0.069315	0.222769	0.117473	0.013817	0.000000	0.000000	0.000000	0.000000	0.447899	0.000000	1.000000	PASAY BARANGAY 3
0.217217	0.116963	0.287606	0.154865	0.036210	0.000000	0.000169	0.000000	0.000000	0.181049	0.005922	1.000000	PASAY BARANGAY 4
0.631440	0.340006	0.008661	0.004664	0.000000	0.000000	0.000000	0.000000	0.000000	0.015228	0.000000	1.000000	PASAY BARANGAY 5
0.638656	0.343892	0.011344	0.006108	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	PASAY BARANGAY 6
0.083830	0.045139	0.431983	0.223882	0.013480	0.000000	0.000000	0.000000	0.000000	0.201685	0.000000	1.000000	PASAY BARANGAY 7
0.143883	0.065993	0.473943	0.255200	0.000000	0.001122	0.000000	0.000000	0.000000	0.059858	0.000000	1.000000	PASAY BARANGAY 8
0.311345	0.088554	0.368072	0.198193	0.017068	0.007731	0.000000	0.000000	0.000000	0.009036	0.000000	1.000000	PASAY BARANGAY 9
0.318906	0.125174	0.281463	0.151557	0.005244	0.004568	0.001311	0.000139	0.000209	0.111430	0.000000	1.000000	PASAY BARANGAY 10
0.350692	0.186002	0.210558	0.089957	0.000000	0.000277	0.000000	0.000000	0.000000	0.153025	0.009490	1.000000	PASAY BARANGAY 11
0.253642	0.129590	0.262564	0.141381	0.026586	0.000683	0.000121	0.000000	0.000000	0.173293	0.012140	1.000000	PASAY BARANGAY 12
0.338967	0.176536	0.243029	0.092363	0.000000	0.000585	0.000000	0.000000	0.000000	0.132922	0.015600	1.000000	PASAY BARANGAY 13
0.364232	0.193517	0.179853	0.093769	0.013413	0.000196	0.000186	0.000186	0.000028	0.153502	0.001118	1.000000	PASAY BARANGAY 14
0.424609	0.214516	0.153259	0.082524	0.014633	0.001380	0.000000	0.000000	0.000000	0.103093	0.005986	1.000000	PASAY BARANGAY 15
0.272840	0.146914	0.112346	0.060494	0.195679	0.000000	0.017284	0.000000	0.000000	0.157407	0.037037	1.000000	PASAY BARANGAY 16
0.573902	0.309024	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.117073	0.000000	1.000000	PASAY BARANGAY 17
0.206220	0.108020	0.267231	0.122128	0.023822	0.000212	0.005294	0.000265	0.000000	0.266808	0.000000	1.000000	PASAY BARANGAY 18
0.179872	0.082425	0.430104	0.229408	0.003480	0.001392	0.000000	0.000557	0.000835	0.064965	0.006961	1.000000	PASAY BARANGAY 19
0.413445	0.209172	0.195726	0.105391	0.009204	0.001315	0.000000	0.000000	0.000000	0.034188	0.031558	1.000000	PASAY BARANGAY 20
0.248176	0.133633	0.332309	0.178936	0.017491	0.000000	0.000000	0.000000	0.000000	0.089455	0.000000	1.000000	PASAY BARANGAY 21
0.197205	0.005652	0.209627	0.036211	0.124720	0.009752	0.030559	0.000696	0.000484	0.371429	0.013665	1.000000	PASAY BARANGAY 22
0.363782	0.184959	0.261382	0.134282	0.009292	0.001103	0.000000	0.000271	0.000407	0.042973	0.001549	1.000000	PASAY BARANGAY 23
0.316031	0.170170	0.320252	0.172443	0.000000	0.000000	0.000000	0.000000	0.000000	0.021104	0.000000	1.000000	PASAY BARANGAY 24
0.611419	0.329225	0.025503	0.013451	0.000000	0.000000	0.000000	0.000282	0.000000	0.008048	0.012072	1.000000	PASAY BARANGAY 25
0.228031	0.117841	0.260652	0.113894	0.000000	0.000483	0.000000	0.000000	0.000000	0.271849	0.007249	1.000000	PASAY BARANGAY 26
0.355020	0.191165	0.169679	0.091365	0.046854	0.000000	0.000000	0.000000	0.000000	0.141901	0.004016	1.000000	PASAY BARANGAY 27
0.384447	0.197681	0.216780	0.117735	0.015189	0.000477	0.000728	0.001646	0.000286	0.065030	0.000000	1.000000	PASAY BARANGAY 28
0.368012	0.198160	0.180100	0.095239	0.001614	0.000000	0.000000	0.000000	0.000000	0.156875	0.000000	1.000000	PASAY BARANGAY 29
0.050499	0.027192	0.477913	0.250166	0.000000	0.000000	0.000000	0.000000	0.000000	0.194229	0.000000	1.000000	PASAY BARANGAY 30
0.014912	0.005158	0.620772	0.261277	0.014737	0.000281	0.000000	0.000056	0.000000	0.082807	0.000000	1.000000	PASAY BARANGAY 31
0.101026	0.050280	0.455379	0.237469	0.064801	0.000373	0.002985	0.000000	0.000000	0.087687	0.000000	1.000000	PASAY BARANGAY 32
0.389450	0.209704	0.213827	0.082579	0.000000	0.000000	0.000000	0.000000	0.000000	0.104440	0.000000	1.000000	PASAY BARANGAY 33
0.223973	0.118697	0.392762	0.171026	0.017771	0.000093	0.000000	0.000152	0.000000	0.069604	0.005924	1.000000	PASAY BARANGAY 34

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.451616	0.243178	0.123698	0.066607	0.000000	0.000000	0.000000	0.000000	0.114901	0.000000	1.000000	PASAY BARANGAY 35	
0.150140	0.065503	0.770810	0.009916	0.000000	0.001117	0.000000	0.001844	0.000670	0.000000	0.000000	1.000000	PASAY BARANGAY 36
0.145005	0.067161	0.700445	0.010336	0.006924	0.001039	0.000000	0.000455	0.000386	0.068249	0.000000	1.000000	PASAY BARANGAY 37
0.304376	0.149150	0.460256	0.059114	0.005240	0.001282	0.000892	0.000184	0.000276	0.006689	0.012542	1.000000	PASAY BARANGAY 38
0.428229	0.220107	0.229498	0.088043	0.020079	0.001043	0.004625	0.000147	0.000220	0.008009	0.000000	1.000000	PASAY BARANGAY 39
0.511193	0.264725	0.123846	0.060769	0.025557	0.001052	0.000188	0.000170	0.000254	0.009105	0.003140	1.000000	PASAY BARANGAY 40
0.260355	0.089034	0.402507	0.153954	0.011985	0.005238	0.000245	0.001810	0.002715	0.070934	0.001223	1.000000	PASAY BARANGAY 41
0.107830	0.025595	0.519696	0.061973	0.008279	0.002156	0.000000	0.001842	0.000466	0.260435	0.011728	1.000000	PASAY BARANGAY 42
0.091950	0.033985	0.793716	0.055011	0.002102	0.000441	0.000000	0.000874	0.000063	0.002102	0.019756	1.000000	PASAY BARANGAY 43
0.078503	0.035088	0.680390	0.184501	0.004362	0.001091	0.001091	0.000143	0.000151	0.012164	0.002517	1.000000	PASAY BARANGAY 44
0.330889	0.121561	0.297609	0.160678	0.000000	0.005339	0.000000	0.000616	0.000000	0.082722	0.000587	1.000000	PASAY BARANGAY 45
0.094025	0.018819	0.599571	0.019968	0.003215	0.002242	0.000536	0.002544	0.000595	0.240443	0.018042	1.000000	PASAY BARANGAY 46
0.273367	0.147198	0.337987	0.181993	0.022612	0.000000	0.000780	0.000000	0.000000	0.036062	0.000000	1.000000	PASAY BARANGAY 47
0.286789	0.154425	0.286370	0.154199	0.000000	0.000000	0.000000	0.000000	0.000000	0.118217	0.000000	1.000000	PASAY BARANGAY 48
0.178741	0.089040	0.340449	0.183319	0.047535	0.000704	0.010563	0.000000	0.000000	0.147887	0.001761	1.000000	PASAY BARANGAY 49
0.161364	0.072341	0.176715	0.095154	0.000000	0.001501	0.000000	0.000600	0.000901	0.470840	0.020583	1.000000	PASAY BARANGAY 50
0.100609	0.048268	0.162797	0.083515	0.000000	0.000577	0.000000	0.000000	0.000000	0.604233	0.000000	1.000000	PASAY BARANGAY 51
0.217997	0.117383	0.193859	0.098536	0.018895	0.000000	0.000000	0.000000	0.000000	0.308928	0.044402	1.000000	PASAY BARANGAY 52
0.441028	0.237477	0.116636	0.062804	0.007477	0.000000	0.000000	0.000000	0.000000	0.134579	0.000000	1.000000	PASAY BARANGAY 53
0.190387	0.102198	0.269062	0.143077	0.007218	0.000000	0.000000	0.000000	0.000000	0.288058	0.000000	1.000000	PASAY BARANGAY 54
0.326476	0.064272	0.458926	0.090958	0.000000	0.011320	0.000000	0.004528	0.006792	0.036727	0.000000	1.000000	PASAY BARANGAY 55
0.266935	0.106231	0.390879	0.100075	0.016080	0.003869	0.004020	0.001548	0.002322	0.108040	0.000000	1.000000	PASAY BARANGAY 56
0.403150	0.217081	0.031102	0.016747	0.000000	0.000000	0.000000	0.000000	0.000000	0.319806	0.012114	1.000000	PASAY BARANGAY 57
0.335124	0.171808	0.192075	0.103425	0.008756	0.000892	0.001378	0.000357	0.000535	0.171869	0.013782	1.000000	PASAY BARANGAY 58
0.221035	0.119019	0.337366	0.178763	0.006720	0.000000	0.000000	0.000000	0.000000	0.137097	0.000000	1.000000	PASAY BARANGAY 59
0.383825	0.192585	0.097254	0.039324	0.021442	0.001210	0.000000	0.000336	0.000445	0.250504	0.013074	1.000000	PASAY BARANGAY 60
0.322955	0.169452	0.119080	0.046830	0.003914	0.000157	0.000000	0.000626	0.000000	0.306849	0.030137	1.000000	PASAY BARANGAY 61
0.264557	0.109140	0.318528	0.143011	0.148056	0.003267	0.000000	0.000083	0.000124	0.013234	0.000000	1.000000	PASAY BARANGAY 62
0.581244	0.312977	0.068756	0.037023	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	PASAY BARANGAY 63
0.156058	0.081874	0.291518	0.108531	0.000000	0.000000	0.000000	0.000000	0.000000	0.362018	0.000000	1.000000	PASAY BARANGAY 64
0.428443	0.229210	0.133673	0.070608	0.003231	0.000091	0.000000	0.000020	0.000030	0.133683	0.001010	1.000000	PASAY BARANGAY 65
0.188401	0.099182	0.378805	0.195093	0.006008	0.000000	0.000334	0.000000	0.000000	0.127503	0.004673	1.000000	PASAY BARANGAY 66
0.280134	0.137789	0.269714	0.145231	0.009721	0.001276	0.000000	0.000000	0.000000	0.156136	0.000000	1.000000	PASAY BARANGAY 67
0.325167	0.174163	0.140574	0.075694	0.000000	0.000096	0.000000	0.000038	0.000057	0.284211	0.000000	1.000000	PASAY BARANGAY 68
0.384475	0.207025	0.075402	0.040601	0.000613	0.000000	0.000153	0.000000	0.000000	0.276417	0.015314	1.000000	PASAY BARANGAY 69
0.557109	0.299982	0.026339	0.014182	0.001809	0.000000	0.000000	0.000000	0.000000	0.100579	0.000000	1.000000	PASAY BARANGAY 70
0.327725	0.176467	0.221467	0.119251	0.004790	0.000000	0.000000	0.000000	0.000000	0.147305	0.002994	1.000000	PASAY BARANGAY 71
0.374377	0.201588	0.085430	0.046001	0.004823	0.000000	0.000000	0.000000	0.000000	0.287781	0.000000	1.000000	PASAY BARANGAY 72

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.205458	0.110631	0.314665	0.169435	0.003702	0.000000	0.000570	0.000000	0.000000	0.193640	0.001898	1.000000	PASAY BARANGAY 73
0.561739	0.302475	0.042507	0.022888	0.009537	0.000000	0.000000	0.000000	0.000000	0.058583	0.002271	1.000000	PASAY BARANGAY 74
0.335484	0.180645	0.251863	0.135618	0.021889	0.000000	0.000000	0.000000	0.000000	0.074501	0.000000	1.000000	PASAY BARANGAY 75
0.511144	0.245796	0.002286	0.000249	0.105400	0.002648	0.000000	0.000275	0.000275	0.107058	0.024870	1.000000	PASAY BARANGAY 76
0.256411	0.127804	0.271960	0.146307	0.000000	0.001024	0.000000	0.000290	0.000236	0.174228	0.021739	1.000000	PASAY BARANGAY 77
0.360286	0.194000	0.081714	0.044000	0.121429	0.000000	0.000000	0.000000	0.000000	0.198571	0.000000	1.000000	PASAY BARANGAY 78
0.242205	0.115381	0.047769	0.025722	0.025197	0.001470	0.000000	0.000000	0.000000	0.542257	0.000000	1.000000	PASAY BARANGAY 79
0.388539	0.207226	0.077778	0.041880	0.031080	0.000194	0.000000	0.000000	0.000000	0.251748	0.001554	1.000000	PASAY BARANGAY 80
0.057204	0.030802	0.550896	0.283217	0.043614	0.000000	0.000000	0.000000	0.000000	0.034268	0.000000	1.000000	PASAY BARANGAY 81
0.000000	0.000000	0.705789	0.225543	0.040984	0.000000	0.008197	0.000020	0.000000	0.019467	0.000000	1.000000	PASAY BARANGAY 82
0.550158	0.272652	0.064641	0.008051	0.024152	0.001342	0.000316	0.003694	0.000805	0.058406	0.015785	1.000000	PASAY BARANGAY 83
0.572482	0.289293	0.096865	0.000000	0.016011	0.000000	0.000000	0.000000	0.000000	0.008005	0.017345	1.000000	PASAY BARANGAY 84
0.306231	0.160329	0.195584	0.105314	0.000000	0.000449	0.000000	0.000022	0.000034	0.232036	0.000000	1.000000	PASAY BARANGAY 85
0.351684	0.165661	0.165597	0.089168	0.010165	0.002446	0.000000	0.000978	0.001468	0.211563	0.001271	1.000000	PASAY BARANGAY 86
0.285473	0.153716	0.273161	0.107470	0.105706	0.000000	0.002402	0.000000	0.000000	0.045796	0.026276	1.000000	PASAY BARANGAY 87
0.193906	0.101063	0.275685	0.148446	0.028057	0.000327	0.005481	0.000000	0.000000	0.247035	0.000000	1.000000	PASAY BARANGAY 88
0.386795	0.206677	0.152226	0.078239	0.013848	0.000000	0.000000	0.000000	0.000000	0.162216	0.000000	1.000000	PASAY BARANGAY 89
0.392420	0.211303	0.055607	0.029942	0.009309	0.000000	0.000000	0.000000	0.000000	0.296099	0.005319	1.000000	PASAY BARANGAY 90
0.155426	0.083691	0.171556	0.087239	0.169469	0.000000	0.000000	0.000000	0.000000	0.329040	0.003578	1.000000	PASAY BARANGAY 91
0.305292	0.164388	0.272326	0.146637	0.008820	0.000000	0.000000	0.000000	0.000000	0.102536	0.000000	1.000000	PASAY BARANGAY 92
0.340512	0.183353	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.476135	0.000000	1.000000	PASAY BARANGAY 93
0.128223	0.046725	0.589341	0.026291	0.000834	0.002211	0.000000	0.000363	0.000338	0.204422	0.001252	1.000000	PASAY BARANGAY 94
0.335856	0.153335	0.054041	0.014368	0.001924	0.002309	0.000000	0.000924	0.001386	0.435856	0.000000	1.000000	PASAY BARANGAY 95
0.205642	0.042691	0.390635	0.014710	0.000000	0.006875	0.000000	0.002750	0.004125	0.332572	0.000000	1.000000	PASAY BARANGAY 96
0.282185	0.105998	0.426010	0.012025	0.000000	0.004483	0.000000	0.001823	0.002690	0.164786	0.000000	1.000000	PASAY BARANGAY 97
0.098184	0.000000	0.783406	0.022323	0.000000	0.003131	0.000000	0.009048	0.000000	0.070758	0.013150	1.000000	PASAY BARANGAY 98
0.132046	0.013654	0.575836	0.005987	0.013535	0.005096	0.000000	0.001218	0.000239	0.242834	0.009554	1.000000	PASAY BARANGAY 99
0.334921	0.086246	0.394807	0.029964	0.002149	0.010279	0.000000	0.003453	0.000645	0.099570	0.037966	1.000000	PASAY BARANGAY 100
0.679484	0.000000	0.157812	0.061345	0.000000	0.022962	0.000000	0.041766	0.001304	0.035326	0.000000	1.000000	PASAY BARANGAY 101
0.342857	0.184615	0.118187	0.056538	0.015385	0.000000	0.000000	0.000000	0.000000	0.282418	0.000000	1.000000	PASAY BARANGAY 102
0.356083	0.191737	0.120849	0.065073	0.000000	0.000000	0.000000	0.000000	0.000000	0.266259	0.000000	1.000000	PASAY BARANGAY 103
0.411766	0.221720	0.100868	0.054313	0.004084	0.000000	0.000000	0.000000	0.000000	0.207249	0.000000	1.000000	PASAY BARANGAY 104
0.396228	0.213354	0.222630	0.119878	0.000000	0.000000	0.000000	0.000000	0.000000	0.047910	0.000000	1.000000	PASAY BARANGAY 105
0.227855	0.122691	0.373177	0.200942	0.050425	0.000000	0.000000	0.000000	0.000000	0.024909	0.000000	1.000000	PASAY BARANGAY 106
0.287218	0.154656	0.292295	0.157390	0.001502	0.000000	0.000000	0.000000	0.000000	0.106939	0.000000	1.000000	PASAY BARANGAY 107
0.182528	0.075900	0.435316	0.228966	0.032545	0.001994	0.004408	0.001157	0.000233	0.036953	0.000000	1.000000	PASAY BARANGAY 108
0.384467	0.179762	0.265533	0.118254	0.000000	0.002664	0.000000	0.000000	0.000000	0.049320	0.000000	1.000000	PASAY BARANGAY 109
0.293162	0.103353	0.283659	0.140533	0.007327	0.003992	0.001332	0.003464	0.003099	0.156528	0.003552	1.000000	PASAY BARANGAY 110

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.173792	0.093580	0.475062	0.255802	0.000000	0.000000	0.000000	0.000000	0.001764	0.000000	1.000000	PASAY BARANGAY 111	
0.321559	0.102986	0.310488	0.065259	0.005244	0.006409	0.000000	0.002447	0.003671	0.181937	0.000000	1.000000	PASAY BARANGAY 112
0.285940	0.015104	0.546404	0.090599	0.011879	0.012204	0.000000	0.004390	0.003132	0.022923	0.007425	1.000000	PASAY BARANGAY 113
0.457151	0.246158	0.151743	0.081708	0.000000	0.000000	0.000000	0.000000	0.063239	0.000000	1.000000	PASAY BARANGAY 114	
0.347066	0.143423	0.275784	0.148499	0.000000	0.003002	0.000000	0.001821	0.001821	0.075885	0.002698	1.000000	PASAY BARANGAY 115
0.042612	0.015288	0.575093	0.199071	0.015428	0.000790	0.003160	0.000316	0.000474	0.143123	0.004647	1.000000	PASAY BARANGAY 116
0.044245	0.023824	0.353960	0.190594	0.003713	0.000000	0.000000	0.000000	0.000000	0.357673	0.025990	1.000000	PASAY BARANGAY 117
0.213147	0.074712	0.453596	0.112802	0.001151	0.003251	0.000000	0.003602	0.001951	0.036249	0.099540	1.000000	PASAY BARANGAY 118
0.224137	0.111225	0.382139	0.176906	0.010618	0.000398	0.002655	0.001669	0.000000	0.090254	0.000000	1.000000	PASAY BARANGAY 119
0.258160	0.050067	0.308798	0.156548	0.000000	0.008086	0.000000	0.002055	0.002720	0.213566	0.000000	1.000000	PASAY BARANGAY 120
0.276963	0.144500	0.359771	0.193723	0.000000	0.000453	0.000000	0.000000	0.000000	0.024590	0.000000	1.000000	PASAY BARANGAY 121
0.204051	0.106365	0.420317	0.222632	0.007287	0.000343	0.000000	0.000000	0.000000	0.039006	0.000000	1.000000	PASAY BARANGAY 122
0.215108	0.106470	0.417344	0.194444	0.001084	0.000915	0.000271	0.000000	0.000000	0.064363	0.000000	1.000000	PASAY BARANGAY 123
0.188399	0.093301	0.372246	0.199183	0.016620	0.000840	0.000654	0.000336	0.000504	0.117647	0.010271	1.000000	PASAY BARANGAY 124
0.341582	0.170861	0.202759	0.109178	0.082883	0.001323	0.017342	0.000349	0.000524	0.061937	0.011261	1.000000	PASAY BARANGAY 125
0.457090	0.246125	0.190471	0.098852	0.000000	0.000000	0.000000	0.000000	0.000000	0.007463	0.000000	1.000000	PASAY BARANGAY 126
0.343934	0.181989	0.226017	0.117766	0.012057	0.000301	0.001884	0.000000	0.000000	0.111907	0.004145	1.000000	PASAY BARANGAY 127
0.294190	0.119204	0.362021	0.194934	0.000000	0.003892	0.000000	0.000458	0.000687	0.024614	0.000000	1.000000	PASAY BARANGAY 128
0.286310	0.154167	0.321905	0.173333	0.000000	0.000000	0.000000	0.000000	0.000000	0.064286	0.000000	1.000000	PASAY BARANGAY 129
0.119703	0.050688	0.529459	0.034057	0.009970	0.001332	0.000774	0.000413	0.000490	0.247099	0.006016	1.000000	PASAY BARANGAY 130
0.404453	0.213487	0.225517	0.024377	0.000000	0.000443	0.000000	0.000177	0.000266	0.124525	0.006754	1.000000	PASAY BARANGAY 131
0.416920	0.059695	0.242623	0.130643	0.005076	0.016108	0.001015	0.000000	0.000000	0.127919	0.000000	1.000000	PASAY BARANGAY 132
0.101305	0.052627	0.217383	0.117052	0.013549	0.000198	0.000000	0.000079	0.000119	0.476537	0.021150	1.000000	PASAY BARANGAY 133
0.360350	0.180612	0.118076	0.056122	0.007872	0.002478	0.001603	0.000146	0.000146	0.272595	0.000000	1.000000	PASAY BARANGAY 134
0.397667	0.175922	0.101486	0.035835	0.006847	0.003461	0.000301	0.000451	0.000000	0.264108	0.013920	1.000000	PASAY BARANGAY 135
0.599430	0.311596	0.048582	0.026160	0.009701	0.001153	0.002226	0.000461	0.000692	0.000000	0.000000	1.000000	PASAY BARANGAY 136
0.109700	0.053442	0.590398	0.133477	0.007991	0.000529	0.000000	0.000133	0.000199	0.104131	0.000000	1.000000	PASAY BARANGAY 137
0.047078	0.000000	0.769900	0.018874	0.000000	0.000000	0.000000	0.008033	0.000000	0.156115	0.000000	1.000000	PASAY BARANGAY 138
0.138519	0.065872	0.537892	0.144009	0.000000	0.000878	0.000000	0.000232	0.000301	0.112296	0.000000	1.000000	PASAY BARANGAY 139
0.393553	0.017851	0.468768	0.000000	0.000000	0.018968	0.000000	0.000000	0.000000	0.100860	0.000000	1.000000	PASAY BARANGAY 140
0.179194	0.096489	0.353316	0.190247	0.010403	0.000000	0.000000	0.000000	0.000000	0.159948	0.010403	1.000000	PASAY BARANGAY 141
0.067544	0.014448	0.626961	0.260526	0.000000	0.002064	0.000000	0.000903	0.001238	0.015480	0.010836	1.000000	PASAY BARANGAY 142
0.175290	0.093570	0.140712	0.075186	0.380887	0.000030	0.000000	0.000417	0.000060	0.121941	0.011908	1.000000	PASAY BARANGAY 143
0.189860	0.098973	0.058573	0.031077	0.000000	0.000130	0.000000	0.000450	0.000259	0.618516	0.002161	1.000000	PASAY BARANGAY 144
0.332393	0.153176	0.170052	0.091014	0.022165	0.002299	0.000934	0.000397	0.000393	0.221649	0.005529	1.000000	PASAY BARANGAY 145
0.180315	0.090753	0.164824	0.088751	0.006101	0.000620	0.001525	0.000000	0.000000	0.465205	0.001907	1.000000	PASAY BARANGAY 146
0.415500	0.221137	0.131350	0.070727	0.000000	0.000254	0.000000	0.000000	0.000000	0.161033	0.000000	1.000000	PASAY BARANGAY 147
0.415737	0.201155	0.130778	0.070419	0.005303	0.002172	0.000898	0.000068	0.000068	0.169981	0.003421	1.000000	PASAY BARANGAY 148

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.387872	0.204043	0.271206	0.094326	0.000000	0.000000	0.000000	0.000000	0.042553	0.000000	1.000000	PASAY BARANGAY 149	
0.262430	0.141308	0.306776	0.165187	0.000000	0.000000	0.000000	0.000000	0.124299	0.000000	1.000000	PASAY BARANGAY 150	
0.152736	0.082242	0.203648	0.109657	0.016953	0.000000	0.000000	0.000000	0.434764	0.000000	1.000000	PASAY BARANGAY 151	
0.378523	0.109140	0.254556	0.137068	0.004527	0.009762	0.000000	0.003860	0.005789	0.074137	0.022637	1.000000	PASAY BARANGAY 152
0.133359	0.050693	0.408975	0.207357	0.013867	0.002350	0.001541	0.000324	0.000485	0.154083	0.026965	1.000000	PASAY BARANGAY 153
0.170881	0.092013	0.441509	0.237736	0.022013	0.000000	0.000000	0.000000	0.035849	0.000000	1.000000	PASAY BARANGAY 154	
0.132711	0.071460	0.504446	0.271625	0.015807	0.000000	0.003952	0.000000	0.000000	0.000000	1.000000	PASAY BARANGAY 155	
0.040567	0.021117	0.461346	0.247118	0.003962	0.000000	0.000540	0.000225	0.000000	0.224223	0.000900	1.000000	PASAY BARANGAY 156
0.017988	0.008737	0.530690	0.269273	0.035830	0.000000	0.006755	0.000037	0.000000	0.118209	0.012482	1.000000	PASAY BARANGAY 157
0.129134	0.069534	0.488402	0.262986	0.000000	0.000000	0.000000	0.000000	0.049945	0.000000	1.000000	PASAY BARANGAY 158	
0.396029	0.139735	0.304295	0.093598	0.000000	0.006397	0.000000	0.001858	0.002442	0.055646	0.000000	1.000000	PASAY BARANGAY 159
0.472946	0.124625	0.195401	0.100827	0.000000	0.009406	0.000000	0.010729	0.000279	0.079070	0.006718	1.000000	PASAY BARANGAY 160
0.539866	0.014408	0.263893	0.024664	0.002616	0.027813	0.000000	0.007159	0.010738	0.107971	0.000872	1.000000	PASAY BARANGAY 161
0.444917	0.239571	0.008581	0.004620	0.206601	0.000000	0.000000	0.000000	0.093729	0.001980	1.000000	PASAY BARANGAY 162	
0.281662	0.150430	0.224690	0.121251	0.007641	0.000000	0.000000	0.000382	0.000000	0.202006	0.011939	1.000000	PASAY BARANGAY 163
0.268209	0.115506	0.221345	0.114295	0.000000	0.002855	0.000000	0.000216	0.000324	0.262976	0.014273	1.000000	PASAY BARANGAY 164
0.203266	0.106472	0.093881	0.047161	0.002942	0.000235	0.000471	0.000000	0.000000	0.542630	0.002942	1.000000	PASAY BARANGAY 165
0.265214	0.045837	0.596495	0.037147	0.000000	0.007181	0.000000	0.007303	0.004309	0.036514	0.000000	1.000000	PASAY BARANGAY 166
0.550230	0.279402	0.057227	0.030815	0.013141	0.001741	0.000000	0.000696	0.001045	0.065703	0.000000	1.000000	PASAY BARANGAY 167
0.493379	0.218311	0.159178	0.064566	0.036530	0.004886	0.000000	0.001954	0.002932	0.018265	0.000000	1.000000	PASAY BARANGAY 168
0.312419	0.135960	0.238046	0.101989	0.007696	0.003329	0.001816	0.001332	0.001997	0.195417	0.000000	1.000000	PASAY BARANGAY 169
0.298921	0.150627	0.280571	0.137953	0.002786	0.001010	0.000000	0.000000	0.000000	0.128134	0.000000	1.000000	PASAY BARANGAY 170
0.392833	0.204193	0.154895	0.064471	0.003965	0.000625	0.000000	0.000000	0.000000	0.179018	0.000000	1.000000	PASAY BARANGAY 171
0.304175	0.150732	0.175239	0.093854	0.004729	0.001276	0.000713	0.000000	0.000000	0.263276	0.006005	1.000000	PASAY BARANGAY 172
0.212733	0.085357	0.380338	0.192140	0.005387	0.003012	0.000000	0.001205	0.001807	0.088639	0.029383	1.000000	PASAY BARANGAY 173
0.202104	0.000000	0.656938	0.034485	0.001432	0.009355	0.000358	0.006338	0.005730	0.083259	0.000000	1.000000	PASAY BARANGAY 174
0.242192	0.083521	0.272055	0.065170	0.010247	0.004589	0.000164	0.000079	0.000066	0.321918	0.000000	1.000000	PASAY BARANGAY 175
0.142770	0.000000	0.757351	0.000000	0.003038	0.007473	0.000000	0.000267	0.000401	0.088700	0.000000	1.000000	PASAY BARANGAY 176
0.389224	0.175205	0.153040	0.081372	0.011652	0.002835	0.000624	0.001278	0.001216	0.171278	0.012276	1.000000	PASAY BARANGAY 177
0.154484	0.077806	0.337975	0.150935	0.075732	0.000475	0.017295	0.000309	0.000247	0.182996	0.001747	1.000000	PASAY BARANGAY 178
0.413159	0.206820	0.123246	0.066363	0.003547	0.001369	0.000000	0.000279	0.000298	0.184575	0.000343	1.000000	PASAY BARANGAY 179
0.112208	0.060420	0.436123	0.234835	0.000000	0.000000	0.000000	0.000000	0.000000	0.156414	0.000000	1.000000	PASAY BARANGAY 180
0.474635	0.249470	0.054772	0.021807	0.001326	0.000234	0.000000	0.000336	0.000336	0.197084	0.000000	1.000000	PASAY BARANGAY 181
0.081594	0.043935	0.388258	0.209062	0.032017	0.000000	0.003244	0.000000	0.000000	0.201693	0.040197	1.000000	PASAY BARANGAY 182
0.227516	0.104120	0.441310	0.129969	0.003304	0.001552	0.000305	0.000857	0.000421	0.085623	0.005023	1.000000	PASAY BARANGAY 183
0.182674	0.065113	0.467308	0.106026	0.010362	0.003061	0.001171	0.000580	0.000114	0.161373	0.002218	1.000000	PASAY BARANGAY 184
0.400825	0.180664	0.229650	0.119389	0.005213	0.003425	0.000201	0.000060	0.000000	0.044831	0.015741	1.000000	PASAY BARANGAY 185
0.292841	0.132521	0.287583	0.151895	0.032319	0.002171	0.000373	0.001311	0.001534	0.096211	0.001242	1.000000	PASAY BARANGAY 186

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.308982	0.151930	0.290753	0.152184	0.011373	0.001349	0.000922	0.000499	0.000041	0.071380	0.010587	1.000000	PASAY BARANGAY 187
0.462915	0.236142	0.161727	0.087557	0.005107	0.001090	0.000911	0.000859	0.000264	0.043429	0.000000	1.000000	PASAY BARANGAY 188
0.366473	0.182188	0.261563	0.138437	0.016964	0.001563	0.000000	0.000625	0.000937	0.024107	0.007143	1.000000	PASAY BARANGAY 189
0.175010	0.088421	0.385351	0.078103	0.053372	0.000624	0.001014	0.000257	0.000109	0.212476	0.005263	1.000000	PASAY BARANGAY 190
0.152041	0.063730	0.162020	0.066509	0.019379	0.001566	0.000163	0.000572	0.000482	0.529262	0.004275	1.000000	PASAY BARANGAY 191
0.402226	0.209951	0.191886	0.097350	0.001649	0.000492	0.000000	0.000174	0.000181	0.093735	0.002355	1.000000	PASAY BARANGAY 192
0.329987	0.169033	0.194437	0.102988	0.004933	0.000874	0.000508	0.000007	0.000007	0.175644	0.021581	1.000000	PASAY BARANGAY 193
0.384561	0.204410	0.228315	0.061405	0.018926	0.000227	0.001160	0.000175	0.000114	0.097964	0.002743	1.000000	PASAY BARANGAY 194
0.283611	0.152040	0.272949	0.146972	0.012725	0.000066	0.000000	0.000000	0.000000	0.119789	0.011847	1.000000	PASAY BARANGAY 195
0.156994	0.084535	0.452484	0.242548	0.002904	0.000000	0.000408	0.000000	0.000000	0.054013	0.006115	1.000000	PASAY BARANGAY 196
0.280898	0.139094	0.249609	0.131539	0.000000	0.001011	0.000000	0.000350	0.000410	0.193583	0.003505	1.000000	PASAY BARANGAY 197
0.322636	0.173727	0.284191	0.146698	0.036206	0.000000	0.000000	0.000000	0.000000	0.024790	0.011752	1.000000	PASAY BARANGAY 198
0.329366	0.177351	0.237963	0.122058	0.001612	0.000000	0.000000	0.000000	0.000000	0.126814	0.004836	1.000000	PASAY BARANGAY 199
0.356107	0.189251	0.224430	0.120847	0.004886	0.000244	0.000000	0.000000	0.000000	0.104235	0.000000	1.000000	PASAY BARANGAY 200
0.389536	0.171218	0.226565	0.095656	0.007009	0.003174	0.000164	0.001443	0.001533	0.077639	0.026063	1.000000	PASIG BAGONG ILOG
0.170335	0.090786	0.434662	0.210919	0.002889	0.000000	0.000000	0.000289	0.000000	0.090121	0.000000	1.000000	PASIG BAGONG KATIPUNAN
0.176760	0.086566	0.382355	0.187548	0.021323	0.000705	0.001276	0.000653	0.000324	0.135624	0.006866	1.000000	PASIG BAMBANG
0.218279	0.116520	0.345721	0.182141	0.008781	0.000080	0.000275	0.000082	0.000010	0.121862	0.006248	1.000000	PASIG BUTING
0.382269	0.200548	0.209347	0.068455	0.006355	0.000405	0.000398	0.000537	0.000150	0.128824	0.002711	1.000000	PASIG CANIOGAN
0.558540	0.292007	0.075319	0.017185	0.016249	0.000840	0.000123	0.000160	0.000146	0.025551	0.013881	1.000000	PASIG DELA PAZ
0.387853	0.194290	0.150589	0.069604	0.029741	0.001308	0.001614	0.000275	0.000171	0.152359	0.012196	1.000000	PASIG KALAWAAN
0.322823	0.170956	0.172045	0.091332	0.012215	0.000288	0.000000	0.000056	0.000083	0.225970	0.004233	1.000000	PASIG KAPASIGAN
0.478192	0.210789	0.224085	0.018450	0.018708	0.004646	0.000663	0.000729	0.000467	0.021501	0.021771	1.000000	PASIG KAPITOLYO
0.396819	0.183219	0.129206	0.068188	0.067747	0.002928	0.000000	0.000554	0.000000	0.133205	0.018133	1.000000	PASIG MALINAO
0.463297	0.233046	0.124075	0.049155	0.016997	0.001632	0.000314	0.000351	0.000296	0.100835	0.010003	1.000000	PASIG MANGGAHAN
0.389092	0.191816	0.181644	0.049809	0.024517	0.001791	0.000882	0.000477	0.000273	0.149099	0.010601	1.000000	PASIG MAYBUNGA
0.432808	0.201612	0.184425	0.076463	0.001010	0.002945	0.000000	0.000404	0.000000	0.100333	0.000000	1.000000	PASIG ORANBO
0.369354	0.131899	0.236804	0.071728	0.016414	0.006407	0.000496	0.000919	0.000607	0.161275	0.004097	1.000000	PASIG PALATIW
0.243623	0.110921	0.173534	0.064947	0.031380	0.001796	0.001211	0.000702	0.000522	0.355949	0.015415	1.000000	PASIG PINAGBUHATAN
0.365859	0.189739	0.220188	0.106283	0.009049	0.000718	0.000682	0.000270	0.000158	0.099930	0.007125	1.000000	PASIG PINEDA
0.463297	0.233046	0.124075	0.049155	0.016997	0.001632	0.000314	0.000351	0.000296	0.100835	0.010003	1.000000	PASIG ROSARIO
0.166900	0.057925	0.453592	0.159597	0.003897	0.002407	0.000862	0.000599	0.000396	0.152299	0.001527	1.000000	PASIG SAGAD
0.664572	0.204731	0.007005	0.003772	0.014292	0.015024	0.000000	0.000441	0.000662	0.082584	0.006916	1.000000	PASIG SAN ANTONIO
0.387419	0.203205	0.215024	0.107990	0.009931	0.000511	0.000765	0.000044	0.000000	0.070629	0.004482	1.000000	PASIG SAN JOAQUIN
0.504830	0.267829	0.077782	0.021462	0.004410	0.000493	0.000000	0.000055	0.000082	0.116758	0.006300	1.000000	PASIG SAN JOSE
0.338902	0.175549	0.184971	0.079315	0.020861	0.000485	0.000643	0.000358	0.000121	0.189582	0.009213	1.000000	PASIG SAN MIGUEL
0.313820	0.168090	0.174105	0.093939	0.020202	0.000000	0.000000	0.000275	0.000000	0.223140	0.006428	1.000000	PASIG SAN NICOLAS (POB.)
0.283427	0.136585	0.193732	0.104317	0.001951	0.001598	0.000000	0.000234	0.000351	0.276341	0.001463	1.000000	PASIG SANTA CRUZ

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.150999	0.060021	0.444594	0.076625	0.003444	0.001653	0.000000	0.000544	0.000413	0.247934	0.013774	1.000000	PASIG SANTA ROSA
0.232047	0.115341	0.413668	0.100921	0.014116	0.000890	0.000555	0.000150	0.000118	0.113964	0.008230	1.000000	PASIG SANTO TOMAS
0.383125	0.168725	0.251474	0.093723	0.011079	0.003594	0.000912	0.000335	0.000173	0.072484	0.014375	1.000000	PASIG SANTOLAN
0.307055	0.162908	0.284086	0.147302	0.008500	0.000159	0.000137	0.000292	0.000114	0.083547	0.005900	1.000000	PASIG SUMILANG
0.547721	0.231854	0.126130	0.030846	0.006395	0.006092	0.000000	0.001561	0.001161	0.039900	0.008340	1.000000	PASIG UGONG
0.508896	0.268418	0.070474	0.023867	0.020797	0.000519	0.000377	0.000158	0.000188	0.098123	0.008182	1.000000	PASIG SANTA LUCIA
0.492341	0.247474	0.159560	0.034854	0.010662	0.001743	0.000098	0.000584	0.000489	0.041878	0.010318	1.000000	PASIG NAPICO
0.320935	0.146058	0.370791	0.055607	0.015479	0.001926	0.000000	0.002024	0.000927	0.073631	0.012623	1.000000	PATEROS AGUHO
0.283558	0.142400	0.254575	0.137180	0.064458	0.000202	0.000462	0.002543	0.000000	0.114621	0.000000	1.000000	PATEROS MAGTANGGOL
0.368915	0.147681	0.275224	0.081160	0.021571	0.004713	0.000125	0.001247	0.000486	0.090025	0.008853	1.000000	PATEROS MARTIRES DEL 96
0.305532	0.164250	0.290846	0.155576	0.005131	0.000026	0.000454	0.000000	0.000000	0.077661	0.000524	1.000000	PATEROS POBLACION
0.504178	0.260987	0.069708	0.033376	0.019732	0.000974	0.000000	0.000887	0.000292	0.105481	0.004385	1.000000	PATEROS SAN PEDRO
0.294966	0.158113	0.242263	0.130441	0.005105	0.000058	0.000134	0.000025	0.000017	0.162612	0.006266	1.000000	PATEROS SAN ROQUE
0.306862	0.154079	0.187147	0.081723	0.025769	0.001024	0.000594	0.000224	0.000152	0.235199	0.007226	1.000000	PATEROS SANTA ANA
0.417472	0.217202	0.139788	0.073567	0.026238	0.000606	0.000907	0.000208	0.000203	0.120117	0.003691	1.000000	PATEROS SANTO ROSARIO-KANLURAN
0.272435	0.137509	0.223438	0.120242	0.023627	0.000930	0.000000	0.000316	0.000368	0.221134	0.000000	1.000000	PATEROS SANTO ROSARIO-SILANGAN
0.304818	0.160750	0.277356	0.145483	0.024040	0.000256	0.000000	0.000202	0.000240	0.085886	0.000969	1.000000	PATEROS TABACALERA
0.261094	0.033141	0.606672	0.022803	0.000540	0.011018	0.000000	0.003721	0.005408	0.053120	0.002483	1.000000	QUEZON ALICIA
0.473681	0.248978	0.064320	0.031849	0.004240	0.000623	0.001060	0.000215	0.000322	0.019285	0.155428	1.000000	QUEZON AMIHAN
0.445059	0.175909	0.200657	0.045003	0.011981	0.006145	0.000755	0.000879	0.000941	0.099146	0.013525	1.000000	QUEZON APOLONIO SAMSON
0.376942	0.191452	0.262250	0.065275	0.020201	0.001103	0.000986	0.000499	0.000369	0.070868	0.010056	1.000000	QUEZON BAESA
0.319734	0.162621	0.286642	0.068285	0.038505	0.000954	0.003815	0.000476	0.000246	0.107870	0.010850	1.000000	QUEZON BAGBAG
0.458875	0.245967	0.135818	0.066880	0.002233	0.000114	0.000000	0.000037	0.000048	0.021929	0.068099	1.000000	QUEZON BAGUMBUHAY
0.390663	0.171383	0.235442	0.079532	0.028758	0.003894	0.004880	0.001054	0.000415	0.070999	0.012979	1.000000	QUEZON BAGONG LIPUNAN NG CRAME
0.280011	0.125751	0.267388	0.095028	0.017006	0.002246	0.001861	0.000932	0.000147	0.204235	0.005395	1.000000	QUEZON BAGONG PAG-ASA
0.460122	0.207869	0.137870	0.033740	0.020778	0.003959	0.002678	0.000351	0.000266	0.120363	0.012005	1.000000	QUEZON BAGONG SILANGAN
0.557767	0.225070	0.062962	0.018284	0.006129	0.007031	0.000118	0.000695	0.000592	0.097921	0.023430	1.000000	QUEZON BAGUMBAYAN
0.496145	0.208685	0.153630	0.044468	0.019619	0.005492	0.000288	0.000772	0.000269	0.061210	0.009422	1.000000	QUEZON BAHAY TORO
0.404398	0.208064	0.173243	0.079996	0.022448	0.000752	0.002099	0.000336	0.000195	0.104112	0.004357	1.000000	QUEZON BALINGASA
0.148619	0.033273	0.761544	0.041657	0.004255	0.004414	0.000724	0.002368	0.000883	0.002263	0.000000	1.000000	QUEZON BAYANIHAN
0.567060	0.280754	0.047261	0.026266	0.000591	0.002030	0.000000	0.001181	0.000000	0.027610	0.047246	1.000000	QUEZON BLUE RIDGE A
0.493709	0.255109	0.142205	0.070568	0.006952	0.000695	0.000000	0.000695	0.000000	0.016163	0.013903	1.000000	QUEZON BLUE RIDGE B
0.339058	0.127317	0.154417	0.054085	0.181650	0.005952	0.000000	0.000162	0.000015	0.117408	0.019937	1.000000	QUEZON BOTOCAN
0.380233	0.189469	0.207040	0.084914	0.018100	0.001554	0.000212	0.000408	0.000581	0.096000	0.021490	1.000000	QUEZON BUNGAD
0.560219	0.290761	0.090431	0.044418	0.005293	0.001083	0.001323	0.000135	0.000202	0.005894	0.000241	1.000000	QUEZON CAMP AGUINALDO
0.366085	0.172108	0.322658	0.024328	0.016618	0.002468	0.000065	0.000348	0.000447	0.088608	0.006268	1.000000	QUEZON CENTRAL
0.345652	0.169105	0.318507	0.066959	0.033006	0.001762	0.000792	0.000510	0.000406	0.045343	0.017959	1.000000	QUEZON COMMONWEALTH
0.359709	0.147514	0.361275	0.039653	0.022882	0.004222	0.000953	0.000753	0.000299	0.062314	0.000426	1.000000	QUEZON KRISTONG HARI

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.453477	0.230113	0.134972	0.056721	0.040876	0.001283	0.000576	0.000215	0.000155	0.063956	0.017656	1.000000	QUEZON CULIAT
0.647893	0.345382	0.004150	0.002234	0.000000	0.000340	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	QUEZON DAMAR
0.378541	0.181194	0.240594	0.094576	0.013348	0.001678	0.001189	0.001444	0.000593	0.085328	0.001513	1.000000	QUEZON DAMAYAN
0.435553	0.192460	0.121738	0.032504	0.023865	0.003691	0.000562	0.001494	0.000834	0.163285	0.024013	1.000000	QUEZON DAMAYANG LAGI
0.391423	0.196489	0.186980	0.073607	0.013609	0.001669	0.001562	0.000343	0.000354	0.114253	0.019711	1.000000	QUEZON DEL MONTE
0.396175	0.209768	0.183287	0.098693	0.020565	0.000357	0.000000	0.000073	0.000110	0.061171	0.029801	1.000000	QUEZON DIOQUINO ZOBEL
0.215291	0.080795	0.524830	0.159187	0.002267	0.003542	0.000000	0.001364	0.002011	0.005951	0.004761	1.000000	QUEZON DON MANUEL
0.294497	0.142561	0.395107	0.105960	0.001677	0.001540	0.000000	0.000171	0.000256	0.040396	0.017835	1.000000	QUEZON DUYAN-DUYAN
0.369987	0.173537	0.240963	0.095025	0.010596	0.002702	0.000473	0.000674	0.000619	0.082378	0.023045	1.000000	QUEZON E. RODRIGUEZ
0.304823	0.157705	0.393323	0.122795	0.006594	0.000173	0.000611	0.000172	0.000006	0.009118	0.004681	1.000000	QUEZON EAST KAMIAS
0.211982	0.089677	0.611874	0.031720	0.014439	0.000799	0.000000	0.000320	0.000479	0.000000	0.038710	1.000000	QUEZON ESCOPA I
0.202656	0.087698	0.568990	0.015437	0.062547	0.000151	0.000000	0.000260	0.000090	0.009797	0.052374	1.000000	QUEZON ESCOPA II
0.267310	0.119708	0.269296	0.105832	0.050024	0.002004	0.004784	0.000268	0.000350	0.171454	0.008969	1.000000	QUEZON ESCOPA III
0.462147	0.248848	0.148377	0.079895	0.002618	0.000000	0.000000	0.000000	0.000000	0.058115	0.000000	1.000000	QUEZON ESCOPA IV
0.523999	0.267912	0.106595	0.028366	0.025492	0.001395	0.000632	0.000342	0.000378	0.037390	0.007499	1.000000	QUEZON FAIRVIEW
0.349816	0.181014	0.192334	0.081578	0.032426	0.000982	0.001955	0.000208	0.000158	0.147581	0.011949	1.000000	QUEZON GULOD
0.514893	0.138824	0.207846	0.041308	0.031287	0.013343	0.000000	0.002460	0.002014	0.031599	0.016428	1.000000	QUEZON HORSESHOE
0.368509	0.150265	0.299791	0.091628	0.011020	0.003918	0.000418	0.003661	0.001206	0.058754	0.010829	1.000000	QUEZON IMMACULATE CONCEPCION
0.447434	0.234353	0.177503	0.054093	0.027446	0.000628	0.001201	0.000346	0.000301	0.028585	0.028109	1.000000	QUEZON KALIGAYAHAN
0.409053	0.202105	0.227523	0.122749	0.000000	0.001692	0.000000	0.000536	0.000290	0.036052	0.000000	1.000000	QUEZON KALUSUGAN
0.422127	0.222906	0.177875	0.067076	0.007605	0.000294	0.000321	0.000089	0.000111	0.097974	0.003621	1.000000	QUEZON KAMUNING
0.375345	0.186810	0.283896	0.038021	0.018558	0.001572	0.000000	0.000644	0.000598	0.078067	0.016488	1.000000	QUEZON KATIPUNAN
0.435452	0.223548	0.229806	0.031365	0.001801	0.001303	0.000000	0.000171	0.000244	0.076310	0.000000	1.000000	QUEZON KAUNLARAN
0.415168	0.164804	0.263167	0.097602	0.012138	0.005700	0.000019	0.000220	0.000244	0.031493	0.009445	1.000000	QUEZON KRUS NA LIGAS
0.578375	0.288860	0.061458	0.013233	0.022315	0.002111	0.000269	0.000219	0.000277	0.022935	0.009948	1.000000	QUEZON LAGING HANDA
0.245305	0.107518	0.288932	0.145335	0.003503	0.001723	0.000000	0.001157	0.001056	0.200889	0.004581	1.000000	QUEZON LIBIS
0.153962	0.081157	0.604427	0.119646	0.004799	0.000116	0.000000	0.000256	0.000069	0.019653	0.015915	1.000000	QUEZON LOURDES
0.519649	0.237992	0.091354	0.042272	0.016549	0.003397	0.000486	0.001312	0.001351	0.066040	0.019598	1.000000	QUEZON LOYOLA HEIGHTS
0.423900	0.219546	0.286498	0.050350	0.005297	0.000794	0.000695	0.000302	0.000288	0.008683	0.003647	1.000000	QUEZON MAHARLIKA
0.354687	0.179991	0.283215	0.041763	0.016110	0.000971	0.000243	0.000181	0.000237	0.118356	0.004248	1.000000	QUEZON MALAYA
0.354769	0.157187	0.272434	0.039902	0.085164	0.003471	0.000986	0.001999	0.000848	0.058132	0.025108	1.000000	QUEZON MANRESA
0.424813	0.202567	0.232546	0.080956	0.014511	0.002450	0.000309	0.000725	0.000327	0.023265	0.017532	1.000000	QUEZON MARIANA
0.330991	0.157722	0.309205	0.060457	0.001105	0.002035	0.000000	0.000699	0.000467	0.133450	0.003868	1.000000	QUEZON MARIBLO
0.487353	0.248380	0.118814	0.051022	0.010365	0.001211	0.000085	0.000380	0.000225	0.009571	0.072594	1.000000	QUEZON MARILAG
0.485552	0.257930	0.035511	0.019121	0.003538	0.000352	0.000033	0.000056	0.000084	0.002232	0.195592	1.000000	QUEZON MASAGANA
0.373316	0.178218	0.257298	0.071782	0.019304	0.002321	0.000442	0.000991	0.000598	0.080174	0.015555	1.000000	QUEZON MASAMBONG
0.467748	0.206786	0.141666	0.056243	0.024900	0.004544	0.001465	0.000473	0.000257	0.078747	0.017171	1.000000	QUEZON MATANDANG BALARA
0.495980	0.259210	0.089616	0.036117	0.014308	0.000683	0.001109	0.000488	0.000410	0.007982	0.094098	1.000000	QUEZON MILAGROSA

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.519027	0.274902	0.100950	0.025702	0.016738	0.000495	0.001288	0.000223	0.000076	0.054990	0.005608	1.000000	QUEZON NAGKAISANG NAYON
0.484944	0.233918	0.120266	0.049316	0.025092	0.002584	0.000440	0.000110	0.000018	0.074151	0.009162	1.000000	QUEZON NAYONG KANLURAN
0.423528	0.223964	0.161669	0.072188	0.034101	0.000350	0.000822	0.000255	0.000179	0.076715	0.006230	1.000000	QUEZON NOVALICHES PROPER
0.204580	0.068019	0.514008	0.067257	0.018926	0.003697	0.003397	0.001907	0.001710	0.109682	0.006819	1.000000	QUEZON OBRERO
0.272603	0.115795	0.250498	0.104462	0.022084	0.003010	0.003653	0.000000	0.000000	0.224575	0.003321	1.000000	QUEZON OLD CAPITOL SITE
0.313857	0.162738	0.342275	0.114423	0.003130	0.000042	0.000000	0.000124	0.000083	0.056425	0.006903	1.000000	QUEZON PAANG BUNDOK
0.277431	0.068013	0.407390	0.113631	0.049659	0.007778	0.005428	0.001156	0.000686	0.056886	0.011942	1.000000	QUEZON PAG-IBIG SA NAYON
0.438433	0.227208	0.157960	0.082816	0.030523	0.000800	0.004761	0.000245	0.000273	0.052504	0.004476	1.000000	QUEZON PALIGSAHAN
0.427780	0.223657	0.146826	0.065794	0.016086	0.000777	0.000060	0.000063	0.000081	0.115541	0.003335	1.000000	QUEZON PALTOK
0.355916	0.133997	0.329778	0.076953	0.021974	0.005475	0.000871	0.000891	0.000560	0.066013	0.007571	1.000000	QUEZON PANSOL
0.308515	0.124384	0.450036	0.047060	0.013147	0.004108	0.002157	0.001967	0.001584	0.042214	0.004827	1.000000	QUEZON PARAISO
0.514051	0.259802	0.096616	0.026763	0.025875	0.001675	0.001333	0.000479	0.000617	0.061415	0.011372	1.000000	QUEZON PASONG TAMO
0.647293	0.346397	0.000000	0.000000	0.005719	0.000210	0.000000	0.000000	0.000000	0.000000	0.000381	1.000000	QUEZON PHIL-AM
0.374286	0.175358	0.162852	0.063579	0.036579	0.002501	0.004049	0.000639	0.000680	0.164737	0.014740	1.000000	QUEZON PINYAHAN
0.123107	0.039842	0.739317	0.042241	0.003850	0.002090	0.000000	0.001370	0.000641	0.038168	0.009374	1.000000	QUEZON PINAGKAISAHAN
0.488569	0.260395	0.032939	0.016192	0.033057	0.000270	0.000163	0.000068	0.000097	0.016045	0.152206	1.000000	QUEZON PROJECT 6
0.172995	0.080716	0.664269	0.028142	0.005098	0.001369	0.000193	0.000955	0.000250	0.040169	0.005844	1.000000	QUEZON QUIRINO 2-A
0.481917	0.251753	0.148526	0.078771	0.004945	0.000883	0.000275	0.000000	0.000000	0.013711	0.019219	1.000000	QUEZON QUIRINO 2-B
0.437241	0.220255	0.148706	0.076836	0.003389	0.001490	0.000451	0.000045	0.000068	0.017696	0.093823	1.000000	QUEZON QUIRINO 2-C
0.636586	0.342777	0.000000	0.000000	0.002743	0.000000	0.000000	0.000000	0.000000	0.008751	0.009143	1.000000	QUEZON QUIRINO 3-A
0.291666	0.124325	0.371713	0.078093	0.019402	0.002930	0.000893	0.001352	0.000285	0.096426	0.012915	1.000000	QUEZON RAMON MAGSAYSAY
0.367724	0.140895	0.355051	0.078083	0.004418	0.005106	0.000127	0.001886	0.000138	0.030079	0.016492	1.000000	QUEZON ROXAS
0.511858	0.148893	0.228378	0.033224	0.016612	0.012176	0.001322	0.001076	0.000387	0.035178	0.010895	1.000000	QUEZON SACRED HEART
0.400256	0.203535	0.239614	0.103969	0.013639	0.001062	0.000586	0.000586	0.000251	0.008577	0.027926	1.000000	QUEZON SAINT IGNATIUS
0.444904	0.236871	0.115233	0.062049	0.009541	0.000271	0.001962	0.000057	0.000085	0.129028	0.000000	1.000000	QUEZON SAINT PETER
0.330702	0.164020	0.236349	0.015459	0.003717	0.001167	0.000000	0.000827	0.000541	0.235800	0.011418	1.000000	QUEZON SALVACION
0.445356	0.202150	0.215129	0.053638	0.028537	0.003632	0.002833	0.000194	0.000082	0.040837	0.007613	1.000000	QUEZON SAN AGUSTIN
0.323025	0.137596	0.318850	0.097566	0.028744	0.003784	0.003902	0.001299	0.001305	0.073999	0.009929	1.000000	QUEZON SAN ANTONIO
0.499982	0.254353	0.143382	0.029814	0.019394	0.001383	0.000572	0.000533	0.000239	0.044596	0.005751	1.000000	QUEZON SAN BARTOLOME
0.232057	0.114377	0.352268	0.171339	0.004337	0.001014	0.000118	0.000128	0.000190	0.111250	0.012922	1.000000	QUEZON SAN ISIDRO LABRADOR
0.332142	0.138338	0.341272	0.031694	0.005898	0.003112	0.000788	0.002078	0.001006	0.139836	0.003835	1.000000	QUEZON SAN MARTIN DE PORRES
0.167613	0.085213	0.205168	0.072182	0.010834	0.000364	0.000000	0.000128	0.000168	0.092995	0.365335	1.000000	QUEZON SAN VICENTE
0.398917	0.199238	0.167055	0.074352	0.033611	0.001588	0.000727	0.000491	0.000184	0.112583	0.011254	1.000000	QUEZON SANTA LUCIA
0.430412	0.217875	0.233105	0.030698	0.019530	0.001303	0.000590	0.000451	0.000236	0.039411	0.026389	1.000000	QUEZON SANTA MONICA
0.328692	0.148945	0.311525	0.150682	0.009688	0.002883	0.000054	0.000360	0.000541	0.034707	0.011921	1.000000	QUEZON SANTA TERESITA
0.432835	0.228888	0.153658	0.077160	0.000254	0.000394	0.000000	0.000068	0.000091	0.106246	0.000406	1.000000	QUEZON SANTOL
0.451978	0.213616	0.178026	0.048169	0.023870	0.002872	0.001039	0.000277	0.000164	0.070580	0.009408	1.000000	QUEZON SAUYO
0.518747	0.278698	0.104018	0.055708	0.000420	0.000061	0.000000	0.000000	0.000000	0.040737	0.001611	1.000000	QUEZON SIENNA

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.592159	0.216828	0.113862	0.019323	0.022972	0.019023	0.002928	0.000512	0.000021	0.005652	0.006720	1.000000	QUEZON SIKATUNA VILLAGE
0.438643	0.217858	0.208158	0.065460	0.010306	0.001814	0.000905	0.000369	0.000431	0.050838	0.005217	1.000000	QUEZON SOCORRO
0.474405	0.225672	0.124463	0.027800	0.012514	0.002839	0.000116	0.000340	0.000348	0.126183	0.005320	1.000000	QUEZON SOUTH TRIANGLE
0.141948	0.066419	0.406540	0.177382	0.015524	0.001033	0.003881	0.000413	0.000620	0.103831	0.082409	1.000000	QUEZON TAGUMPAY
0.515690	0.248549	0.098820	0.010158	0.031290	0.002796	0.000000	0.000554	0.000779	0.070990	0.020375	1.000000	QUEZON TALAYAN
0.489255	0.253537	0.132543	0.048876	0.014431	0.000878	0.000926	0.000294	0.000076	0.054680	0.004504	1.000000	QUEZON TALIPAPA
0.517798	0.254841	0.105816	0.029227	0.013565	0.002268	0.000598	0.000771	0.000806	0.064072	0.010238	1.000000	QUEZON TANDANG SORA
0.287988	0.135215	0.263276	0.096236	0.037368	0.001816	0.001062	0.000607	0.000429	0.163158	0.012846	1.000000	QUEZON TATALON
0.508804	0.270404	0.141597	0.020075	0.048387	0.000270	0.000688	0.000122	0.000153	0.009500	0.000000	1.000000	QUEZON TEACHERS VILLAGE EAST
0.537156	0.276972	0.083702	0.033248	0.017491	0.001226	0.000000	0.000205	0.000307	0.017564	0.032128	1.000000	QUEZON TEACHERS VILLAGE WEST
0.303583	0.161410	0.219488	0.106630	0.019900	0.000305	0.000625	0.000045	0.000038	0.178553	0.009423	1.000000	QUEZON U.P. CAMPUS
0.555668	0.269781	0.080430	0.020576	0.018586	0.002792	0.000173	0.000904	0.000971	0.033941	0.016178	1.000000	QUEZON U.P. VILLAGE
0.727621	0.156113	0.038110	0.016486	0.011081	0.022093	0.000000	0.003090	0.000143	0.001219	0.024046	1.000000	QUEZON UGONG NORTE
0.103823	0.027613	0.531359	0.083253	0.045613	0.002707	0.007823	0.001565	0.000398	0.187448	0.008398	1.000000	QUEZON UNANG SIGAW
0.517110	0.230832	0.106994	0.053615	0.010251	0.004633	0.000077	0.000828	0.000820	0.064922	0.009918	1.000000	QUEZON VALENCIA
0.393673	0.123698	0.279252	0.123500	0.004854	0.008574	0.000267	0.000228	0.000070	0.060551	0.005334	1.000000	QUEZON VASRA
0.573984	0.289908	0.054704	0.027016	0.012745	0.001870	0.000044	0.000094	0.000108	0.024669	0.014857	1.000000	QUEZON VETERANS VILLAGE
0.544009	0.239611	0.008674	0.004671	0.005022	0.005453	0.000000	0.001834	0.002751	0.008323	0.179653	1.000000	QUEZON VILLA MARIA CLARA
0.174082	0.083938	0.484571	0.207026	0.016533	0.000898	0.000574	0.000294	0.000314	0.018152	0.013618	1.000000	QUEZON WEST KAMIAS
0.428095	0.205941	0.181191	0.078945	0.040947	0.002564	0.000552	0.000645	0.000923	0.047022	0.013176	1.000000	QUEZON WEST TRIANGLE
0.583131	0.256885	0.087611	0.046935	0.008439	0.005586	0.000000	0.000030	0.000045	0.005205	0.006134	1.000000	QUEZON WHITE PLAINS
0.422205	0.201688	0.285574	0.033185	0.005151	0.002420	0.000393	0.001068	0.001014	0.047161	0.000140	1.000000	QUEZON BALONG BATO
0.488810	0.256267	0.132816	0.062697	0.022389	0.000584	0.000397	0.000241	0.000131	0.025129	0.010541	1.000000	QUEZON SANGANDAAN
0.334633	0.169073	0.241370	0.079600	0.059654	0.001046	0.003338	0.000313	0.000217	0.099142	0.011613	1.000000	QUEZON PAYATAS
0.504434	0.265429	0.133220	0.036804	0.013684	0.000636	0.001631	0.000407	0.000016	0.035713	0.008026	1.000000	QUEZON BATASAN HILLS
0.376454	0.169889	0.278076	0.069498	0.020987	0.003270	0.001517	0.000558	0.000245	0.070768	0.008739	1.000000	QUEZON HOLY SPIRIT
0.632295	0.321967	0.009036	0.000991	0.016817	0.001797	0.000167	0.000065	0.000086	0.009208	0.007571	1.000000	QUEZON GREATER LAGRO
0.522463	0.277664	0.057323	0.015300	0.069705	0.000265	0.000390	0.000149	0.000057	0.039715	0.016969	1.000000	QUEZON NORTH FAIRVIEW
0.546382	0.262870	0.105282	0.046704	0.004897	0.003076	0.000000	0.000098	0.000147	0.015241	0.015303	1.000000	SAN JUAN ADDITION HILLS
0.467871	0.214564	0.130563	0.069174	0.007866	0.003619	0.000330	0.000286	0.000391	0.102704	0.002630	1.000000	SAN JUAN BALONG-BATO
0.277566	0.139831	0.235287	0.120686	0.027292	0.000907	0.000357	0.000408	0.000404	0.169944	0.027318	1.000000	SAN JUAN BATIS
0.204315	0.092129	0.275690	0.099358	0.015348	0.001589	0.001373	0.000334	0.000347	0.300879	0.008638	1.000000	SAN JUAN CORAZON DE JESUS
0.196277	0.080828	0.360104	0.059735	0.019391	0.000231	0.001513	0.002542	0.000462	0.271949	0.006968	1.000000	SAN JUAN HALO-HALO (ST. JOSEPH)
0.291721	0.144555	0.287350	0.153333	0.000157	0.000927	0.000000	0.000873	0.000113	0.113681	0.007291	1.000000	SAN JUAN KABAYANAN
0.300957	0.107941	0.452423	0.093455	0.004406	0.005642	0.001101	0.001201	0.000827	0.020350	0.011696	1.000000	SAN JUAN LITTLE BAGUIO
0.527896	0.249518	0.129955	0.049674	0.006529	0.003420	0.000804	0.000358	0.000506	0.016976	0.014365	1.000000	SAN JUAN MAYTUNAS
0.427306	0.227637	0.108211	0.056018	0.013403	0.000248	0.000000	0.000064	0.000097	0.159878	0.007137	1.000000	SAN JUAN ONSE
0.281613	0.084878	0.398580	0.083366	0.012856	0.006558	0.000740	0.003008	0.002431	0.122272	0.003700	1.000000	SAN JUAN PEDRO CRUZ

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.299763	0.079445	0.470516	0.049708	0.000000	0.008001	0.000000	0.000207	0.000302	0.085144	0.006914	1.000000	SAN JUAN RIVERA
0.243614	0.118501	0.333690	0.145989	0.012820	0.001233	0.000516	0.000754	0.000291	0.136616	0.005975	1.000000	SAN JUAN SALAPAN
0.292401	0.153358	0.212784	0.110316	0.034402	0.000333	0.000871	0.000048	0.000000	0.193308	0.002178	1.000000	SAN JUAN SAN PERFECTO
0.335385	0.146598	0.277901	0.097343	0.003619	0.002668	0.000025	0.002179	0.001137	0.126610	0.006535	1.000000	SAN JUAN SANTA LUCIA
0.267069	0.130019	0.393895	0.071988	0.005614	0.001309	0.000000	0.000707	0.000566	0.124482	0.004351	1.000000	SAN JUAN TIBAGAN
0.294864	0.153118	0.232705	0.111223	0.006921	0.000526	0.001200	0.000136	0.000155	0.187806	0.011345	1.000000	SAN JUAN WEST CRAME
0.765148	0.144445	0.025168	0.011885	0.011247	0.026206	0.000000	0.001339	0.001672	0.000063	0.012826	1.000000	SAN JUAN GREENHILLS
0.322420	0.141359	0.298909	0.064170	0.021317	0.003313	0.002001	0.000839	0.000782	0.136951	0.007940	1.000000	TAGUIG BAGONG TANYAG
0.503036	0.253501	0.088514	0.034201	0.034210	0.001579	0.001326	0.000261	0.000116	0.075017	0.008238	1.000000	TAGUIG BAGUMBAYAN
0.358850	0.180872	0.222493	0.107963	0.011620	0.001579	0.000000	0.000549	0.000177	0.107883	0.008014	1.000000	TAGUIG BAMBANG
0.308245	0.145350	0.339422	0.035107	0.012795	0.001940	0.000630	0.000739	0.000510	0.145357	0.009906	1.000000	TAGUIG CALZADA
0.528134	0.246836	0.076423	0.037072	0.047036	0.003695	0.000329	0.000214	0.000215	0.053073	0.006972	1.000000	TAGUIG HAGONOY
0.306127	0.152440	0.232892	0.104494	0.014892	0.001241	0.001376	0.000462	0.000638	0.154799	0.030637	1.000000	TAGUIG IBAYO-TIPAS
0.380440	0.200955	0.175944	0.093846	0.013085	0.000370	0.001717	0.000024	0.000036	0.131661	0.001924	1.000000	TAGUIG LIGID-TIPAS
0.469162	0.235420	0.124352	0.045814	0.018531	0.001891	0.003014	0.000343	0.000155	0.094616	0.006702	1.000000	TAGUIG LOWER BICUTAN
0.376742	0.199594	0.137481	0.072438	0.021055	0.000258	0.000765	0.000178	0.000000	0.188648	0.002840	1.000000	TAGUIG MAHARLIKA VILLAGE
0.448326	0.222687	0.071651	0.033867	0.070143	0.001844	0.000829	0.000330	0.000394	0.131602	0.018327	1.000000	TAGUIG NAPINDAN
0.281076	0.136322	0.279951	0.139168	0.021676	0.001354	0.000496	0.000486	0.000129	0.132977	0.006366	1.000000	TAGUIG PALINGON
0.372030	0.183388	0.184654	0.053710	0.014021	0.001223	0.001077	0.000449	0.000480	0.175559	0.013408	1.000000	TAGUIG SANTA ANA
0.476679	0.223760	0.195172	0.033113	0.012706	0.003260	0.001469	0.000724	0.000673	0.046385	0.006060	1.000000	TAGUIG SIGNAL VILLAGE
0.289891	0.141896	0.385469	0.039383	0.008566	0.001032	0.000669	0.001447	0.000000	0.124830	0.006818	1.000000	TAGUIG TUKTUKAN
0.524375	0.244171	0.134942	0.029685	0.015622	0.003547	0.000727	0.000761	0.000218	0.039671	0.006282	1.000000	TAGUIG UPPER BICUTAN
0.440398	0.153773	0.250928	0.031953	0.015728	0.008149	0.001009	0.001898	0.001629	0.071351	0.023184	1.000000	TAGUIG USUSAN
0.188464	0.062692	0.488628	0.120375	0.018392	0.003486	0.002747	0.003937	0.000212	0.096880	0.014187	1.000000	TAGUIG WAWA
0.434721	0.182055	0.134012	0.033763	0.039426	0.004831	0.000670	0.001976	0.000972	0.157550	0.010024	1.000000	TAGUIG WESTERN BICUTAN
0.420962	0.205164	0.169491	0.049781	0.008789	0.002105	0.000256	0.000608	0.000609	0.133761	0.008476	1.000000	VALENZUELA ARKONG BATU
0.392239	0.184283	0.299947	0.043779	0.009481	0.002433	0.001292	0.001615	0.000691	0.051588	0.012652	1.000000	VALENZUELA BAGBAGUIN
0.437574	0.230464	0.140669	0.074851	0.011528	0.000461	0.000909	0.000100	0.000016	0.097715	0.005712	1.000000	VALENZUELA BALANGKAS
0.485521	0.245622	0.149609	0.060913	0.012457	0.001205	0.000571	0.000628	0.000472	0.038604	0.004397	1.000000	VALENZUELA PARADA
0.504876	0.260525	0.070041	0.037281	0.039814	0.001105	0.001326	0.000035	0.000052	0.079422	0.005523	1.000000	VALENZUELA BIGNAY
0.499172	0.268116	0.078847	0.035490	0.008282	0.000000	0.000000	0.000017	0.000000	0.107315	0.002761	1.000000	VALENZUELA BISIG
0.424056	0.200285	0.224324	0.048617	0.010510	0.002853	0.001097	0.000382	0.000382	0.079860	0.007636	1.000000	VALENZUELA CANUMAY
0.426688	0.210056	0.214798	0.062752	0.007711	0.001980	0.000862	0.000402	0.000387	0.068476	0.005889	1.000000	VALENZUELA KARUHATAN
0.446033	0.236025	0.157484	0.079402	0.002618	0.000298	0.000225	0.000346	0.000048	0.063197	0.014324	1.000000	VALENZUELA COLOONG
0.405038	0.160563	0.267944	0.042823	0.004798	0.005234	0.000323	0.002015	0.000989	0.099788	0.010486	1.000000	VALENZUELA DALANDANAN
0.447529	0.218697	0.187663	0.049299	0.021535	0.001919	0.000495	0.001099	0.000506	0.060906	0.010352	1.000000	VALENZUELA HEN. T. DE LEON
0.223224	0.117049	0.327566	0.176382	0.025294	0.000290	0.000328	0.000054	0.000066	0.117533	0.012215	1.000000	VALENZUELA ISLA
0.544346	0.238042	0.134189	0.018646	0.016134	0.005337	0.001999	0.000885	0.000296	0.031878	0.008250	1.000000	VALENZUELA LAWANG BATU

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.551571	0.282420	0.062393	0.026325	0.005696	0.001430	0.000000	0.000115	0.000147	0.060411	0.009493	1.000000	VALENZUELA LINGUNAN
0.211189	0.091207	0.642098	0.037628	0.008472	0.001914	0.000000	0.000543	0.000815	0.005259	0.000876	1.000000	VALENZUELA MABOLO
0.291230	0.126201	0.294977	0.057719	0.056327	0.002827	0.000354	0.000677	0.000844	0.144457	0.024389	1.000000	VALENZUELA MALANDAY
0.435453	0.227227	0.120893	0.046619	0.023766	0.000722	0.001465	0.000067	0.000086	0.137652	0.006051	1.000000	VALENZUELA MALINTA
0.400329	0.182291	0.243889	0.066500	0.011799	0.003381	0.000331	0.001330	0.001788	0.079053	0.009309	1.000000	VALENZUELA MAPULANG LUPA
0.395559	0.192669	0.245056	0.058238	0.018654	0.001928	0.000557	0.000659	0.000425	0.076846	0.009408	1.000000	VALENZUELA MARULAS
0.477109	0.231924	0.168956	0.032784	0.005668	0.002280	0.000484	0.000977	0.000598	0.069064	0.010156	1.000000	VALENZUELA MAYSAN
0.330039	0.170482	0.223349	0.106078	0.020967	0.000679	0.001091	0.000032	0.000029	0.132590	0.014665	1.000000	VALENZUELA PALASAN
0.409836	0.212300	0.108614	0.058572	0.004212	0.000779	0.000421	0.000126	0.000000	0.191660	0.013479	1.000000	VALENZUELA PARIANCILLO VILLA
0.496547	0.247366	0.129925	0.029640	0.014832	0.001870	0.000340	0.000438	0.000363	0.066020	0.012659	1.000000	VALENZUELA PASO DE BLAS
0.384702	0.022459	0.452381	0.007955	0.006615	0.017751	0.000882	0.002685	0.000711	0.095590	0.008269	1.000000	VALENZUELA PASOLO
0.515772	0.236616	0.085891	0.046249	0.000000	0.004135	0.000000	0.000887	0.001330	0.109122	0.000000	1.000000	VALENZUELA POBLACION
0.410318	0.213710	0.131148	0.070618	0.008269	0.000707	0.000000	0.000000	0.000000	0.160636	0.004594	1.000000	VALENZUELA PULO
0.529988	0.280174	0.069332	0.034410	0.010538	0.000485	0.000000	0.000143	0.000043	0.072520	0.002368	1.000000	VALENZUELA PUNTURIN
0.517851	0.266890	0.029729	0.014718	0.009915	0.001125	0.000000	0.000127	0.000116	0.155760	0.003768	1.000000	VALENZUELA RINCON
0.501485	0.270030	0.111263	0.047727	0.000000	0.000000	0.000000	0.000000	0.000000	0.060202	0.009293	1.000000	VALENZUELA TAGALAG
0.452550	0.229931	0.176529	0.044022	0.020993	0.001322	0.000872	0.000368	0.000422	0.065283	0.007708	1.000000	VALENZUELA UGONG
0.495467	0.262829	0.073206	0.032069	0.005478	0.000342	0.000382	0.000132	0.000066	0.128056	0.001974	1.000000	VALENZUELA VIENTE REALES
0.494544	0.266293	0.042952	0.023128	0.003031	0.000000	0.000000	0.000000	0.000000	0.135192	0.034859	1.000000	VALENZUELA WAWANG PULO
0.393946	0.212125	0.159729	0.086008	0.009959	0.000000	0.000102	0.000000	0.000000	0.137619	0.000512	1.000000	ANGONO BAGUMBAYAN
0.427362	0.224928	0.056511	0.029979	0.007594	0.000216	0.000575	0.000442	0.000423	0.246478	0.005493	1.000000	ANGONO KALAYAAN
0.326830	0.175000	0.134494	0.072420	0.026945	0.000102	0.001779	0.000041	0.000061	0.221657	0.040671	1.000000	ANGONO POBLACION IBABA
0.391840	0.210991	0.222375	0.119740	0.000000	0.000000	0.000000	0.000000	0.000000	0.055053	0.000000	1.000000	ANGONO POBLACION ITAAS
0.462379	0.216036	0.176534	0.021347	0.018061	0.002948	0.000436	0.000817	0.000455	0.081699	0.019288	1.000000	ANGONO SAN ISIDRO
0.440924	0.228936	0.194383	0.101138	0.000591	0.000325	0.000148	0.001478	0.000000	0.032077	0.000000	1.000000	ANGONO SAN PEDRO
0.446376	0.226530	0.164429	0.057149	0.007530	0.001270	0.000552	0.000773	0.000344	0.087221	0.007827	1.000000	ANGONO SAN ROQUE
0.493426	0.265433	0.047612	0.022793	0.017128	0.000019	0.000470	0.000015	0.000000	0.150228	0.002877	1.000000	ANGONO SAN VICENTE
0.389738	0.191401	0.110174	0.057112	0.022305	0.001503	0.000000	0.000814	0.000970	0.138133	0.087850	1.000000	ANGONO SANTO NIÑO
0.462082	0.245820	0.086542	0.039488	0.031632	0.000326	0.002194	0.000158	0.000127	0.127305	0.004327	1.000000	ANGONO MAHABANG PARANG
0.152120	0.081911	0.113741	0.061245	0.014707	0.000000	0.002469	0.000000	0.000000	0.120773	0.453033	1.000000	ANTIPOLO CALAWIS
0.305838	0.145960	0.269511	0.060908	0.062094	0.001784	0.002774	0.000774	0.000403	0.134670	0.015284	1.000000	ANTIPOLO CUPANG
0.369963	0.169565	0.195397	0.037383	0.016729	0.002564	0.001417	0.001402	0.000352	0.187121	0.018108	1.000000	ANTIPOLO DELA PAZ
0.516745	0.271239	0.081752	0.019149	0.019291	0.000566	0.000585	0.000265	0.000200	0.078620	0.011587	1.000000	ANTIPOLO MAYAMOT
0.410846	0.206863	0.192813	0.035814	0.055644	0.001353	0.001283	0.000594	0.000405	0.077314	0.017070	1.000000	ANTIPOLO SAN ISIDRO
0.352094	0.147288	0.176383	0.045385	0.049311	0.003895	0.006520	0.001299	0.001308	0.137589	0.078928	1.000000	ANTIPOLO SAN JOSE
0.383438	0.192868	0.170833	0.070189	0.052498	0.001403	0.001016	0.000446	0.000102	0.109304	0.017905	1.000000	ANTIPOLO SAN ROQUE
0.383287	0.200871	0.165765	0.052840	0.032447	0.000554	0.001599	0.000243	0.000177	0.144714	0.017504	1.000000	ANTIPOLO MAMBUNGAN
0.384009	0.199328	0.145308	0.036766	0.041636	0.000701	0.002921	0.000468	0.000094	0.055146	0.133624	1.000000	ANTIPOLO BAGONG NAYON

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION
0.550206	0.295404	0.010736	0.003773	0.022054	0.000000	0.000170	0.000000	0.000000	0.114872	0.002786	1.000000	ANTIPOLO BEVERLY HILLS
0.481997	0.238110	0.067494	0.020121	0.028953	0.002090	0.001746	0.000132	0.000131	0.139273	0.019954	1.000000	ANTIPOLO DALIG
0.376858	0.185288	0.192452	0.047690	0.060397	0.001413	0.006259	0.000350	0.000382	0.065996	0.062916	1.000000	ANTIPOLO INARAWAN
0.358702	0.190049	0.102394	0.052781	0.033973	0.000283	0.004119	0.000201	0.000147	0.165049	0.092302	1.000000	ANTIPOLO SAN JUAN
0.407580	0.199554	0.195053	0.019751	0.044555	0.001928	0.001200	0.000418	0.000402	0.084142	0.045416	1.000000	ANTIPOLO SAN LUIS
0.326061	0.159231	0.226661	0.068786	0.052190	0.001671	0.002467	0.000289	0.000093	0.147060	0.015491	1.000000	ANTIPOLO SANTA CRUZ
0.566521	0.300398	0.016496	0.008882	0.040277	0.000456	0.000955	0.000107	0.000153	0.061027	0.004727	1.000000	ANTIPOLO MUNTINDILAW
0.497440	0.236324	0.116084	0.031093	0.023121	0.003106	0.000347	0.000341	0.000367	0.083220	0.008555	1.000000	CAINTA SAN ANDRES
0.558540	0.292007	0.075319	0.017185	0.016249	0.000840	0.000123	0.000160	0.000146	0.025551	0.013881	1.000000	CAINTA SAN ISIDRO
0.419828	0.209422	0.113379	0.027682	0.038178	0.001563	0.001341	0.000303	0.000150	0.179542	0.008612	1.000000	CAINTA SAN JUAN
0.467871	0.241512	0.164508	0.044465	0.002978	0.001046	0.000269	0.000350	0.000083	0.072243	0.004674	1.000000	CAINTA SAN ROQUE
0.256361	0.138041	0.303280	0.154170	0.004071	0.000000	0.001018	0.000000	0.000000	0.139949	0.003110	1.000000	CAINTA SANTA ROSA
0.192705	0.091618	0.319571	0.029221	0.060934	0.001317	0.002948	0.000565	0.000421	0.290210	0.010490	1.000000	CAINTA SANTO NIÑO
0.460330	0.231836	0.093109	0.027043	0.017700	0.001511	0.000551	0.000402	0.000296	0.159551	0.007670	1.000000	CAINTA SANTO DOMINGO
0.366902	0.194237	0.217026	0.112642	0.004652	0.000279	0.000747	0.000149	0.000163	0.095624	0.007581	1.000000	RODRIGUEZ BALITE
0.527971	0.278944	0.083137	0.038425	0.005762	0.000482	0.000361	0.000140	0.000099	0.058063	0.006615	1.000000	RODRIGUEZ BURGOS
0.504102	0.268971	0.095482	0.049942	0.016300	0.000159	0.000809	0.000264	0.000047	0.052570	0.011354	1.000000	RODRIGUEZ GERONIMO
0.072554	0.039067	0.057148	0.030772	0.021254	0.000000	0.003976	0.000000	0.000000	0.122324	0.652905	1.000000	RODRIGUEZ MACABUD
0.477154	0.245108	0.144381	0.064876	0.010503	0.001085	0.000295	0.000260	0.000219	0.046241	0.009876	1.000000	RODRIGUEZ MANGAHAN
0.328038	0.173922	0.079339	0.042721	0.028891	0.000280	0.002744	0.000112	0.000168	0.031075	0.312710	1.000000	RODRIGUEZ MASCAP
0.031923	0.007618	0.255804	0.017352	0.141717	0.001028	0.000726	0.000266	0.000399	0.024426	0.518742	1.000000	RODRIGUEZ PURAY
0.316949	0.157320	0.334643	0.092489	0.041577	0.001477	0.001290	0.000491	0.000595	0.042035	0.011133	1.000000	RODRIGUEZ ROSARIO
0.125527	0.066828	0.157123	0.084768	0.037478	0.000000	0.004690	0.000236	0.000000	0.118227	0.405123	1.000000	RODRIGUEZ SAN ISIDRO
0.377617	0.181782	0.295763	0.035236	0.026457	0.002310	0.001315	0.000656	0.000757	0.061129	0.016978	1.000000	RODRIGUEZ SAN JOSE
0.376737	0.200164	0.164246	0.083807	0.021058	0.000263	0.002520	0.000066	0.000070	0.077950	0.073120	1.000000	RODRIGUEZ SAN RAFAEL
0.534342	0.276456	0.079925	0.037756	0.023077	0.000955	0.000715	0.000566	0.000387	0.030777	0.015043	1.000000	SAN MATEO AMPID I
0.313789	0.167874	0.262877	0.136965	0.009704	0.000020	0.000079	0.000008	0.000012	0.102195	0.006478	1.000000	SAN MATEO DULONG BAYAN 1
0.168459	0.090709	0.405381	0.216945	0.008098	0.000000	0.001547	0.000000	0.000000	0.106856	0.002005	1.000000	SAN MATEO DULONG BAYAN 2
0.278332	0.140625	0.311339	0.129289	0.043128	0.000820	0.009179	0.000623	0.000433	0.083784	0.002448	1.000000	SAN MATEO GUINAYANG
0.613569	0.274923	0.039448	0.017132	0.014350	0.005375	0.000202	0.000129	0.000144	0.028471	0.006257	1.000000	SAN MATEO GITNANG BAYAN I
0.536417	0.288048	0.061036	0.031184	0.047755	0.000082	0.000089	0.000033	0.000049	0.025892	0.009415	1.000000	SAN MATEO GITNANG BAYAN II
0.390817	0.190585	0.146722	0.050042	0.037391	0.002154	0.004938	0.000881	0.000902	0.094706	0.080863	1.000000	SAN MATEO MALANDAY
0.355054	0.184258	0.275124	0.093652	0.017756	0.000678	0.001130	0.000240	0.000341	0.053268	0.018499	1.000000	SAN MATEO MALY
0.411066	0.216129	0.158065	0.084725	0.010531	0.000519	0.000887	0.000150	0.000219	0.105442	0.012267	1.000000	SAN MATEO SANTA ANA
0.421987	0.210529	0.264747	0.045792	0.004841	0.001552	0.000980	0.001087	0.000588	0.028697	0.019199	1.000000	SAN MATEO AMPID II
0.538405	0.214517	0.122581	0.005754	0.009589	0.006691	0.000208	0.002914	0.004015	0.068517	0.026808	1.000000	SAN MATEO BANABA
0.570130	0.306993	0.010521	0.005665	0.016267	0.000000	0.003907	0.000000	0.000000	0.081652	0.004864	1.000000	SAN MATEO GULONG MALAYA
0.221956	0.116151	0.057413	0.030915	0.021703	0.000347	0.002271	0.000139	0.000208	0.057413	0.491483	1.000000	SAN MATEO PITONG BOCAWE

C1	CHB	CWS	MWS	N	S1	S3	URA	URM	W1	OTHER	CHECK	LGU AND BARANGAY COMBINATION							
0.352042	0.176745	0.398778	0.010995	0.009021	0.001342	0.000350	0.000637	0.000700	0.043609	0.005781	1.000000	SAN MATEO SANTO NIÑO							
0.372382	0.194646	0.225930	0.045061	0.047279	0.000439	0.000904	0.000199	0.000092	0.042674	0.070393	1.000000	SAN MATEO SILANGAN							
0.238595	0.120979	0.300180	0.087039	0.009520	0.000613	0.001659	0.000159	0.000000	0.240083	0.001172	1.000000	SAN PEDRO BAGONG SILANG							
0.435938	0.225787	0.152605	0.052273	0.017600	0.000731	0.000475	0.000525	0.000160	0.105102	0.008803	1.000000	TAYTAY DOLORES							
0.413309	0.220145	0.164393	0.036384	0.015894	0.000257	0.002247	0.000146	0.000067	0.130498	0.016661	1.000000	TAYTAY MUZON							
0.443080	0.213273	0.152095	0.046751	0.015889	0.002440	0.000536	0.000648	0.000762	0.121971	0.002555	1.000000	TAYTAY SAN ISIDRO							
0.368133	0.191578	0.109261	0.049517	0.021524	0.000524	0.001610	0.000388	0.000192	0.245641	0.011633	1.000000	TAYTAY SAN JUAN							
0.276683	0.126473	0.190054	0.067115	0.020625	0.002089	0.000985	0.000749	0.001039	0.302005	0.012184	1.000000	TAYTAY SANTA ANA							

Table F.2. Look Up Table with multipliers for non-residential buildings (derived from Quezon City Assessor's Office data and field/desktop classification of buildings in selected Critical Facilities).

L4_USE	L5_USE	W1	W2	W3	N	CHB	URA	URM	RM1	RM2	MWS	CWS	C1	C2	C4	PC1	PC2	S1	S2	S3	S4	SUM
Education	Schools	0.0017	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0443	0.9523	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Education	Universities	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0500	0.0000	0.0500	0.0000	0.0000	0.7000	0.0000	0.1500	0.0000	0.0000	0.0500	0.0000	0.0000	1.0000	
Education	Vocational Colleges	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0625	0.0000	0.0000	0.0000	0.0000	0.7500	0.0000	0.1875	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Education	Day Care Centers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.7500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Health and Welfare	Hospitals	0.0097	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0194	0.3981	0.0000	0.5728	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Health and Welfare	Health Centers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Health and Welfare	Aged Care Centers	0.3333	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Health and Welfare	Rehabilitation Centers	0.0000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Health and Welfare	Orphanages	0.1429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1429	0.7143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Government	Administration	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0769	0.6538	0.0385	0.0769	0.0000	0.0385	0.1154	0.0000	0.0000	0.0000	1.0000	
Government	Services	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Government	Accommodation	0.0000	0.0000	0.0000	0.0000	0.1538	0.0000	0.0000	0.0000	0.0000	0.0000	0.8462	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Government	Operations	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Emergency and Defense	Police	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7500	0.0833	0.0000	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	1.0000	
Emergency and Defense	Fire and Rescue	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8571	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Emergency and Defense	Ambulance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Emergency and Defense	Armed Forces	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.4000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	1.0000	
Cultural	Places of Worship	0.0210	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0252	0.9538	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Cultural	Places of Assembly	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0377	0.9019	0.0000	0.0000	0.0000	0.0604	0.0000	0.0000	0.0000	0.0000	1.0000	
Cultural	Cemeteries	0.0588	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1569	0.7843	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Leisure	Exhibitions																					

L4_USE	L5_USE	W1	W2	W3	N	CHB	URA	URM	RM1	RM2	MWS	CWS	C1	C2	C4	PC1	PC2	S1	S2	S3	S4	SUM	
Energy Production	Gas	0.0042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0380	0.9190	0.0000	0.0000	0.0000	0.0000	0.0388	0.0000	0.0000	0.0000	0.0000	1.0000	
Energy Production	Liquid Fuels	0.0042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0380	0.9190	0.0000	0.0000	0.0000	0.0000	0.0388	0.0000	0.0000	0.0000	0.0000	1.0000	
Water Supply	Potable Water Storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.6667	0.0000	0.0000	0.0000	0.0000	0.0833	0.0000	0.0000	0.0000	0.0000	1.0000
Water Supply	Treatment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Water Supply	Transmission	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.6667	0.0000	0.0000	0.0000	0.0000	0.0833	0.0000	0.0000	0.0000	0.0000	1.0000
Water Supply	Urban Supply	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3333	0.0000	0.0000	0.6667	0.0000	1.0000
Communications	Telecommunications	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000
Communications	Broadcasting	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6667	0.0000	0.3333	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
Communications	Postal Services	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7500	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
Waste Management	Solid Waste	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.5000	0.0000	0.0000	0.0000	0.0000	0.3000	0.0000	0.0000	0.0000	0.0000	1.0000	
Waste Management	Liquid Waste	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.5000	0.0000	0.0000	0.0000	0.0000	0.3000	0.0000	0.0000	0.0000	0.0000	1.0000	
Waste Management	Hazardous Waste	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	1.0000
Transportation	Road Transport	0.0769	0.0000	0.0000	0.0769	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4615	0.0000	0.0000	0.0000	0.0000	0.1538	0.2308	0.0000	0.0000	0.0000	1.0000	
Transportation	Rail Transport	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8182	0.0000	0.0000	0.0000	0.0000	0.1818	0.0000	0.0000	0.0000	0.0000	1.0000	
Transportation	Air Transport	0.0028	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0279	0.9352	0.0000	0.0000	0.0000	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	1.0000	
Transportation	Marine Transport	0.0000	0.0000	0.0000	0.0000	0.1667	0.2500	0.0000	0.0000	0.0000	0.0000	0.2500	0.0000	0.0000	0.0000	0.0000	0.3333	0.0000	0.0000	0.0000	0.0000	1.0000	
Transportation	Cargo and Storage	0.0127	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0742	0.8981	0.0000	0.0000	0.0000	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	1.0000	
Heavy Industry	Manufacturing	0.0123	0.0123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0637	0.9076	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000	0.0000	0.0000	1.0000	
Heavy Industry	Processing	0.0123	0.0123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0637	0.9076	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000	0.0000	0.0000	1.0000	
Heavy Industry	Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8667	0.0000	0.0000	0.0000	0.0000	0.1333	0.0000	0.0000	0.0000	0.0000	1.0000	
Heavy Industry	Construction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8667	0.0000	0.0000	0.0000	0.0000	0.1333	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Retail	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0147	0.5904	0.0000	0.3864	0.0000	0.0000	0.0066	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Wholesale	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0038	0.7885	0.0000	0.0000	0.0000	0.0000	0.1923	0.0115	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Office	0.0008	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0237	0.6266	0.0000	0.3481	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Accommodation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0260	0.6364	0.0000	0.3377	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Mixed Major Commercial	0.1667	0.1667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0833	0.4167	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Markets	0.0068	0.0068	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0405	0.9243	0.0000	0.0000	0.0000	0.0000	0.0216	0.0000	0.0000	0.0000	0.0000	1.0000	
Major Commercial	Tourism Facilities	0.0625	0.0000	0.0938	0.0000	0.0313	0.0000	0.0313	0.0000	0.0000	0.5625	0.0000	0.0000	0.0000	0.0000	0.1250	0.0938	0.0000	0.0000	0.0000	0.0000	1.0000	
Food Security	Government Grain Storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000					

L4_USE	L5_USE	W1	W2	W3	N	CHB	URA	URM	RM1	RM2	MWS	CWS	C1	C2	C4	PC1	PC2	S1	S2	S3	S4	SUM
Natural Areas	National Parks	0.0435	0.0435	0.0000	0.0000	0.0000	0.0000	0.1304	0.0000	0.0000	0.0000	0.0870	0.3913	0.0435	0.0870	0.0000	0.0435	0.1304	0.0000	0.0000	0.0000	1.0000
Reserved Areas	Urban Parks	0.1429	0.0000	0.0000	0.0000	0.0000	0.0000	0.4286	0.0000	0.0000	0.0000	0.1429	0.1429	0.0000	0.0000	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	1.0000
Reserved Areas	Greenbelts	0.1429	0.0000	0.0000	0.0000	0.0000	0.0000	0.4286	0.0000	0.0000	0.0000	0.1429	0.1429	0.0000	0.0000	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	1.0000
Reserved Areas	Buffer Zones	0.1429	0.0000	0.0000	0.0000	0.0000	0.0000	0.4286	0.0000	0.0000	0.0000	0.1429	0.1429	0.0000	0.0000	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	1.0000
Reclamations	Yet to be defined																					

