# KERTAS KERJA 18

**Tajuk** : **Endless Possibilities and Opportunities: Digital JUPEM**

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# Endless Possibilities and Opportunities: Digital JUPEM

by;

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## Synopsis

*This paper enumerates the possibilities and opportunities gain from owning complete cadastral and topography databases which includes better management of printed maps, new provisions for Fees Act 2010 and new mapping product. In addition, this paper also suggests the implementation of Field Watch System to better monitor all field parties around the country to increase productivity. Furthermore it looks into the possibility of combining all 12 JUPEM States offices into one central office and a few regional offices. Most importantly it requires an urgent decision on the printing of maps MY701A/T and MY711A/T series, which is at 1:10,000 scale that totals 32,000 sheets when fully printed, when there are only 2,075 racks available in the Pusat Peta Negara.*

## 1. Introduction

I would like to begin by recording our heartfelt appreciations to Senior Officers of JUPEM in particular Director General of Survey and Mapping Malaysia, YBhg. Datuk Prof Sr Dr. Abdul Kadir bin Taib who personally leads the request for additional promotional posts at all level of Surveyor positions in JUPEM, which after many years of effort, succeeded in getting JPA to approve most of the posts applied except for a number of JUSA positions. The community of Surveyors in JUPEM sees this as fine effort by Director General who considers his staffs' contentment as an important element for a successful and vigorous organisation. This exercise that concurs with the challenges that JUPEM faces as of today and many years to come, will incredibly makes many surveyors happy and be well remembered for a long time, and will certainly propel the professionalism spirits of every surveyor in JUPEM.

JUPEM like any other organization requires continuous transformations and rejuvenations to keep up with the increasing rapid changes in technology happening around the world. It is significant to be ahead of things and this includes the understanding of human natures and their preferences, where no organization survives when this factor is ignored. JUPEM established in 1885 is already 128 years old and headed by our Nineteen Director General of Survey and Mapping Malaysia. Whilst cadastral activity was carried out during the early years of JUPEM formations, mapping activity only started officially in 1965 when cadastral was already 80 years old. Hence as of this year when cadastral activity is already 128 years old, mapping activity is only 48 years old.

In 1958, a Licensed Surveyors Act was passed by Malaysia's Parliament thus paving the way for contracting of the cadastral survey work to private sectors that was originally carried out by JUPEM alone. Unfortunately until today, JUPEM does not have any legal Act or Law to spell out the powers and functions of all its activities which were given mainly through the Cabinet decisions. Generally mapping activity requires more varied knowledge of technical subjects which may include Topography, Photogrammetry, Cartography, Hydrography, Geodesy, GIS, Astronomy, Engineering Survey, Survey Computation, Remote Sensing, Utility, Printing and international laws on boundary survey, than cadastral activity which requires knowledge in Cadastral Survey, Land Law, Survey Computation and GIS.
To date JUPEM keeps about 400,000 pieces of aerial photographs taken with analog cameras since 1966. In addition, JUPEM also archived 11,103 sheets of old and current maps including production material for future references. At every JUPEM State offices, there are Strong Rooms that are used to safely keep all the Certified Plans and Filed Books. These cadastral and mapping records are in hardcopy form and occupying large space of the office though it is hardly been referred to anymore, as the department turns to digital technology for latest methods of acquisition of survey and mapping data.

I took over as the Director of Mapping Services Sections in early 2007 and it has been almost seven years now. Since then as part of the sectional activity, many maps have been eliminated and destroyed to be replaced by new map editions. The table below shows the record of such maps:

| Year | Maps Eliminated (sheets) |
|---|---|
| 2006 | 46,441 |
| 2007 | 122,607 |
| 2008 | 302,667 |
| 2009 | 117,774 |
| 2010 | 124,755 |
| 2011 | 860,157 |
| 2012 | Nil |
| 2013 | 298,106 |
| 2013/2014 (Under action) | 1,936,835 sheets |
| **Total Maps** | **3,809,342 sheets** |

This figure above shows big wastage of fund used to print the maps and the process of destroying them. These maps were originally printed at 5,000 copies per sheet during the era of manual printing and later reduce to 3,000, 2,000 and now 1,000 copies. There was an understanding that the *Pusat Peta Negara* will keep a minimum of 1,000 copies of each map sheet to be used in emergency situations. With the current digital data being in used, this policy is no longer necessary since the reprinting of maps could be carried out easily anywhere and anytime, and with greater efficiency and speed using plotters unlike the special expensive heavy duty printers that were previously a must for such printing.

Both cadastral data and mapping data form a basic layer for any database of every agency that embarked on GIS and mapping. It is also used in various applications which include planning, car navigation, transportation, agriculture, forestry, disaster management, water management, tourism, mineral exploration, etc.

JUPEM is famous with its quality cadastral database which consists of around 8 million lots. Apart from that, its 48 years old mapping 'great grandson' also owns a completed topographic database at 25,000 scale for Peninsular Malaysia, and at 25,000 and 50,000 scales for the states of Sabah and Sarawak.

| Data Type | Content | Price | Average Cost | Cost Per Layer of Data |
|---|---|---|---|---|
| Cadastre | 8 million lot | RM740,000 | 9 cents per lot | 3 cents per lot |
| Mapping | 300,000 km2 area | RM730,000 | RM2.40 km2 | 24 cents per layer |

The above table shows that the cost to purchase cadastral data is only 9 cents per lot while mapping data cost RM2.40 per square kilometre which is dirt cheap compare to the huge cost in acquiring and maintaining the data. For example the cost for collecting details for Limbangan Sungai Muar cost RM1,200 per square kilometre.

It is to be noted that according to a study carried out, the actual cost of producing each map reached one million ringgit per sheet that covers 25 square kilometres. This means that for the whole of Malaysia where there are 713 sheets, the total cost for producing MY502A and MY512A maps series are staggering RM713 million excluding the cost of maintenance. The selling price for the same hardcopy maps of Malaysia will cost only RM14,260 while the softcopy cost only RM730,000 or 0.1% of the production cost.

At Ordnance Survey, United Kingdom, the organization had recognized the strategy of outsourcing to private sector partners that would do marketing, adding values and selling mapping products on behalf of Ordnance Survey at an agreed formula of profits sharing.

As any government department there are no competitors from other organisations unlike numerous competitors that exist in the private sectors business environment. For example in the mapping sections of JUPEM there is only one section that work on certain process of task in Malaysia except for Topography Sections where there are three sections namely in Peninsular, Sabah and Sarawak that carry out similar tasks. This lack of competitors may lead to complacent and makes benchmarking difficult. The upcoming GDAS projects where decentralisation would be carried out in Sabah and Sarawak will provide comparisons and spur competitions within the JUPEM organisation. Furthermore the rate of change in the electronic world is phenomenal. We are comfortable with email and web page technologies, but now we are under siege through 24/7 communications and the pressure to be active in personal and professional social networks. Data is also flooding in from these sources. Time and cost minimisation will be the biggest challenges in the future.

It is noted that Department of Land and Survey for Sabah and Sarawak undertake cadastral, mapping, land, valuation and planning activities which are much wider scope than that of JUPEM albeit it covers wider areas than most states in Peninsular.

It is also noted though we have *Timbalan Ketua Pengarah Ukur dan Pemetaan (Kadaster)* and *Pengarah Ukur Bahagian Kadaster*, the word *Kadaster* does not appear in the positions of all JUPEM State Directors which are called Pengarah Ukur dan Pemetaan Negeri. The irony is that all Directors of Mapping are only called *Pengarah Ukur Seksyen* without the word of *Pemetaan*. It is about time for JUPEM State directors to undertake some task related to mapping especially large scale mapping to reflect the post given. In the meanwhile, the Directors of Mapping should appropriately be called *Pengarah Ukur dan Pemetaan* to synchronise with the Directors of JUPEM State. In addition the *Pengarah Ukur Bahagian* for both mapping and cadastre should now be called *Pengarah Ukur dan Pemetaan Bahagian*.

## 2. 5S Pusat Peta Negara

*Pusat Peta Negara* was built to store and distribute printed maps to all JUPEM State and Topography Sabah and Sarawak offices. There are a total of 2,075 racks available to store these maps. At the same time the store is supposed to stock up maps for security reason. This policy is in place during the period where non digital processes which takes considerable time, are required to publish the maps and could only be printed at headquarters in Kuala Lumpur. The table below shows maps series that are kept in the *Pusat Peta Negara*:

| Type of Map | Number of Sheet |
|---|---|
| MY502A and MY512A | 713 (128 sheets printed) |
| MY701A/T and MY511A/T | 32,000 (940 sheets printed, 800 sheets at various sections) |
| Malaysia Map (4), State Map (21), Transportation (13) | 38 |
| District Map | 145 |
| TPC, ONC, Island Map | 50 |
| L7030 (354), T738 (556) A/T | 910 |
| L808 (90), L905 (360), T931 (178) A/T | 628 |
| 1:25,000 Map | 870 (Elimination Process) |

It is obvious that the printed maps which total 3,709 sheets had now overrun the number of racks available in the *Pusat Peta Negara* by 1,005 sheets and the number are still increasing rapidly due to the productions of MY series maps. This leads to *Pusat Peta Negara* becoming very disorderly and as consequence creates difficult working conditions for the staff working in the map store. In addition, there are few forklifts operating in the store to carry and transport the maps. As such, with many of the maps sitting on the floor, many passages are blocked for these forklifts to move around. Furthermore, when the maps are stacked high on the floor, it will be dangerous if it topples and could cause fatal accidents.

At this point, an urgent decision must be taken to improve the working condition of this important map store. The main issue is the printing of map series MY701A/T and MY711A/T as its total number for whole of Malaysia will be huge 32,000 sheets.

| Type of Map | Number of Sheets |
|---|---|
| MY502A and MY512A | 713 (258 sheets printed) |
| ~~MY701A/T and MY511A/T~~ | ~~32,000 (940 sheets printed, 800 sheets at various sections)~~ |
| **MY701 A/T MY711 A/T (564 sheets x 2)** | **1,129 (564 sheets x 2) (Total 2,075 sheets)** |
| Malaysia Map (4), State Map (21), Transportation (13) | 38 |
| District Map | 145 |
| TPC, ONC, Island Map | 50 |
| ~~L7030 (354), T738 (556) A/T~~ | ~~910~~ |
| ~~L808 (90), L905 (360), T931 (178) A/T~~ | ~~628~~ |
| ~~1:25,000 Map~~ | ~~870 – (Elimination Process)~~ |

The table above shows that whilst it is not necessary to limit the other maps series, it is a must to stop the avalanche of map series MY701 A/T and MY711 A/T from making the *Pusat Peta Negara* becoming a rubbish dump center that will threaten to stop all paper maps service altogether. Since the total number of racks available is only 2,075 units, the maximum available for printed maps of MY701A/T and MY711A/T are only at 1,129 sheets or 564 sheets (restricted and non-restricted maps) out of the total 32,000 sheets. This takes into considerations that non-MY series maps will be taken out from circulations and destroyed once the related MY series maps have completed its sheets production.

## 3. Possibility 1 and Opportunity 1 – Identify MY701A/T and MY711A/T Maps and Saves Money

In this case, only 564 sheets of MY701A/T and MY711A/T series need to be identified where priority should be given to urban and developing areas of the country. 82 of such cities and towns are listed as in Annex A where population exceeds 100,000.

In this regard, the decision to limit the number of printed maps series MY701A/T and MY711A/T should seriously include whether the necessity for printing two versions of restricted and non-restricted maps. If a decision is taken by JUPEM to only print non-restricted maps then it could double the number of maps sheets of this large 10,000 scale map series.

The rest of the maps should be prepared until Cartographic Section and keep in GeoPDF or Geotiff format where the maps will only be printed based on demand from consumers. This is very possible using many plotters that are currently available and additional plotters that will be acquired in near future. This act will save government huge cost of unsold maps that later would need to be destroyed after new editions maps are produced.

### 3.1 Possibility 2 and Opportunity 2 – Print On Demand for All Maps

Next JUPEM should look further the possibility of adopting a policy of Print on Demand for all maps in near future. This exercise will reduce much cost of preprinting and eliminate map stores which exist in all JUPEM offices. For this new policy, study on the demand, cost, quality of such product needs to be look into under various scenarios. Taking Ordnance Survey, UK as an example, all orders of maps through online would be printed on demand and despatch the next day if order is confirmed before 2 pm.

### 3.2 Possibility 3 and Opportunity 3 – Amending Fees Act 2010

Users of digital data require updated JUPEM data to include the latest information. According to Fees Act 2010, the users have to pay every time they apply for the data. An annual fee of RM100 for government agencies or RM200 for private companies is charged as a licensed to use JUPEM data. There is no updated version given to these users and they have to repurchase all the data each time they require latest data. This means a purchaser of this year cadastral lot that pays RM740,000 for 8 million cadastral lots will need to fork another RM740,000 plus extra

cost of the latest data to get the latest data next year. This also applies to mapping data unless the users purchase only the maps sheets that are newly updated since his last buy.

This payment is actually unfair since the buyers are paying again for the data that they already purchased last time. It is clear that these are multiple payments if the buyer decides to purchase new data every year or many times.

For this reason, Fees Act 2010 should be amended such that two new licenses for these users are introduced for both cadastral and mapping data. The licensed with annual payment of RM100,000 be charged which also allows users to request for free yearly update of cadastral data without any extra payment. Similarly another RM100,000 also be charged for the facility to annual free update of the mapping data. The users only pay once when they purchased the data and subsequent years be give free yearly update. This means that for cadastral data with a yearly payment of RM100,000, an estimated additional about 200,000 or more cadastral lots are provided which only amounting to fifty cents per lot or less.

Similarly for mapping data which updates yearly about 150 map sheets (at scale of 1:50 000) or 93,750 square kilometres will cost RM100,000 for the users each year which cost only RM666 per map sheet or RM1.00 per square kilometre. This new license will enable users of JUPEM data to continuously update their data base without having to repay their earlier purchase data and could plan their budget better. JUPEM too benefits from this arrangement that will result to higher collection of revenue.

In addition, Fees Act 2010 should also be amended pertaining to power of Director General to give remittance for data provided to agencies that requested for them. The present Fees Act is silence on the conditions and circumstances to give free or discounted data which now mainly given to most government agencies. It is recommended that this power to give remittance be amended that only free or discounted data shall only be given for the purposes of security, disaster, publicity and education. This will help JUPEM to increase its revenue which is important when involving the application for organization restructuring from JPA such as the recent case where the figures on revenues collected plays an important role for the decision make to upgrade management posts. Besides this, many government agencies ignore and become forgetful to set aside their budget for the cost of purchasing JUPEM data when carrying out their projects and acts of 'forcing' JUPEM to give free data are abundance. An example was the recent request for free data from *Pengurusan Air Aset Berhad* (PAAB) which is owned by MOF where

an officer of MOF had threatened to cut off Operating Budget of JUPEM and even reports the matter to YAB Prime Minister and YB Menteri if JUPEM refuses to give free data to PAAB.

Taking Ordnance Survey, UK again as a cue, Fees Act 2010 should also include an amendment to give special fee rates to JUPEM Partners to become resellers of JUPEM data. The partners would be the promoter and adviser of JUPEM data for all users and add value when necessary for specific applications.

### 3.3 Possibility 4 and Opportunity 4 – JUPEM New Product

Currently, JUPEM produces paper maps in flat sheet which are suitable for wall maps and difficult to keep otherwise. In addition, folded maps and maps in book form should also be published. These folded and book maps are found in abundance in any book stores since the users demand for such maps form. For example a book map of Malacca state could include Malaysia map, state map, district map and town map, historical maps and certified plans. Likewise, a book on the past and historical maps could be produced for lovers of art, history and geography. In addition many specific thematic maps in similar book form could also be produced.

These maps in a book form could easily be sold at many book stores around the where the buyers could keep the maps for a longer period as any other books in the house or office. The tourists could also purchase the books as a souvenir.

### 3.4 Possibility 5 and Opportunity 5 - Field Watch System (FiWaS)

In the light of the application of GPS technology, it is time that JUPEM considers seriously developing a GPS system to monitor all cadastral, topographic, utility and geodetic of about 400 field parties. Human resources are the most importance asset that any organization has besides other assets such as hardware and software. About 2,500 officers or 50 percent are directly involved with field work around the country and continuously moving their location of workplaces. There are issues when mentioning about the working hours of these field officers of which the most important is how to monitor their attendance in the field diligently such as that are used on office workers. This is absolutely important as every working day and every hour means productivity and integrity on the part of the field officers. The current method of supervision by the district surveyors on cadastral field parties and by regional officers on topographic field parties are minimal and based on cats and mouse game. This method actually fails to ensure that field officers work

according to their working hours. Even caught not working, the officer concerned will always be excused on taking a leave or being sick to work or already working in different locations.

Hence, the time has come to strengthen the supervision on field parties. The benefits are manifold which may see immediate jump in productivity. As such, with FiWaS in place at headquarter state and district level, the weakness in field supervision will be greatly enhanced. This FiWaS should consists of such information including field surveyors' data, type of survey job, locations of work with daily, monthly and yearly performance. For this purpose, GPS trackers could be implanted inside the survey equipment and tough books and government vehicle.

An impact study should be carried on both topographic and cadastral field parties' performance as an outcome in using new and expensive equipment with the aid of MyRTKNet technology, that judiciously should be much higher than the progress of work employing old plane table, and theodolite and chain survey that were previously employed.

### 3.5 Possibility 6 and Opportunity 6 – Merging of 12 State Offices into One Office

This possibility may be the most objectionable to implement due to the issues of loss of promotional posts and welfare of the staffs unless solutions to these issues are acceptable. The current 12 JUPEM State offices including Labuan, were set up to comply with the state administrative boundaries and to be close the locations of field work since manual processes of survey were employed at that time. But time change with a powerful eKadaster system at used and employed advanced mobile wireless technology especially in the field. EKadaster is almost entirely automated and requires little human intervention in processing data into certified plans and kept seamlessly in the National Digital Cadastral Database. Hence providing savings of manpower at office level. Now the huge question ***is it still necessary to still operate JUPEM offices at every state when huge savings could be obtained if there is only one cadastral office like Peninsular Topography Office compare to 12 offices now and 30 district offices***. This is certainly very possible with eKadaster and FiWaS in placed. Savings in offices, management and overhead cost would be very large. This OneKadster office will also help to secure the database from being stolen and sell for profits. Looking at private sector angle and possibly at the operation of Department of Land and Survey of Sabah and Sarawak, only one central office and 3 or 4 regional offices will be sufficient taking

into considerations the economic value and usage of existing technology. Instead, the topographic capability of JUPEM should be increased manifold to cater for the updating of rapid changes of features in Malaysia.

## 4. Moving Forward Beyond 2020

In summary, there are many possibilities and opportunities around us even working as a civil servant. JUPEM needs to have an Establishment Act to stake its many functions and enhanced its current activities. In addition, it is also desirable to look at the possibility of total Print on Demand for all its maps series which means no maps store is necessary at all. Most imperative now is to limit the number of sheets of printed map series MY701A/T and MY711A/T due to space constraint in *Pusat Peta Negara*. Furthermore it will be plausible to keep all the archived maps and aerial photographs in digital for future references.

Wrapping up there are many various subjects that are affecting JUPEM which requires further and detailed studies which includes:

a. The Status Of Certified Plans And Field Books In The JUPEM State Offices
b. JUPEM Establishment Act
c. Separating Cadastral And Mapping Division Into Two Separate Agencies
d. Partners of JUPEM Products
e. Outsourcing of Mapping Job
f. Privatisation of Cadastral Survey Functions
g. Impact and Outcome of Development Projects

Finally, as we will enter a period beyond the year 2020 where most of the sitting directors and senior officers will already be retired, let us think uncommon sense a landscape of opportunities made available in this era of Digital Malaysia particularly Digital JUPEM. The magnanimous sweats of today will be handsomely rewarded with numerous future achievements due to many astute and sound policies of now that will become fundamental and focal policies for the next generations of JUPEM.

**Annex A**

## Population in Malaysia's Cities and Townships in 2010

| No. | City/Town | State | Population |
|---|---|---|---|
| 1. | Kuala Lumpur | **Wilayah Persekutuan Kuala Lumpur** | 1,588,750 |
| | | | |
| 2. | Kota Kinabalu | **Sabah** | 452,058 |
| 3. | Tawau | Sabah | 397,673 |
| 4. | Lahad Datu | Sabah | 199,830 |
| 5. | Semporna | Sabah | 133,164 |
| 6. | Kinabatangan | Sabah | 182,328 |
| 7. | Beluran | Sabah | 104,484 |
| 8. | Tuaran | Sabah | 102,411 |
| 9. | Penampang | Sabah | 176,667 |
| 10. | Papar | Sabah | 124,420 |
| 11. | Kota Marudu/Pitas | Sabah | 104,182 |
| 12. | Keningau | Sabah | 173,103 |
| | | | |
| 13. | Kuching Utara | **Sarawak** | 165,642 |
| 14. | Kuching Selatan | Sarawak | 159,490 |
| 15. | Miri | Sarawak | 234,541 |
| 16. | Sandakan | Sarawak | 396,290 |
| 17. | Padawan | Sarawak | 273,485 |
| 18. | Sibu | Sarawak | 162,676 |
| 19. | Samarahan | Sarawak | 116,685 |
| 20. | Kapit | Sarawak | 110,656 |
| 21. | Bintulu | Sarawak | 212,994 |
| | | | |
| 22. | Johor Bahru | **Johor** | 497,067 |
| 23. | Batu Pahat | Johor | 209,461 |
| 24. | Johor Bahru Tengah | Johor | 529,074 |
| 25. | Kluang | Johor | 167,833 |
| 26. | Muar | Johor | 201,148 |
| 27. | Kulai | Johor | 234,532 |
| 28. | Segamat | Johor | 103,035 |
| 29. | Tangkak | Johor | 131,890 |
| | | | |
| 30. | Alor Setar | **Kedah** | 405,523 |
| 31. | Sungai Petani | Kedah | 443,488 |

| | | | |
|---|---|---|---|
| 32. | Kulim | Kedah | 281,260 |
| 33. | Baling | Kedah | 132,304 |
| 34. | Kubang Pasu | Kedah | 214,479 |
| | | | |
| 35. | Melaka Bandaraya Bersejarah | **Melaka** | 484,885 |
| 36. | Alor Gajah | Melaka | 173,712 |
| 37. | Jasin | Melaka | 131,539 |
| 38. | Ipoh | **Perak** | 657,892 |
| 39. | Manjung | Perak | 211,113 |
| 40. | Kuala Kangsar | Perak | 108,504 |
| 41. | Taiping | Perak | 245,182 |
| 42. | Teluk Intan | Perak | 128,143 |
| 43. | Kerian | Perak | 120,192 |
| | | | |
| 44. | Petaling Jaya | **Selangor** | 613,977 |
| 45. | Shah Alam | Selangor | 541,306 |
| 46. | Selayang | Selangor | 542,409 |
| 47. | Klang | Selangor | 744,062 |
| 48. | Subang Jaya | Selangor | 708,296 |
| 49. | Sepang | Selangor | 207,354 |
| 50. | Kajang | Selangor | 795,522 |
| 51. | Ampang Jaya | Selangor | 468,961 |
| 52. | Kuala Langat | Selangor | 220,214 |
| 53. | Kuala Selangor | Selangor | 205,257 |
| 54. | Ulu Selangor | Selangor | 194,387 |
| | | | |
| 55. | Kuala Terengganu | **Terengganu** | 337,553 |
| 56. | Dungun | Terengganu | 149,851 |
| 57. | Kemaman | Terengganu | 166,750 |
| 58. | Besut | Terengganu | 136,563 |
| | | | |
| 59. | Kota Bharu | **Kelantan** | 314,964 |
| 60. | Ketereh | Kelantan | 153,474 |
| 61. | Pasir Mas | Kelantan | 180,878 |
| 62. | Pasir Puteh | Kelantan | 113,191 |
| 63. | Tanah Merah | Kelantan | 115,949 |
| 64. | Tumpat | Kelantan | 143,793 |
| | | | |

| | | | |
|---|---|---|---|
| 65. | Port Dickson | **Negeri Sembilan** | 101,073 |
| 66. | Seremban | Negeri Sembilan | 314,502 |
| 67. | Nilai | Negeri Sembilan | 200,988 |
| | | | |
| 68. | Bentong | **Pahang** | 114,397 |
| 69. | Kuantan | Pahang | 427,515 |
| 70. | Temerloh | Pahang | 158,724 |
| 71. | Pekan | Pahang | 103,839 |
| 72. | Rompin | Pahang | 109,599 |
| 73. | Maran | Pahang | 111,056 |
| | | | |
| 74. | Kangar | **Perlis** | 225,590 |
| | | | |
| 75. | Seberang Perai | **Pulau Pinang** | 818,197 |
| 76. | Pulau Pinang | Pulau Pinang | 708,127 |
| 77. | Bukit Mertajam | *(sumber Wikipedia)* | 227,972 |
| 78. | Georgetown | *(sumber Wikipedia)* | 207,743 |
| 79. | Sungai Ara | *(sumber Wikipedia)* | 187,990 |
| 80. | Gelugor | *(sumber Wikipedia)* | 171,652 |
| 81. | Ayer Itam | *(sumber Wikipedia)* | 117,662 |
| 82. | Butterworth | *(sumber Wikipedia)* | 104,719 |