

Questionable Water Demand Figures Used to Justify The Pahang-Selangor Raw Water Transfer Project

**By
*The Coalition for Sustainable Water Management (CSWM)**

31 March 2009

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The Federal government has claimed that without the Pahang-Selangor Raw Water Transfer Project, Selangor and the Federal Territories of Kuala Lumpur and Putrajaya will face a major water shortage in 2007¹. It is now 2009, and while the project has not been implemented, the projected water crisis has not materialized.

The Pahang-Selangor Raw Water Transfer Project, estimated to cost around RM9 billion, was a proposal arising from the National Water Resources Study (NWRS) commissioned by the EPU in 2000 (see Appendix 1). **It is the view of the Coalition, that the NWRS has a number of grievous flaws, raising doubts on the viability of the NWRS as a justifying document for the Pahang-Selangor Raw Water Transfer project and all other water supply projects that may arise from the recommendations made in the study.**

1. Immediate Need for a Review of the NWRS Report

In view of the enormous financial costs required to implement the water transfer projects and the substantial environmental impacts arising from their implementation, there is an immediate need to conduct a thorough review of the relevant information in the NWRS report used to justify the project. Particular focus needs to be placed on the **projected water demands and population growth figures** for the following reasons:

- (a) Use of questionable per capita water demand figures in the Report
- (b) Changes in Development Plans for Peninsular Malaysia since 2000
- (c) Need for the proposed projects to adapt to "Climate Change Scenarios"

1.1 Use Of Questionable Per Capita Water Demand Figures In The NWRS

The method recommended for estimating water demand in the country is the "*Design Guidelines for Water Supply Systems*", (which is an adaptation of the JKR Design Criteria and Standards for Water Supply Systems published in 1989), that was published by the Malaysian Water Association (MWA) in 1994.

No reasons were given in the NWRS report as to why the recommended method cited above was not used in calculating the water demand in the report. Neither were any deficiencies in the MWA method that might have made its application in the NWRS unsuitable, highlighted in the report. Moreover, there is no specific reference made in the NWRS report to the MWA Design Guidelines, or to any JKR Design Criteria and Standards!

Instead, a general comment made in the NWRS report² on estimating water demand based on the MWA Method, states that "*the water demand estimates derived based on such methods have been generally satisfactory.*" If it is satisfactory, and given that the JKR/MWA design guideline is an industry standard, why did the report not use the recommended method? Given its importance, the report should explain why it was not used.

Estimates for the per capita water demand in the NWRS report, are typically more than **double** the maximum value of **320 litres per capita per day (l/c/d)** value for urban areas recommended in Section 5.1.5 in the MWA Design Guidelines. These substantially greater estimates are then used to justify the Pahang-Selangor Raw Water Transfer Project.

¹ The Detailed EIA of JKR Proposed Raw Water Transfer Project from Pahang to Selangor by MBA Aug 2000, Executive Summary, Page 1

² NWRS, Volume 3 Sector Report Domestic and Industrial Water Demand Forecasting, Chapter 4 – see page 4-2

a. Grossly inflated per capita water demand

It is important to note that the figure of 320 l/c/d stated in the MWA Design Guidelines is within the range of per capita water consumptions reported for major cities of other countries, such as 156 l/c/d for London (UK), 214 l/c/d for Sydney (Australia)³ and 328 l/c/d for Singapore.⁴

In comparison the water demand figures used in the NWRS Report of **400-657 l/c/d** for the capital region of Kuala Lumpur and Selangor⁵ in 1995 with projected, progressive increase of up to **500-1224 l/c/d in 2010**, and up to **729-1077 l/c/d in 2050** appear **highly excessive and thus appear highly questionable**⁶.

b. Flawed NWRS method used in estimating industrial water demand

The recommended 320 l/c/d stated in the MWA “*Design Guidelines for Water Supply Systems*”, accounts for all normal commercial, industrial and domestic use, including a 25% loss due to unaccounted-for-water losses.

However, Table 5.1 in the NWRS Report, Volume 12: Selangor provides separate estimates for domestic, commercial and institutional uses, as well as the unaccounted-for-water losses (see Appendix 2).

This breakdown of uses arises from the method adopted in the NWRS, in preference to the recommended MWA method, to estimate water demand. The method used in the study attempts to make separate estimates for the domestic, commercial, institutional, leakage and industrial water demands. It can be observed from Table 5.1, that the large increase in the total per capita water demand projection in all the stated years arise principally from projected industrial uses.

The “Water Requirements Approach” is the method used in the NWRS to estimate total industrial water demand. This approach assumes that there is an inter-relationship between GDP, per capita income and manufacturing growth, and between manufacturing growth and industrial water demand (which in the NWRS, strictly refers to the water required by the manufacturing sector). The procedure adopted to estimate the industrial water demand for 2000 to 2050 in the Approach, requires the following six steps.

1. Estimate the projected national GDP growth for 2000-2050
2. Calculate the projected per capita GDP (whole country)
3. Estimate the projected total GDP of each state in Peninsular Malaysia
4. Estimate the “Manufacturing Value-Added (MVA)” component in the estimated total State GDP
5. Calculate the estimated total gross value of manufacturing output for each state from the MVA
6. Estimate the projected total cost of industrial water, for each state from the estimated total gross value of manufacturing output.

In applying the above procedure to calculate the total industrial water demand (manufacturing sector water demand), a series of highly questionable and unsupported assumptions need to be made at every step to link the national GDP to per capita income, to manufacturing growth, and ultimately to the industrial water demand.

³ [Source: “*Report on Leakage and Water Efficiency*”, 1998-1999, Office of Water Services Regulatory Body for Water Industry in England and Wales, pg 16 and 43, respectively]

⁴ (www.pub.gov.sg)

⁵ capital region comprising of Kuala Lumpur, Gombak, Klang, Petaling, Sepang, Hulu Langat and Ulu Selangor

⁶ (NWRS Report Volume 12: Selangor : Table 5.1) – see Appendix 2

This may explain why, at the end of the six-step procedure, the estimated industrial water demand figures become grossly excessive, as compared with those estimated using the recommended MWA method and projected industrial land requirements in Selangor, as reported in the Rancangan Struktur Negeri Selangor 2020 (RSNS-2020)⁷.

c. Estimated industrial water demand in Selangor - A comparison of NWRS figures against figures calculated using the MWA method and RSNS-2020 data

An estimate of the per capita industrial water demand in Selangor, based on the method used in the MWA Design Guidelines, and the projected industrial and population figures given in the RSNS-2020, was carried out (see Appendix 3).

It was found that the per capita industrial water demand ranges from 13.66 l/c/d in 2010 to 27.39 l/c/d in 2020 assuming that the projected industrial land in Selangor for 2010 and 2020 are completely utilised for heavy industries, respectively.

The Table below shows the comparison of figures for the industrial water demands for 2010 and 2020 for Selangor, derived using the NWRS and MWA method.

Comparison of the Estimated Industrial Water Demands for 2010 and 2020 for Selangor, reported in the NWRS and estimated using the recommended MWA Method

Year	2010	2020
NWRS Method (l/c/d)	75-659	139-611
MWA Method (l/c/d)	13.66	27.39

Note: The values in the NWRS Method refers to a range of values for different districts in Selangor

It can be seen that the appreciably lower figures derived using the MWA method seem more reasonable compared with the extremely high values given in Table 5.1 in the NWRS Report for the year 2020

1.2 Changes In Development Plans For Peninsular Malaysia Since 2000

Since the completion of the NWRS, there have been a number of significant changes in the development emphasis in the country. A National Physical Plan Study for Peninsular Malaysia was completed in 2005 and needs to be considered in the planning for management of national water resources.

Also, in an effort to spread development to other parts of the country, the Government has initiated and promoted the Northern, Eastern and Southern Economic Development Corridors. There is an immediate need to review the basis for the raw water transfer project due to these major changes in the development plans, which were not considered during the preparation of the Report. There is also a need to review the projected population figures given in the Report against the actual current population figures.

1.3 Need For The Proposed Projects In View Of Climate Change

The Malaysian Government should review all projects and plans that may be affected by climate change. Climate change affects weather patterns and rainfall and will significantly impact on the national hydrological characteristics and on the justifications for the projects recommended by the NWRS report.

⁷ Rancangan Struktur Negeri Selangor 2020 (RSNS-2020) was gazetted on 14 June 2007 by the Selangor State Government (Gazette No. 1541)

To summarise, the Pahang-Selangor Raw Water Transfer project is based on figures where the margin of error is more than 100%. This is most probably due to the use of the questionable method used in the NWRS to estimate industrial water demand. The figure of 320 l/c/d recommended in the MWA Design Guidelines, which is an adaptation from the JKR Design Criteria and Standards for Water Supply Systems, should be used instead. This figure has already accounted for all normal commercial, industrial and domestic use, including a 25% loss due to unaccounted-for-water losses.

In addition, it must be noted that there are no plans or strategies in the NWRS Report to manage per capita water demand at a sustainable level. Instead, the report assumes that per capita water demand will continue to increase unabated into the future.

2. Recommendations

In view of the above facts, there is a need for the Malaysian Government to take **immediate action** to do the following:

- (a) **Stop all on-going work** (design and award of tenders for construction) on the Pahang-Selangor Raw Water Transfer Project, pending the complete review of the basis for the water transfer projects as given in the NWRS report.
- (b) Conduct a complete review of the NWRS report and update it with the latest information to account for the 3 main issues raised above, and include strategies and plans to manage the per capita water demand to remain at a sustainable level.
- (c) Commission an immediate study to review the need for the water transfer projects based on the updated NWRS report

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Background on the National Water Resources Study

[Kajian Sumber Air Negara 2000-2050 (Semenanjung Malaysia), March 2000, by SMHB Sdn Bhd, in association with Ranhill Bersekutu Sdn Bhd and Jurutera Perunding Zaaba Sdn Bhd]

In 2000, a National Water Resources Study (NWRS) was completed for all states of Peninsular Malaysia covering aspects of planning, development and management of water resources till 2050. The scope of the study included:

- (a) Assessment of the availability of water in each state, in terms of quantity and quality for domestic and industrial water supply, irrigation, hydropower and environmental functions.
- (b) Identification of all possible alternative water sources for development and recommendation of the most viable projects for implementation to meet requirements in the various states, including inter-basin and inter-state transfers.

The NWRS report concluded that no additional feasible water catchment sites are available in Selangor. The Report proposed that inter-basin water transfer from planned reservoirs in Sungai Pahang be implemented to meet the projected water demands in Selangor and Kuala Lumpur till 2050.

Two major inter-basin water transfer projects were proposed: the Southern and Northern Water Transfer Projects from Pahang to Selangor, via Southern and Northern transfer tunnels, respectively through the Main Range. These projects are planned for implementation, in phases over the next 40 years, to provide the additional water supply to avoid a water crisis.

The Malaysian Government has followed the recommendations of the Report and is now in the process of implementing the Southern Water Transfer Project i.e. the Pahang-Selangor Raw Water Transfer Project.

SELANGOR & KUALA LUMPUR

Table 5.1 Per Capita Demand projections (in l/c/d)
(Ref: NWRS Report, Volume 12: Selangor)

	1995	1997	2000	2010	2020	2030	2040	2050
Domestic uses								
*CR	245-255	265-275	285-290	295-300	310-325	310-330	310-330	310-330
**OD	220	235	240	265	275	280	280	280
Commercial uses								
CR	30-35	35-40	40-50	60-80	80	85	90	90
OD	20	25	28	30	55	60	60	60
Institutional uses								
CR	15-35	35	30-35	50-80	80	85	90	90
OD	21	17	26	19	68	84	87	88
Industrial uses								
CR	40-247	41-214	64-494	75-659	139-611	145-555	180-524	164-477
OD	5-14	25-55	27-65	40-150	109-218	256-393	269-360	259-348
Total uses								
CR	330-537	376-549	419-849	480-1064	620-1081	645-1035	670-1014	654-967
OD	274	359	375	426-475	494-603	656-793	669-760	663-748
Losses								
CR	70-120	76-130	60-160	80-160	90-120	90-110	85-130	75-110
OD	50-57	63-70	65-75	51-70	67-90	86-101	81-85	75-85
Demand								
CR	400-657	452-679	479-1009	560-1224	720-1181	735-1129	750-1144	729-1077
OD	318-331	374-410	388-436	418-545	561-693	742-893	749-845	734-833

Notes: Figures quoted are averages for regions-see detailed calculations for actual quantities allowed in the various districts

*CR- Capital Regions comprising of Kuala Lumpur, Gombak, Klang, Petaling, Sepang, Hulu Langat and Ulu Selangor

**OD – Outer Districts of Selangor comprising of KualaLangat, Kuala Selangor and Sabak Bernam

Estimation of Industrial Water Demand based on the recommended MWA Method, using the projected industrial land requirements and population figures given in the Rancangan Struktur Negeri Selangor 2020 (RSNS-2020), June 2007

To calculate the additional industrial water demand, the recommended method to estimate industrial water demand in Section 5.1.7 in the MWA Design Guidelines uses the size of any proposed industries as well as the unit-area water demand figures for different types of industries.

The MWA Design Guidelines also recommends the unit-area water demand of 22,000 litres/hectare/day(l/ha/day) for light industries and 45,000 litres/hectare/day for heavy industries.

The Table below gives the projected population and industrial land requirements in Selangor, as extracted from the RSNS-2020. It shows how:

- the total industrial water demand per day in Selangor for two unit-area water demand rates as recommended in the MWA Guidelines are calculated – 45,000 (100% heavy industries) and 33,500 (averaged rates based on 50% heavy and 50% light industries)
- the per capita industrial water uses are derived.

Estimation of Industrial Water Demand for Selangor for 2005-2020, using the MWA Method

Year	2005	2010	2015	2020
Industrial Land Needed (ha)	1807	1812	3920	4485
Projected Population	5,097,430	5,968,350	6,854,030	7,369,030
Calculations based on 45,000 l/ha/day (100% Heavy industries)				
Total Water Demand (litres/day)	81,315,000	81,540,000	176,400,000	201,825,000
Per Capita Industrial Water Uses (l/c/d)	15.95	13.66	25.74	27.39
Calculations based on 33,500 l/ha/day (50% Heavy + 50% light industries)				
Total Water Demand (litres/day)	60,534,500	60,702,000	131,320,000	150,247,500
Per Capita Industrial Water Industrial Uses (l/c/d)	11.86	10.17	19.16	20.39