

REFERENCES

Thai

- ควบคุมมลพิษ, กรม. 2539. การแก้ไขปัญหาการฝังกากสารเคมี จังหวัดกาญจนบุรี. 35 หน้า
- ควบคุมมลพิษ, กรม. 2541. เกณฑ์มาตรฐานและแนวทางการจัดการขยะมูลฝอยชุมชน. กรุงเทพมหานคร: กองจัดการสารอันตรายและกากของเสีย กรมควบคุมมลพิษ. 100 หน้า
- ทรัพยากรธรณี, กรม. 2519. แผนที่ธรณีวิทยาบริเวณจังหวัดกรุงเทพมหานครมาตราส่วน 1:250000. กองธรณีวิทยา
- ทรัพยากรธรณี, กรม. 2519. รายงานการสำรวจธรณีวิทยา บริเวณจังหวัดกรุงเทพมหานครและบริเวณจังหวัดระยองมาตราส่วน 1:250000. 7 หน้า
- ทรัพยากรธรณี, กรม. 2526. ทรัพยากรในดินกำแพงเพชร. เอกสารทรัพยากรธรณีเล่มที่ 2. 136 หน้า
- ทรัพยากรธรณี, กรม. 2539. แผนที่น้ำบาดาลจังหวัดฉะเชิงเทรามาตราส่วน 1:100000. ฝ่ายแผนที่ธรณีวิทยา กองธรณีวิทยา
- ทิม คอนซัลติ้ง เอนจิเนียริ่ง, บจก. 2538. รายงานการศึกษาฉบับสมบูรณ์. โครงการศึกษาเพื่อจัดทำแผนปฏิบัติการและจัดลำดับความสำคัญการลงทุนเพื่อแก้ไขปัญหาสิ่งแวดล้อมจังหวัดฉะเชิงเทรา.
- ธงชัย พรรณสวัสดิ์. 2531. การจัดการมูลฝอยโดยวิธีฝังกลบฝังดินอย่างถูกหลักสุขาภิบาล. หลักการพิจารณาคัดเลือกสถานที่กำจัดมูลฝอย. 19-23 กันยายน 2531: หน้า 1-159 ถึง 1-162.
- นนทบุรี, องค์การบริหารส่วนจังหวัด. 2537. โครงการกำจัดขยะมูลฝอยแบบถูกสุขลักษณะ (Sanitary Landfill) ของสถานที่ทิ้งขยะมูลฝอยขององค์การบริหารส่วนจังหวัดนนทบุรี ตำบลคลองขวาง อำเภอไทรน้อย จังหวัดนนทบุรี เสนอต่อ กระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม
- บุญยง โฉมวงศ์วัฒน์. 2535. การจัดการกากของเสียที่อันตรายต่อสิ่งแวดล้อม. สิ่งแวดล้อม 35. หน้า 501-502.
- ปกรณ์ หล่อวิริชสุธี ปริญญา ผลบุตร และอุภาสิณีย์ จันทนะผะลิน. 2543. การประยุกต์ระบบสารสนเทศทางภูมิศาสตร์ในการคัดเลือกพื้นที่สร้างสนามกอล์ฟของจังหวัดฉะเชิงเทรา (ซีดี-รอม). วิชา GIS: ภาควิชาธรณีวิทยา.
- ปรีดี แย้มเจริญวงศ์. 2531. การจัดการขยะมูลฝอย. ขอนแก่น: โรงพิมพ์มหาวิทยาลัยขอนแก่น.

- โมดัส คอนซัลแทนส์, บจก. 2538. รายงานฉบับสมบูรณ์. แผนการจัดการสิ่งแวดล้อมชุมชนและพื้นที่สีเขียวของภาคมหานคร เสนอต่อสำนักนโยบายและแผนสิ่งแวดล้อม.
- สุโขทัยธรรมมาธิราช, มหาวิทยาลัย. 2533. โครงการพัฒนาคุณภาพสิ่งแวดล้อมของเมืองหลัก. คู่มือการจัดการมูลฝอยสำหรับชุมชนเมืองหลักและเมืองศูนย์กลางความเจริญในภูมิภาค ฉบับที่ 3 เสนอต่อสำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติ. 226 หน้า.
- สุทิน อยู่สุข. 2531. การจัดการมูลฝอยโดยวิธีฝังกลบฝังดินอย่างถูกหลักสุขาภิบาล. การคาดการณ์ประมาณปริมาณและลักษณะของมูลฝอย. 19-23 กันยายน 2531: หน้า 1-53 ถึง 1-74.
- สุพจน์ โฉ่ววีชรินทร์. 2531. การจัดการมูลฝอยโดยวิธีฝังกลบฝังดินอย่างถูกหลักสุขาภิบาล. การฝึกอบรมทางวิชาการเรื่องการจัดการมูลฝอย. 19-23 กันยายน 2531: หน้า 1-167 ถึง 1-167.
- อดิศักดิ์ ทองไข่มุก. 2531. การจัดการมูลฝอยโดยวิธีฝังกลบฝังดินอย่างถูกหลักสุขาภิบาล. สถานการณ์ด้านการจัดการมูลฝอยของประเทศไทยในปัจจุบัน. 19-23 กันยายน 2531: หน้า 1-19 ถึง 1-25.

English

- Boonlue, S. 1998. Solid waste disposal site selection: A Case study of Sanitary Districts of Mae Sai, Mar Chan, and Chiang Saen. Master's Thesis, Department of Geography, Graduate School, Chulalongkorn University.uz
- Chachoengsao Provincial Statistical, Office. 1999. Statistical Reports of Changwat Chachoengsao Provincial Statistical Office. 99 p.
- Christensen, T, H., Cossu, R., and Stegmann, R. 1994. Landfill of Waste: Barrier. London: E. & F.N. Spon. 631 p.
- Department of Environmental Quality Promotion. Digital Format of Environmental Information of Changwat Chachoengsao. (CD-ROM).
- Dheeradilok, Ph., and Kaewyana, W., 1983. On the Quaternary deposits of Thailand. Third meeting of the working Group on Geomorphology of river and coastal plains. 11-17 December. pp. 11-17.
- Disathien, C. 1992. Selection of Potential Sites for Solid Waste Disposal. Using Geographic Information System (GIS) Technology: A Case Study of Saraburi Municipality. Master's Thesis, Technology of Environmental Management, Graduate School, Mahidol University.

- Field, Brian G., and Mac Gregor, Bryan D. 1992. Forecasting Techniques for Urban and Regional Planning. 3rd. London: UCL Press. 238 p.
- Huong, P.T. 1996. Solid Waste Management in Hanoi, Vietnam: A Case Study of Hospital Waste Management. Master's Thesis, Department of Science. Asian Institute of Technology School of Environment Resources and Development
- Jarupongsakul, S. 1987. Stratigraphy of Bangkok clay and Holocene Transgression of The Chao Phraya Delta, Central Thailand. Master's Thesis, Division of Tropical of Agriculture, Graduate School of Agriculture, Kyoto University.
- Kerdput, K. 1999. Selection of potential solid waste disposal areas in Pathum Province. Master's Thesis, Inter-Department of Environmental Science, Graduate School, Mahidol University.
- Kreith, F. 1994. Handbook of solid waste management. The United States of America: McGraw-Hill, Inc.
- Lillesand, Thomas M., and Kiefer, Ralph W. 1994. Remote Sensing and Image Interpretation. 3rd. New York: Wiley. 750 p.
- Meteorological, Department. 1998. Rainfall and Temperature Statistical Data of Changwat Chachoengsao. Meteorological Department.
- Mungkung, N. 1992. Preliminary Environmental Geological Assessment for Regional Planning in Changwat Chachoengsao, Eastern, Thailand. Bachelor's Senior Project, Department of Geology, Chulalongkorn University.
- National Statistical, Office. 2001. Thailand Statistical. (Internet)
- Noble, G. 1976. Sanitary Landfill Design Handbook. Westport, CT: Technomic. 285 pp.
- Pavoni, J. L., Hagerty, D.J. and Heer, J.E. 1975. Handbook of Solid Waste Disposal. New York: S.N.
- Petts, J., and Eduljee, G. 1994. Environmental Impact Assessment for Waste Treatment and Disposal Facilities. New York: Wiley. 485 p.
- Pfeffer, J.T. 1992. Solid Waste Management Engineering. the United States of America: Prentice-Hall. 302 p.
- Pokaew, S. 1999. Environmental geology of Changwat Krabi for land use planning by using GIS. Master's Thesis, Department of Geology, Graduate School, Chulalongkorn University.

- Testa, S.M. 1994. Geological Aspects of Hazardous Waste Management. the United States of America: CRC Press.
- Thassanapak, H. 2001. Potential Landslide Assesment of Changwat Phuket. Master's Thesis, Department of Geology, Graduate School, Chulalongkorn University.
- Thiramongkol, N. 1983. Geomorphology of the Lower Central Plain, Thailand. Third meeting of the working Group on Geomorphology of river and coastal plains. 11-17 December. pp. 13-25.
- Thiramongkol, N. 1983. Review of Geomorphology of Thailand. First Symposium on Geomorphology and Quaternary Geology of Thailand. 28-29 October. pp. 6-23.
- UNEP, and other. 1993. Landfill of Hazardous Industrial Wastes: A Training Manual. Technical Report No.7. Paris: UNEP. 315 p.
- Van der Wall, R., Wiriosudarmo, S., Zabinal Abidin, D. 1992. Site Selection for Domestic Waste Disposal Sites in the Hilly Surroundings of the Batujajar and Bandung Plains. Project CTA 108 Environmental Geology for Landuse and Regional Planning. Project Rep. No.24.
- Wilson, D.G. 1978. Handbook of Solid Waste Management. New York: Van Nostrand Reinhold. 752 p.
- Youcai Z., and others. 2001. Monitoring and long-term prediction of refuse compositions and settlement in large-scale landfill. Waste Manage & Research. 2(August 2001): 160-168.

APPENDIX

APPENDIX A

FIELD OBSERVATION

Table A.1 Growth Rate for Calculation of Number of Population by Municipalities and Sanitaries During 1994-2013 of Changwat Chachoengsao

r	r-values										
	Muang Chachoengsao	Nakorn Nuang Khet	Bang Pakong	Bang Khlua	Bang Wau	Tha Sa An	Tha Kham	Bang Khla District	Pak Nam	Plaeng Yao	Hua Samrong
r_{min}	-0.021381	-0.146506	-0.032875	-0.201800	-0.109971	-0.165555	-	-0.068497	-0.012500	0.000571	-
r_{min+1}	-0.017119	-0.107272	0.001456	-0.003501	0.000322	-0.164535	-	-0.046093	-0.010812	0.000579	-
$r_{..}$	-0.016831	0.062542	0.002803	0.001322	0.002608	-0.034783	-	-0.013185	-0.009655	0.000579	-
$r_{..}$	-0.010367	0.107486	0.003786	0.001765	0.003536	0.007407	-	0.001778	-0.006695	0.000579	-
$r_{..}$	0.001113	0.111972	0.004249	0.003925	0.003555	0.008683	-	0.018365	-0.000554	0.000696	-
$r_{..}$	0.023097	0.120162	0.005631	0.005204	0.003850	0.033966	-	0.033402	0.002209	0.000812	-
$r_{..}$	0.025396	0.128230	0.006877	0.005279	0.009449	0.061036	-	0.043759	0.004765	0.002210	-
$r_{..}$	0.031914	0.139427	0.010354	0.007027	0.016067	0.063265	-	0.072548	0.005292	0.009748	-
r_{max-1}	0.042506	0.150389	0.026153	0.016825	0.026495	0.165541	-	0.165185	0.017130	0.012377	-
r_{max}	0.045264	0.184864	0.031102	0.254996	0.138569	0.202004	-	0.232239	0.042865	0.016474	-
r	0.009964	0.089117	0.007664	0.004731	0.008235	0.017573	0.007664	0.034470	0.000210	0.003447	0.003447

r	r-values											
	Thung Sa Dao	Bang Nam Prieo	Bang Khanak	Don Chim Plee	Saladaeng	Ban Pho	Thepparat	Phanom Sarakham ¹	Koa Khanoon	Khao Hinson	Sanam Chai Khet	Ratchasan
r_{min}	-	-0.291040	0.002086	0.000351	-	-0.010556	-0.026131	-0.109999	-0.009169	-	-0.079140	-
r_{min+1}	-	-0.168716	0.002428	0.005109	-	0.000000	-0.011392	-0.090072	0.000000	-	-0.025248	-
$r_{..}$	-	0.000000	0.003460	0.007625	-	0.000000	-0.000446	0.001114	0.009628	-	-0.024121	-
$r_{..}$	-	0.003745	0.004778	0.009811	-	0.002823	0.000000	0.002195	0.009877	-	-0.023877	-
$r_{..}$	-	0.004103	0.005146	0.010409	-	0.008280	0.002754	0.002738	0.011773	-	-0.000348	-
$r_{..}$	-	0.039688	0.005172	0.028108	-	0.021773	0.003879	0.003374	0.011845	-	0.001429	-
$r_{..}$	-	0.041436	0.007402	0.030726	-	0.046667	0.005846	0.006053	0.012531	-	0.003176	-
$r_{..}$	-	0.105612	0.009511	0.039355	-	0.066856	0.011966	0.032543	0.027228	-	0.023260	-
r_{max-1}	-	0.113909	0.015230	0.064560	-	0.078387	0.017990	0.099722	0.040000	-	0.091189	-
r_{max}	-	0.201726	0.030728	0.209713	-	0.177511	0.028167	0.138715	0.049914	-	0.190867	-
r	0.003447	0.017472	0.006641	0.024463	0.024463	0.028098	0.003825	0.003095	0.015360	0.003095	0.005682	0.003095

Remark. $r = \text{Average}(\text{Median } r_{min+1} \dots r_{max-1})$

Phanom Sarakham¹ : $r_{av} = \text{Average}(\text{Median } r_{min+2} \dots r_{max-2})$

Table A.2 Predicted Number of Population of Municipal/Sanitary in Changwat Chachoengsao During 1994-2013

YEAR	NUMBER OF POPULATION OF MUNICIPAL/SANITARY IN CHANGWAT CHACHOENGSAO (PERSONS)											
	MUANG CHACHOENGSAO	BANG KHLA DISTRICT	NAKORN NUANG KHET	BANG PAKONG	THA SA AN	BANG KHLUA	BANG WAU	THA KHAM	PAK NAM	PLAENG YAO	HUA SAMRONG	THUNG SA DAO
1994	43,074	9,510	2,474	9,147	5,674	2,368	6,695	7,945	3,642	8,787	5,430	1,935
1995	43,503	9,838	2,694	9,217	5,774	2,379	6,750	8,006	3,654	8,817	5,449	1,942
1996	43,937	10,177	2,935	9,288	5,875	2,390	6,806	8,067	3,665	8,848	5,467	1,948
1997	44,374	10,528	3,196	9,359	5,978	2,402	6,862	8,129	3,677	8,878	5,486	1,955
1998	44,817	10,891	3,481	9,431	6,083	2,413	6,918	8,191	3,689	8,909	5,505	1,962
1999	45,263	11,266	3,791	9,503	6,190	2,425	6,975	8,254	3,701	8,939	5,524	1,969
2000	45,714	11,654	4,129	9,576	6,299	2,436	7,033	8,317	3,713	8,970	5,543	1,975
2001	46,170	12,056	4,497	9,649	6,410	2,448	7,091	8,381	3,724	9,001	5,562	1,982
2002	46,630	12,472	4,898	9,723	6,522	2,459	7,149	8,445	3,736	9,032	5,582	1,989
2003	47,094	12,902	5,334	9,798	6,637	2,471	7,208	8,510	3,748	9,063	5,601	1,996
2004	47,564	13,346	5,810	9,873	6,754	2,482	7,267	8,575	3,760	9,095	5,620	2,003
2005	48,037	13,806	6,327	9,948	6,872	2,494	7,327	8,641	3,772	9,126	5,639	2,010
2006	48,516	14,282	6,891	10,025	6,993	2,506	7,387	8,707	3,785	9,157	5,659	2,017
2007	49,000	14,775	7,505	10,101	7,116	2,518	7,448	8,774	3,797	9,189	5,678	2,024
2008	49,488	15,284	8,174	10,179	7,241	2,530	7,510	8,841	3,809	9,221	5,698	2,031
2009	49,981	15,811	8,903	10,257	7,368	2,542	7,571	8,909	3,821	9,252	5,718	2,037
2010	50,479	16,356	9,696	10,335	7,498	2,554	7,634	8,977	3,833	9,284	5,737	2,045
2011	50,982	16,919	10,560	10,415	7,630	2,566	7,697	9,046	3,846	9,316	5,757	2,052
2012	51,490	17,503	11,501	10,495	7,764	2,578	7,760	9,115	3,858	9,348	5,777	2,059
2013	52,003	18,106	12,526	10,575	7,900	2,590	7,824	9,185	3,870	9,381	5,797	2,066

Table A.2 Predicted Number of Population of Municipal/Sanitary in Changwat Chachoengsao During 1994-2013 (continued)

YEAR	NUMBER OF POPULATION OF MUNICIPAL/SANITARY IN CHANGWAT CHACHOENGSAO (PERSONS)											TOTAL OF POP (PERSONS)
	BANG NAM PRIEO	BANG KHANAK	DON CHIMPLEE	SALA DAENG	BAN PHO	THEPPARAT	PHANOM SARAKHAM	KOA KHANOON	KHAO HINSON	SANAM CHAI KHET	RATCHASAN	
1994	2 836	3 154	3 402	2 013	1 916	6 944	9 484	6 441	4 300	6 714	6 121	160 006
1995	2.886	3.175	3.485	2.062	1.970	6.971	9.513	6.540	4.313	6.752	6.140	161.830
1996	2.936	3.196	3.570	2.113	2.025	6.997	9.543	6.640	4.327	6.791	6.159	163.700
1997	2.987	3.217	3.658	2.164	2.082	7.024	9.572	6.742	4.340	6.829	6.178	165.620
1998	3.039	3.239	3.747	2.217	2.141	7.051	9.602	6.846	4.353	6.868	6.197	167.590
1999	3.093	3.260	3.839	2.272	2.201	7.078	9.632	6.951	4.367	6.907	6.216	169.615
2000	3.147	3.282	3.933	2.327	2.263	7.105	9.661	7.058	4.380	6.946	6.236	171.697
2001	3.202	3.304	4.029	2.384	2.326	7.132	9.691	7.166	4.394	6.986	6.255	173.840
2002	3.258	3.326	4.128	2.442	2.392	7.159	9.721	7.276	4.408	7.025	6.274	176.046
2003	3.314	3.348	4.229	2.502	2.459	7.187	9.751	7.388	4.421	7.065	6.294	178.320
2004	3.372	3.370	4.332	2.563	2.528	7.214	9.782	7.502	4.435	7.105	6.313	180.665
2005	3.431	3.392	4.438	2.626	2.599	7.242	9.812	7.617	4.449	7.146	6.333	183.086
2006	3.491	3.415	4.547	2.690	2.672	7.270	9.842	7.734	4.462	7.186	6.352	185.587
2007	3.552	3.437	4.658	2.756	2.747	7.297	9.873	7.853	4.476	7.227	6.372	188.173
2008	3.614	3.460	4.772	2.824	2.824	7.325	9.903	7.973	4.490	7.268	6.392	190.850
2009	3.677	3.483	4.889	2.893	2.903	7.353	9.934	8.096	4.504	7.310	6.411	193.623
2010	3.742	3.506	5.008	2.963	2.985	7.381	9.965	8.220	4.518	7.351	6.431	196.499
2011	3.807	3.530	5.131	3.036	3.069	7.410	9.996	8.346	4.532	7.393	6.451	199.484
2012	3.874	3.553	5.256	3.110	3.155	7.438	10.026	8.475	4.546	7.435	6.471	202.586
2013	3.941	3.577	5.385	3.186	3.244	7.466	10.058	8.605	4.560	7.477	6.491	205.812
TOTAL POPULATION DURING 1994-2013												3.614.629

Table A.3 The Quantities of Solid Waste of Each Municipal/Sanitary in Changwat Chachoengsao

Year	Quantities of Solid Waste (kg)											
	Muang	Amphoe	Nakorn Nuang	Bang	Tha	Bang	Bang	Tha	Pak	Plaeng	Hua	Thung
	Chachoengsao	Bang Khla	Khet	Pakong	Sa An	Khluang	Wau	Kham	Nam	Yao	Samrong	Sa Dao
1994	37.905	8.369	2.177	8.049	4.993	2.084	5.892	6.992	3.205	7.733	4.778	1.703
1995	38.283	8.657	2.371	8.111	5.081	2.094	5.940	7.045	3.215	7.759	4.795	1.709
1996	38.664	8.956	2.582	8.173	5.170	2.104	5.989	7.099	3.226	7.786	4.811	1.715
1997	39.050	9.264	2.813	8.236	5.261	2.114	6.038	7.154	3.236	7.813	4.828	1.720
1998	39.439	9.584	3.063	8.299	5.353	2.124	6.088	7.208	3.246	7.840	4.845	1.726
1999	39.832	9.914	3.336	8.363	5.448	2.134	6.138	7.264	3.257	7.867	4.861	1.732
2000	40.228	10.256	3.634	8.427	5.543	2.144	6.189	7.319	3.267	7.894	4.878	1.738
2001	40.629	10.609	3.957	8.491	5.641	2.154	6.240	7.375	3.278	7.921	4.895	1.744
2002	41.034	10.975	4.310	8.556	5.740	2.164	6.291	7.432	3.288	7.948	4.912	1.750
2003	41.443	11.353	4.694	8.622	5.841	2.174	6.343	7.489	3.299	7.976	4.929	1.756
2004	41.856	11.745	5.112	8.688	5.943	2.185	6.395	7.546	3.309	8.003	4.946	1.762
2005	42.273	12.150	5.568	8.755	6.048	2.195	6.448	7.604	3.320	8.031	4.963	1.768
2006	42.694	12.568	6.064	8.822	6.154	2.205	6.501	7.662	3.330	8.059	4.980	1.775
2007	43.120	13.002	6.605	8.889	6.262	2.216	6.554	7.721	3.341	8.086	4.997	1.781
2008	43.549	13.450	7.193	8.957	6.372	2.226	6.608	7.780	3.352	8.114	5.014	1.787
2009	43.983	13.913	7.834	9.026	6.484	2.237	6.663	7.840	3.362	8.142	5.032	1.793
2010	44.421	14.393	8.532	9.095	6.598	2.247	6.718	7.900	3.373	8.170	5.049	1.799
2011	44.864	14.889	9.293	9.165	6.714	2.258	6.773	7.961	3.384	8.198	5.066	1.805
2012	45.311	15.402	10.121	9.235	6.832	2.269	6.829	8.022	3.395	8.227	5.084	1.812
2013	45.763	15.933	11.023	9.306	6.952	2.279	6.885	8.083	3.406	8.255	5.101	1.818
Sum	834.341	235.382	110.284	173.265	118.431	43.604	127.522	150.497	66.088	159.822	98.763	35.195

Table A.3 The Quantities of Solid Waste of Each Municipal/Sanitary in Changwat Chachoengsao (continued)

Year	Quantities of Solid Waste (kg)											
	Bang Nam Prieo	Bang Khanak	Don Chim Plee	Saladaena	Ban Pho	Thepparat	Phanom Sarakham	Koa Khanoon	Khao Hinson	Sanam Chai Khet	Ratchasan	Total
1994	2.496	2.776	2.994	1.771	1.686	6.111	8.346	5.668	3.784	5.908	5.386	140.805
1995	2.539	2.794	3.067	1.815	1.733	6.134	8.372	5.755	3.796	5.942	5.403	142.410
1996	2.584	2.813	3.142	1.859	1.782	6.158	8.398	5.844	3.807	5.976	5.420	144.056
1997	2.629	2.831	3.219	1.905	1.832	6.181	8.424	5.933	3.819	6.010	5.437	145.745
1998	2.675	2.850	3.298	1.951	1.884	6.205	8.450	6.024	3.831	6.044	5.453	147.480
1999	2.721	2.869	3.378	1.999	1.937	6.228	8.476	6.117	3.843	6.078	5.470	149.262
2000	2.769	2.888	3.461	2.048	1.991	6.252	8.502	6.211	3.855	6.113	5.487	151.094
2001	2.817	2.907	3.546	2.098	2.047	6.276	8.528	6.306	3.867	6.147	5.504	152.979
2002	2.867	2.926	3.632	2.149	2.105	6.300	8.555	6.403	3.879	6.182	5.521	154.921
2003	2.917	2.946	3.721	2.202	2.164	6.324	8.581	6.502	3.891	6.217	5.538	156.922
2004	2.968	2.965	3.812	2.256	2.224	6.349	8.608	6.601	3.903	6.253	5.556	158.985
2005	3.020	2.985	3.905	2.311	2.287	6.373	8.634	6.703	3.915	6.288	5.573	161.115
2006	3.072	3.005	4.001	2.367	2.351	6.397	8.661	6.806	3.927	6.324	5.590	163.316
2007	3.126	3.025	4.099	2.425	2.417	6.422	8.688	6.910	3.939	6.360	5.607	165.592
2008	3.181	3.045	4.199	2.485	2.485	6.446	8.715	7.016	3.951	6.396	5.625	167.948
2009	3.236	3.065	4.302	2.545	2.555	6.471	8.742	7.124	3.964	6.432	5.642	170.388
2010	3.293	3.086	4.407	2.608	2.627	6.496	8.769	7.234	3.976	6.469	5.660	172.919
2011	3.350	3.106	4.515	2.672	2.701	6.520	8.796	7.345	3.988	6.506	5.677	175.546
2012	3.409	3.127	4.625	2.737	2.777	6.545	8.823	7.458	4.000	6.543	5.695	178.276
2013	3.468	3.147	4.739	2.804	2.855	6.570	8.851	7.572	4.013	6.580	5.712	181.115
Sum	59.135	59.156	76.063	45.007	44.439	126.759	171.919	131.532	77.947	124.768	110.957	3.180.875

Table A.5 Total Volume of Compacted Solid Waste

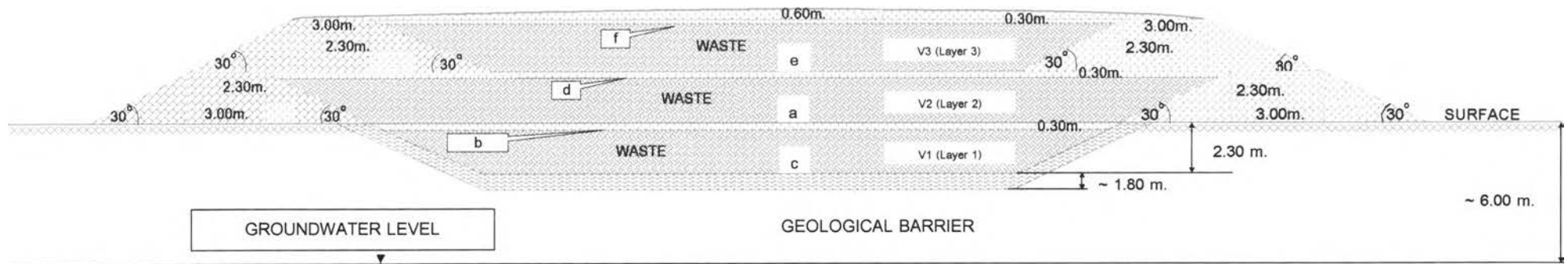
YEAR	NUMBER OF POPULATION (PERSONS)	RATE OF MSW GENERATION (kg/capita/day)	QUANTITY OF MSW (kg/day)	QUANTITY OF MSW (kg/year)	VOLUME OF COMPACTED MSW (m ³ /year)	VOLUME OF DAILY COVER (m ³ /year)	TOTAL VOLUME (m ³ /year)
1994	160.006	0.88	140.805	51.393.825	93.443	23.361	116.804
1995	161.830	0.88	142.410	51.979.650	94.508	23.627	118.135
1996	163.700	0.88	144.056	52.724.496	95.863	23.966	119.829
1997	165.620	0.88	145.746	53.197.290	96.722	24.181	120.903
1998	167.590	0.88	147.479	53.829.835	97.872	24.468	122.340
1999	169.615	0.88	149.261	54.480.265	99.055	24.764	123.819
2000	171.697	0.88	151.093	55.300.038	100.546	25.137	125.683
2001	173.840	0.88	152.979	55.837.335	101.522	25.381	126.903
2002	176.046	0.88	154.920	56.545.800	102.811	25.703	128.514
2003	178.320	0.88	156.922	57.276.530	104.139	26.035	130.174
2004	180.665	0.88	158.985	58.188.510	105.797	26.449	132.246
2005	183.086	0.88	161.116	58.807.340	106.922	26.731	133.653
2006	185.587	0.88	163.317	59.610.705	108.383	27.096	135.479
2007	188.173	0.88	165.592	60.441.080	109.893	27.473	137.366
2008	190.850	0.88	167.948	61.468.968	111.762	27.941	139.703
2009	193.623	0.88	170.388	62.191.620	113.076	28.269	141.345
2010	196.499	0.88	172.919	63.115.435	114.755	28.689	143.444
2011	199.484	0.88	175.546	64.074.290	116.499	29.125	145.624
2012	202.586	0.88	178.276	65.249.016	118.635	29.659	148.294
2013	205.812	0.88	181.115	66.106.975	120.195	30.049	150.244
TOTAL QUANTITY DURING 1994-2013			3,180,873	1,161,819,003	2,112,398	528,104	2,640,502

Table A.6 Calculation Method for Compacted Solid Waste Area

From Figure A.1 $V = V1+V2+V3$	
Where	V is totally volume of compacted solid waste m^3
	V1 is volume of compacted solid waste of layer 1 m^3
	V2 is volume of compacted solid waste of layer 2 m^3
	V3 is volume of compacted solid waste of layer 3 m^3
Equation	$V1 = \frac{1}{2} (b+c) \times h1 \times l1$
	$V2 = \frac{1}{2} (a+d) \times h2 \times l2$
	$V3 = \frac{1}{2} (e+f) \times h3 \times l3$
Where	a, b, c, d, e, f = width of each layer m
	$b = a - 2 \times (0.30 / \tan 30^\circ) = a - 1.03923$
	$c = a - 2 \times (2.30 / \tan 30^\circ) = a - 7.967434$
	$d = a + 2 \times (2 / \tan 30^\circ) = a + 6.928203$
	$e = a - 2 \times (2.30 / \tan 30^\circ) = a - 7.967434$
	$f = a - 2 \times (0.30 / \tan 30^\circ) = a - 1.03923$
Design	h1, h2, h3 = height of each layer = 2.00 m
	height cover material of each lift = 0.30 m
Assumption	l1, l2, l3 = length of layer = 700 m
Replace b,c,d,e,f	$V1 = 1400a - 6304.66494$
	$V2 = 1400a + 4849.74226$
	$V3 = 1400a - 6304.66494$
So	$V = 4200a - 7759.58762$
From Table A.2 $\rightarrow V = 2,640,502 m^3$	
Thus	a = 630.54
	a ~ 631 m
From	l = 700 m
So	Area for compacted solid waste = $631 \times 700 = 441.700 m^2$

Table A.7 Calculation Method for Land Requirement

1. Calculation Method for Compacted Solid Waste Area (see in Table A.6)			
From	Area = Width X Length		
Where	Width = a	631	m
	Length	700	m
Thus	Area for compacted solid waste	441,700	m ²
2. Calculation Method for Leachate Treatment Plant Area			
<i>Calculation Method for amount of leachate</i>			
	From Table 3.6 → Max. Rainfall at Sta.No.423009	288.8 (19.2)	mm(rain-day)
So	Rainfall	15.04	mm/day
	Or	0.01504	m/day
	Area for compacted solid waste	441,700	m ²
So	Amount of Rainfall	6,643	m ³ /day
From	Leachate = 20% of rainfall		
So	Amount of Leachate	1,328.6	m ³ /day
2.1 Calculation Method for Facultative Pond			
	Amount of Leachate for 10 day	1,328.6X10	m ³ /dayXday
So	Capacity of Pond	13,286	m ³
	Depth of Pond	2.50	m
So	Area of Facultative Pond	5,314	m ²
2.2 Calculation Method for Stabilization Pond			
	Amount of Leachate for 20 day	1,328.6X20	m ³ /dayXday
So	Capacity of Pond	26,572	m ³
	Depth of Pond	1.50	m
So	Area of Stabilization Pond	17,715	m ²
3. Miscellaneous areas (including road:width~10 m, tree zone:width~10 m, drainage:width~2 m, garage~150 m ² , office~100 m ²)		60,750	m ²
4. 20% excess areas		105,096	m ²
Total (1+2.1+2.2+3+4)		630,575	m ²



LEGEND







-  Compacted Solid Waste
-  Cover soil
-  Landfill cover
-  Embankment
-  Landfill base (including drainage layer, leachate collection pipe, barrier and synthetic liner)
-  Geological Barrier

FIG. A.1 THE CONCEPTUAL MODEL OF SANITARY LANDFILL DESIGN

APPENDIX B

PHYSICAL AND GEOLOGICAL EVALUATION

Table B.1 Physical Condition Evaluation for Suitable Area Selection from Soil Map

No.	Soil_Unit	Criteria							Classification
		(1) Depth (m)	(2) Slope (%)	(3) Drainage	(4) Permeability (Relative)	(5) Time of Flood Hazard (month)	(6) Water Table (m.)	(7) Location	
1	10	Deep	< 2	Low	Low	6-7	-	Tidal flat deposit	Non-Suitable (3, 5, 7)*
2	11	Deep	< 2	Low	Low	6-7	-	Tidal flat, alluvium deposit	Non-Suitable (3, 5, 7)*
3	12	Too Deep	< 2	Low	Low	-	-	Tidal flat and estuary deposit	Non-Suitable (3, 5, 7)*
4	13	Deep	< 2	Low	Low	-	-	Tidal flat deposit	Non-Suitable (3, 5, 7)*
5	16	Deep	< 2	Low	Low	4-5	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
6	16/6	Deep	< 2	Low	Low	3-5	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
7	17	Too Deep	< 2	Low to Moderate	Low to Moderate	2-4	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
8	17/6	Too Deep	< 2	Low to Moderate	Low to Moderate	3-5	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
9	17B	Too Deep	2-5	Low to Moderate	Low to Moderate	2-4	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
10	18	Too Deep	< 2	Moderate	Moderate	4	-	Peneplain & lower terrace	Non-Suitable (3, 5)*
11	2	Deep	< 2	Low	Low	3-5	-	Central Plain	Non-Suitable (3, 5)*
12	2/11	Deep	< 2	Low	Low	6-7	-	Tidal flat deposit & Central Plain	Non-Suitable (3, 5, 7)*
13	2/3	Shallow	< 2	Low	Low	4-5	-	Central Plain	Non-Suitable (1, 3, 5)*
14	24	Too Deep	< 2	High	High	-	-	Peneplain	Non-Suitable (4, 5)*
15	25	Deep	< 2	Moderate	Moderate to High	3-4	-	Peneplain/Lower to middle terrace	Non-Suitable (4, 5)*
16	25/49	Deep	< 2	Moderate	Moderate to High	3-4	-	Peneplain/Lower to middle terrace	Non-Suitable (4, 5)*
17	25B/17B	Deep	2-5	Moderate	Low to Moderate	3-4	-	Peneplain/Lower to middle terrace	Non-Suitable (5)*
18	3	Deep	< 2	Low	Low	4-5	-	Peneplain	Non-Suitable (3, 5)*
19	35	Deep	< 2	Moderate	Low	-	>1.5	Peneplain & lower terrace	Suitable
20	35/17	Deep	0-2 /3-35	Moderate	Moderate	-	-	Peneplain & lower terrace	Fair
21	35B	Deep	2-5	Moderate	Moderate	-	>1.5	Peneplain & lower terrace	Fair
22	35B/43B	Deep	2-5	Moderate to High	Moderate to High	-	>1.5	Peneplain & lower terrace	Non-Suitable (4)*
23	35C	Deep	5-12	Moderate	Moderate	-	>1.5	Peneplain to undulating	Fair
24	40	Deep	< 2	Moderate	Moderate	-	> 1.0	Peneplain to undulating	Fair
25	40B	Deep	2-5	Moderate	Moderate	-	> 1.0	Peneplain to undulating	Fair
26	40B/46B	Shallow	2-5	Moderate	Moderate	-	> 1	Peneplain to undulating	Non-Suitable (1)*
27	40C	Deep	5-12	Moderate	Moderate	-	>1	Peneplain to undulating	Fair
28	41B	Deep	2-5	High	Moderate	-	> 3	Peneplain to undulating and medium terrace	Suitable
29	43	Deep	< 2	High	High	-	>1.5	Peneplain to undulating/beach deposit	Non-Suitable (4)*
30	43/24	Deep	< 2	High	High	-	-	Peneplain to undulating/beach deposit	Non-Suitable (4)*
31	43B	Deep	2-5	High	High	-	>1.5	Peneplain to undulating	Non-Suitable (4)*

Table B.1 Physical Condition Evaluation for Suitable Area Selection from Soil Map (continued)

No.	Soil_Unit	Criteria							Classification
		(1) Depth (m)	(2) Slope (%)	(3) Drainage	(4) Permeability (Relative)	(5) Time of Flood Hazard (month)	(6) Water Table (m.)	(7) Location	
32	46	Shallow	< 2	Moderate	Moderate	-	> 5.0	Peneplain to undulating	Non-Suitable (1)*
33	46/25	Shallow	< 2	Moderate	Low to Moderate	-	-	Peneplain	Non-Suitable (1)*
34	46/48	Shallow	< 2	Moderate	Moderate to High	-	> 5.0	Undulating to hill	Non-Suitable (1, 4, 7)*
35	46/56	Shallow	< 2	Moderate	Moderate to High	-	> 2.0	Undulating to hill	Non-Suitable (1, 4, 7)*
36	46B	Shallow	5-12	Moderate	Moderate to High	-	> 5.0	Undulating to hill	Non-Suitable (1, 4, 7)*
37	46C	Shallow	5-12	Moderate	Moderate to High	-	> 5.0	Undulating to hill	Non-Suitable (1, 4, 7)*
38	47B	Shallow	2-5	High	High	-	> 3.0	Undulating to hill	Non-Suitable (1, 4, 7)*
39	47B/55	Shallow	2-5	High	High	-	> 3.0	Undulating to hill	Non-Suitable (1, 4, 7)*
40	47B/55B	Shallow	2-5	High	High	-	> 3.0	Undulating to hill	Non-Suitable (1, 4, 7)*
41	47C	Shallow	5-12	High	High	-	> 3.0	Undulating to hill	Non-Suitable (1, 4, 7)*
42	47C/55C	Shallow	5-12	High	High	-	> 3.0	Undulating to hill	Non-Suitable (1, 4, 7)*
43	48	Shallow	< 2	Moderate to High	Moderate to High	2	-	Undulating to hill	Non-Suitable (1, 4, 7)*
44	48B	Shallow	2-5	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
45	48C	Shallow	5-12	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
46	48D	Shallow	12-20	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 2, 4, 7)*
47	48E	Shallow	20-35	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 2, 4, 7)*
48	51B/53B	Shallow	2-5	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
49	51C/53C	Shallow	5-12	Moderate to High	Moderate to High	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
50	55	Shallow	< 2	Low	High	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
51	56	Shallow	< 2	Moderate to High	Moderate	-	> 2.0	Undulating to hill	Non-Suitable (1, 4, 7)*
52	56B	Shallow	2-5	Moderate to High	Moderate	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
53	56B/48B	Shallow	2-5	Moderate to High	Moderate	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
54	56C/48C	Shallow	5-12	Moderate to High	Moderate	-	-	Undulating to hill	Non-Suitable (1, 4, 7)*
55	59	Shallow	< 2	Moderate to High	Moderate to High	-	-	Alluvium deposit/Intermontane basin	Non-Suitable (1, 4, 7)*
56	60	Deep	< 2	Moderate to High	Moderate to High	Rain Season	-	Levee deposit	Non-Suitable (1, 4, 5, 7)*
57	62	Shallow	> 35	Moderate	-	-	-	Intermontane basin	Non-Suitable (1, 2, 7)*
58	62/47E	Shallow	> 20	High	High	-	-	Undulating to hill	Non-Suitable (1, 2, 7)*
59	62/48C	Shallow	> 5	Moderate to High	High	-	-	Undulating to hill	Non-Suitable (1, 2, 7)*
60	8	Deep	< 2	Low	Low	-	-	Tidal flat deposit	Non-Suitable (3, 7)*

Note. * : Indicative criteria pointed non-suitable area

Table B.2 Geological Evaluation of Suitable Area Selection for Sanitary Landfill from Geologic Map (Sedimentary Rocks by Oldest to Youngest)

No.	Age	Description	Symbol	Criteria				Classification
				(1) Content of Clay (Fine Grain)	(2) Permeability (Relative)	(3) Possibility of Fracture/ Sinkhole	(4) Homogeneous	
1	Precambrian	Quartz mica schist and quartz kyanite schist	PEsch	Low	High	-	Low	Non-suitable (1,2)**
2	Silurian-Devonian	Quartz mica schist; quartzite; sandstone yellowish-brown medium-grained interbedded with tuffaceous sandstone and chert bed with fossil of nautiloid	SD	Low	High	-	Low	Non-suitable (1,2)**
3	Carboniferous	Reddish -brown micaceous siltstone; medium-grained sandstone with fossil of brachiopod and bryozoa; shale interbedded with chert; quartzite; dark gray limestone and andesite tuff	Ck1	High	Low to Moderate	-	Moderate	Suitable
4	Carboniferous	Shale; greenish-gray, graywacke; tuffaceous sandstone	Ck2	High	Low	-	High	Suitable
5	Permo-Carboniferous	Sandstone, red to deep red, fine-to medium-grained; conglomerate; pebbly sandstone; light gray tuffaceous shale with chert interbedded	CP	Low	High	-	Moderate	Non-suitable (1,2)**
6	Permian	Limest, gray to dark gray, bedded and massive with fossils of bryozoa, crinoid, fusulinid, some of part recrystal limest and marble interbed with yellowish to greenish-brown shale and some reddish brown fine-grained sandstone	P	High	Low	High	High	Non-suitable (3)**
7	Quaternary	High and low terrace deposit. laterite, gravel, sand, silt and clay	Qt*	-	-	-	-	-
8	Quaternary	Alluvial deposit, beach sand	Qa*	-	-	-	-	-

Note. * : Used data from Soil Map

** : Indicative criteria pointed non-suitable area

Table B.2 Geological Evaluation of Suitable Area Selection for Sanitary Landfill from Geologic Map (Igneous Rocks by Oldest to Youngest) (continued)

No.	Age	Description	Symbol	Criteria				
				(1) Content of Clay (Fine Grain)	(2) Permeability (Relative)	(3) Possibility of Fracture/ Sinkhole	(4) Homogeneous	Level of Suitable area for Sanitary Landfill
1	Post-Carboniferous	Massive greenish-gray to grayish-purple rhyolite tuff	Post C	High	Low	-	High	Suitable
2	Post-Permian	Andesite, dark greenish-gray to purple, fine-grained	Post Pv	High	Low	-	High	Suitable
3	Permo-Triassic	Diorite, greenish gray, very coarse, coarse and medium-grained	PTrdi	Low	High	-	High	Non-suitable (1,2)*
4	Triassic	Medium-to coarse-grained, porphyritic hornblende-biotite granite; mesocratic hornblende granite; porphyritic, mesocratic biotite granite	Trgr	Low	High	-	Moderate	Non-suitable (1,2)*

Note. * : Indicative criteria pointed non-suitable area

Table B.3 Geological Condition Evaluation of Suitable Area Selection for Sanitary Landfill from Groundwater Map.

No.	Description	Symbol	Criteria				
			(1) Content of Clay (Fine Grain)	(2) Permeability (Relative)	(3) Possibility of Fracture/ Sinkhole	(4) Homogeneous	Level of Suitable area for Sanitary Landfill
1	Granite rocks; Biotite-muscovite granite, medium-to-coarse-grained, porphyritic granite with pegmatite and quartz veins.	Rgr	Low	High	-	Low	Non-suitable (1,2)**
2	Gravel, sand, silt and clay	A*	-	-	-	-	-
3	Gravel, sand, silt, clay, lateritic and decomposed rocks	T*	-	-	-	-	-
4	Sandstone and shale	Rst	Moderate	Moderate	-	Moderate	Fair (1,2)**
5	Schist, gneiss, and phyllite	Rsch	Moderate	High	High	Moderate	Non-suitable (2,3)**
6	Volcanic rocks; Rhyolite and tuff	Rvol	High	Low	-	High	Suitable (1,2)**

Note. *: Used data from Soil Map

** : Indicative criteria pointed non-suitable area

APPENDIX C

WEIGHT-RATING CALCULATION

Table C.1 Values of Each Socio-Economic Criteria of Each Suitable Area for Weight-Rating Calculation

No.	Suitable Area	Values of each Socio-Economic Criteria				
		DSWMC (m)	Average of DSWCC (m)	SD of DSWCC (m)	Price of Land (bath/rai)	Area for an Extension (time)
1	THUNGPHRAYA1	96,269.01	91,728.0796	27,694.1041	20,000	6.20
2	THUNGPHRAYA2	95,599.12	91,058.1809	27,694.1035	20,000	109.10
3	KUYAIMEE1	63,959.53	59,288.9087	27,066.2365	40,000	1.50
4	KUYAIMEE2	63,172.63	58,729.7200	26,805.8343	40,000	1.30
5	LADKRATHING1	63,998.63	61,043.2096	25,110.7922	50,000	1.60
6	LAD KRATHING2	60,892.85	59,711.9065	23,894.5363	50,000	3.30
7	THA TAKIAB1	65,923.29	62,760.2943	24,956.9634	30,000	1.30
8	THATAKIAB2	63,720.69	62,495.6930	23,166.7341	30,000	1.00
9	THATAKIAB3	78,868.11	77,643.1139	23,166.7328	30,000	2.00
10	KLONG TAKRAO1	69,028.04	68,208.2765	22,990.3312	40,000	2.10
11	KLONGTAKRAO2	69,016.38	67,791.3852	23,166.7330	40,000	10.90
12	KLONG TAKRAO3	82,073.07	81,253.3061	22,990.3309	40,000	14.90
13	KLONG TAKRAO4	90,261.71	89,441.9513	22,990.3328	40,000	1.60
14	KLONG TAKRAO5	90,270.20	89,450.4400	22,990.3331	40,000	2.20
15	KLONG TAKRAO6	81,824.19	81,004.4317	22,990.3322	40,000	13.90
16	KLONG TAKRAO7	84,280.11	83,460.3504	22,990.3327	40,000	7.20
17	KLONG TAKRAO8	87,735.91	86,916.1517	22,990.3322	40,000	1.20

Table C.2 Distance from Suitable Area to Waste Origins of Municipal/Sanitary in Changwat Chachoengsao

NO.	SOURCE	SUITABLE AREAS FOR SANITARY LANDFILL IN CHANGWAT CHACHOENGSAO								
		THUNGPHRAYA1	THUNGPHRAYA2	KUYAIMEE1	KUYAIMEE2	LADKRATHING1	LAD KRATHING2	THA TAKIAB1	THATAKIAB2	THATAKIAB3
1	BAN PHO	93391.16	92,721.26	57,856.02	57,069.11	57,895.11	55,950.12	59,819.77	57,617.17	72,764.59
2	BANG KHA NAK	123696.59	123,026.69	91,387.11	90,600.20	91,426.20	88,320.43	92,555.15	91,148.26	106,295.68
3	BANG KHLA	76169.41	75,499.52	42,504.83	41,717.93	47,520.40	48,752.60	49,445.06	49,599.47	64,746.89
4	BANG KLUA	112204.20	111,534.30	79,894.72	79,107.82	79,933.81	77,988.82	81,858.48	79,655.87	94,803.29
5	BANG NAM PRIEO	113626.60	112,956.70	81,317.12	80,530.22	81,356.21	78,250.44	82,485.16	81,078.27	96,225.69
6	BANG WAU	119096.01	118,426.11	86,786.53	85,999.63	86,825.63	84,880.63	88,750.29	86,547.68	101,695.10
7	BANGPAKONG	113883.55	113,213.65	81,574.07	80,787.16	81,613.16	79,668.17	83,537.82	81,335.22	96,482.64
8	DON CHIM PLEE	135532.85	134,862.95	103,223.37	102,436.46	103,262.46	100,156.68	104,391.41	102,984.52	118,131.94
9	HUA SAMRONG	66749.32	66,079.43	34,439.84	33,652.94	34,478.94	31,373.16	35,607.89	34,201.00	49,348.42
10	KHAOHINSON	39145.54	38,475.64	27,320.92	31,771.48	34,643.71	35,875.92	36,568.38	41,382.93	56,530.35
11	KOA KANUN	56243.98	55,574.08	22,579.40	21,792.49	27,594.96	28,827.16	29,519.62	34,334.17	49,481.60
12	MUANG CHACHOENGSAO	96269.01	95,599.12	63,959.53	63,172.63	63,998.63	60,892.85	65,923.29	63,720.69	78,868.11
13	NAKORN NUANG KHET	109361.46	108,691.56	77,051.98	76,265.08	77,091.08	73,985.30	78,220.03	76,813.13	91,960.55
14	PAK NAM	78487.69	77,817.79	44,823.11	44,036.21	49,838.68	51,070.88	51,763.34	51,917.75	67,065.17
15	PHANOMSARAKHAM	59455.44	58,785.54	25,790.86	25,003.95	30,806.42	32,038.62	32,731.08	37,545.63	52,693.05
16	PLAENG YAO	74292.99	73,623.09	38,757.84	37,970.94	38,796.94	36,851.94	40,721.60	38,518.99	53,666.41
17	RATCHASARN	70687.83	70,017.93	37,023.25	36,236.35	42,038.82	43,271.02	43,963.48	48,778.03	63,925.45
18	SALADAENG	119150.84	118,480.94	86,841.36	86,054.45	86,880.45	83,774.67	88,009.40	86,602.51	101,749.93
19	SANAMCHAIKHET	44227.56	43,557.66	10,562.98	9,776.08	17,885.78	19,117.98	19,810.44	24,624.99	39,772.42
20	THA KHAM	119791.78	119,121.88	87,482.30	86,695.40	87,521.40	85,576.40	89,446.06	87,243.45	102,390.87
21	THA SA AN	109114.07	108,444.17	76,804.59	76,017.68	76,843.68	74,898.69	78,768.35	76,565.74	91,713.16
22	THEPPARAT	105370.64	104,700.74	73,061.16	72,274.25	73,100.25	71,155.26	75,024.91	72,822.31	87,969.73
23	THUING SADAQ	73797.31	73,127.41	32,602.01	31,815.10	32,641.10	30,696.11	34,565.76	32,363.16	47,510.58

Table C.2 Distance from Suitable Area to Waste Origins of Municipal/Sanitary in Changwat Chachoengsao (continued)

NO.	SOURCE	SUITABLE AREAS FOR SANITARY LANDFILL IN CHANGWAT CHACHOENGSAO							
		KLONG TAKRAO1	KLONGTAKRAO2	KLONG TAKRAO3	KLONG TAKRAO4	KLONG TAKRAO5	KLONG TAKRAO6	KLONG TAKRAO7	KLONG TAKRAO8
1	BAN PHO	62,924.52	62,912.86	75,969.55	84,158.20	84,166.68	75,720.68	78,176.59	81,632.40
2	BANG KHA NAK	96,455.61	96,443.95	109,500.64	117,689.29	117,697.78	109,251.77	111,707.69	115,163.49
3	BANG KHLA	59,566.96	54,895.16	72,611.99	80,800.64	80,809.13	72,363.12	74,819.04	78,274.84
4	BANG KLUA	84,963.23	84,951.56	98,008.26	106,196.90	106,205.39	97,759.38	100,215.30	103,671.10
5	BANG NAM PRIEO	86,385.63	86,373.96	99,430.65	107,619.30	107,627.79	99,181.78	101,637.70	105,093.50
6	BANG WAU	91,855.04	91,843.38	104,900.07	113,088.71	113,097.20	104,651.19	107,107.11	110,562.91
7	BANGPAKONG	86,642.57	86,630.91	99,687.60	107,876.25	107,884.74	99,438.73	101,894.65	105,350.45
8	DON CHIM PLEE	108,291.87	108,280.21	121,336.90	129,525.55	129,534.04	121,088.03	123,543.95	126,999.75
9	HUA SAMRONG	39,508.35	39,496.69	52,553.38	60,742.02	60,750.51	52,304.50	54,760.42	58,216.22
10	KHAOHINSON	46,690.28	46,678.62	59,735.31	67,923.96	67,932.44	59,486.44	61,942.36	65,398.16
11	KOA KANUN	39,641.53	39,629.87	52,686.56	60,875.20	60,883.69	52,437.68	54,893.60	58,349.40
12	MUANG CHACHOENGSAO	69,028.04	69,016.38	82,073.07	90,261.71	90,270.20	81,824.19	84,280.11	87,735.91
13	NAKORN NUANG KHET	82,120.49	82,108.83	95,165.52	103,354.16	103,362.65	94,916.64	97,372.56	100,828.36
14	PAK NAM	61,885.24	57,213.44	74,930.27	83,118.92	83,127.41	74,681.40	77,137.32	80,593.12
15	PHANOMSARAKHAM	42,852.99	42,841.33	55,898.02	64,086.66	64,095.15	55,649.14	58,105.06	61,560.86
16	PLAENG YAO	43,826.35	43,814.68	56,871.38	65,060.02	65,068.51	56,622.50	59,078.42	62,534.22
17	RATCHASARN	54,085.38	54,073.72	67,130.41	75,319.06	75,327.55	66,881.54	69,337.46	72,793.26
18	SALADAENG	91,909.86	91,898.20	104,954.89	113,143.54	113,152.03	104,706.02	107,161.94	110,617.74
19	SANAMCHAIKHET	29,932.35	29,920.69	42,977.38	51,166.02	51,174.51	42,728.50	45,184.42	48,640.22
20	THA KHAM	92,550.81	92,539.14	105,595.84	113,784.48	113,792.97	105,346.96	107,802.88	111,258.68
21	THA SA AN	81,873.09	81,861.43	94,918.12	103,106.77	103,115.26	94,669.25	97,125.17	100,580.97
22	THEPPARAT	78,129.66	78,118.00	91,174.69	99,363.34	99,371.82	90,925.82	93,381.73	96,837.54
23	THUNG SADAQ	37,670.51	37,658.85	50,715.54	58,904.18	58,912.67	50,466.67	52,922.58	56,378.39

Table C.3 Priority of Potential Area (Using Average:SD = 0.40:0.00)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.40	AVERAGE OF DSWCC WEIGHT: 0.40	SD OF DSWCC WEIGHT: 0.00	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	KUYAIMEE1	5	5	1	3	2	11	4.55
2	LAD KRATHING2	5	5	2	2	4	13	4.50
2	KUYAIMEE2	5	5	1	3	1	10	4.50
3	THATAKIAB2	5	4	3	4	1	12	4.25
4	LADKRATHING1	4	5	2	2	2	11	4.00
5	KLONGTAKRAO2	4	4	3	3	5	15	3.90
6	THA TAKIAB1	4	4	2	4	1	11	3.85
7	THATAKIAB3	3	3	3	4	3	13	3.15
8	KLONG TAKRAO6	3	3	5	3	5	16	3.10
9	KLONG TAKRAO1	3	3	5	3	3	14	3.00
10	KLONG TAKRAO3	2	2	5	3	5	15	2.30
11	KLONG TAKRAO7	2	2	4	3	4	13	2.25
12	KLONG TAKRAO8	2	2	5	3	1	11	2.10
13	THUNGPHRAYA2	1	1	1	5	5	12	1.80
14	THUNGPHRAYA1	1	1	1	5	4	11	1.75
15	KLONG TAKRAO5	1	1	4	3	3	11	1.40
16	KLONG TAKRAO4	1	1	4	3	2	10	1.35

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.4 Priority of Potential Area (Using Average:SD = 0.35:0.05)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.40	AVERAGE OF DSWCC WEIGHT: 0.35	SD OF DSWCC WEIGHT: 0.05	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	LAD KRATHING2	5	5	2	2	4	13	4.35
1	KUYAIMEE1	5	5	1	3	2	11	4.35
2	KUYAIMEE2	5	5	1	3	1	10	4.30
3	THATAKIAB2	5	4	3	4	1	12	4.20
4	LADKRATHING1	4	5	2	2	2	11	3.85
4	KLONGTAKRAO2	4	4	3	3	5	15	3.85
5	THA TAKIAB1	4	4	2	4	1	11	3.75
6	KLONG TAKRAO6	3	3	5	3	5	16	3.20
7	THATAKIAB3	3	3	3	4	3	13	3.15
8	KLONG TAKRAO1	3	3	5	3	3	14	3.10
9	KLONG TAKRAO3	2	2	5	3	5	15	2.45
10	KLONG TAKRAO7	2	2	4	3	4	13	2.35
11	KLONG TAKRAO8	2	2	5	3	1	11	2.25
12	THUNGPHRAYA2	1	1	1	5	5	12	1.80
13	THUNGPHRAYA1	1	1	1	5	4	11	1.75
14	KLONG TAKRAO5	1	1	4	3	3	11	1.55
15	KLONG TAKRAO4	1	1	4	3	2	10	1.50

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.5 Priority of Potential Area (Using Average:SD = 0.20:0.20)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.40	AVERAGE OF DSWCC WEIGHT: 0.20	SD OF DSWCC WEIGHT: 0.20	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	THATAKIAB2	5	4	3	4	1	12	4.05
2	LAD KRATHING2	5	5	2	2	4	13	3.90
3	KUYAIMEE1	5	5	1	3	2	11	3.75
4	KUYAIMEE2	5	5	1	3	1	10	3.70
4	KLONGTAKRAO2	4	4	3	3	5	15	3.70
5	KLONG TAKRAO6	3	3	5	3	5	16	3.50
6	THA TAKIAB1	4	4	2	4	1	11	3.45
7	LADKRATHING1	4	5	2	2	2	11	3.40
7	KLONG TAKRAO1	3	3	5	3	3	14	3.40
8	THATAKIAB3	3	3	3	4	3	13	3.15
9	KLONG TAKRAO3	2	2	5	3	5	15	2.90
10	KLONG TAKRAO8	2	2	5	3	1	11	2.70
11	KLONG TAKRAO7	2	2	4	3	4	13	2.65
12	KLONG TAKRAO5	1	1	4	3	3	11	2.00
13	KLONG TAKRAO4	1	1	4	3	2	10	1.95
14	THUNGPHRAYA2	1	1	1	5	5	12	1.80
15	THUNGPHRAYA1	1	1	1	5	4	11	1.75

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.6 Priority of Potential Area (Using Average:SD = 0.05:0.35)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.40	AVERAGE OF DSWCC WEIGHT: 0.05	SD OF DSWCC WEIGHT: 0.35	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	THATAKIAB2	5	4	3	4	1	12	3.90
2	KLONG TAKRAO6	3	3	5	3	5	16	3.80
3	KLONG TAKRAO1	3	3	5	3	3	14	3.70
4	KLONGTAKRAO2	4	4	3	3	5	15	3.55
5	LAD KRATHING2	5	5	2	2	4	13	3.45
6	KLONG TAKRAO3	2	2	5	3	5	15	3.35
7	KUYAIMEE1	5	5	1	3	2	11	3.15
7	THA TAKIAB1	4	4	2	4	1	11	3.15
7	THATAKIAB3	3	3	3	4	3	13	3.15
7	KLONG TAKRAO8	2	2	5	3	1	11	3.15
8	KUYAIMEE2	5	5	1	3	1	10	3.10
9	KLONG TAKRAO7	2	2	4	3	4	13	2.95
9	LADKRATHING1	4	5	2	2	2	11	2.95
10	KLONG TAKRAO5	1	1	4	3	3	11	2.45
11	THUNGPHRAYA2	1	1	1	5	5	12	1.80
12	THUNGPHRAYA1	1	1	1	5	4	11	1.75
13	KLONG TAKRAO4	1	1	4	3	2	10	1.50

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.7 Priority of Potential Area (Using Average:SD = 0.00:0.40)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.40	AVERAGE OF DSWCC WEIGHT: 0.00	SD OF DSWCC WEIGHT: 0.40	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	KLONG TAKRAO6	3	3	5	3	5	16	3.90
2	THATAKIAB2	5	4	3	4	1	12	3.85
3	KLONG TAKRAO1	3	3	5	3	3	14	3.80
4	KLONGTAKRAO2	4	4	3	3	5	15	3.50
4	KLONG TAKRAO3	2	2	5	3	5	15	3.50
5	LAD KRATHING2	5	5	2	2	4	13	3.30
5	KLONG TAKRAO8	2	2	5	3	1	11	3.30
6	THATAKIAB3	3	3	3	4	3	13	3.15
7	KLONG TAKRAO7	2	2	4	3	4	13	3.05
7	THA TAKIAB1	4	4	2	4	1	11	3.05
8	KUYAIMEE1	5	5	1	3	2	11	2.95
9	KUYAIMEE2	5	5	1	3	1	10	2.90
10	LADKRATHING1	4	5	2	2	2	11	2.80
11	KLONG TAKRAO5	1	1	4	3	3	11	2.60
12	KLONG TAKRAO4	1	1	4	3	2	10	2.55
13	THUNGPHRAYA2	1	1	1	5	5	12	1.80
14	THUNGPHRAYA1	1	1	1	5	4	11	1.75

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.8 Priority of Potential Area (Using Land Price: Area for An Extension = 0.15:0.05)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.4	AVERAGE OF DSWCC WEIGHT: 0.35	SD OF DSWCC WEIGHT: 0.05	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	LAD KRATHING2	5	5	2	2	4	13	4.35
1	KUYAIMEE1	5	5	1	3	2	11	4.35
2	KUYAIMEE2	5	5	1	3	1	10	4.30
3	THATAKIAB2	5	4	3	4	1	12	4.20
4	LADKRATHING1	4	5	2	2	2	11	3.85
4	KLONGTAKRAO2	4	4	3	3	5	15	3.85
5	THA TAKIAB1	4	4	2	4	1	11	3.75
6	KLONG TAKRAO6	3	3	5	3	5	16	3.20
7	THATAKIAB3	3	3	3	4	3	13	3.15
8	KLONG TAKRAO1	3	3	5	3	3	14	3.10
9	KLONG TAKRAO3	2	2	5	3	5	15	2.45
10	KLONG TAKRAO7	2	2	4	3	4	13	2.35
11	KLONG TAKRAO8	2	2	5	3	1	11	2.25
12	THUNGPHRAYA2	1	1	1	5	5	12	1.80
13	THUNGPHRAYA1	1	1	1	5	4	11	1.75
14	KLONG TAKRAO5	1	1	4	3	3	11	1.55
15	KLONG TAKRAO4	1	1	4	3	2	10	1.50

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.9 Priority of Potential Area (Using Land Price: Area for An Extension = 0.10:0.10)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.4	AVERAGE OF DSWCC WEIGHT: 0.35	SD OF DSWCC WEIGHT: 0.05	PRICE OF LAND WEIGHT: 0.10	AREA FOR AN EXTENSION WEIGHT: 0.10		
1	LAD KRATHING2	5	5	2	2	4	13	4.45
2	KUYAIMEE1	5	5	1	3	2	11	4.30
3	KUYAIMEE2	5	5	1	3	1	10	4.20
4	THATAKIAB2	5	4	3	4	1	12	4.05
5	KLONGTAKRAO2	4	4	3	3	5	15	3.95
6	LADKRATHING1	4	5	2	2	2	11	3.85
7	THA TAKIAB1	4	4	2	4	1	11	3.60
8	KLONG TAKRAO6	3	3	5	3	5	16	3.30
9	THATAKIAB3	3	3	3	4	3	13	3.10
9	KLONG TAKRAO1	3	3	5	3	3	14	3.10
10	KLONG TAKRAO3	2	2	5	3	5	15	2.55
11	KLONG TAKRAO7	2	2	4	3	4	13	2.40
12	KLONG TAKRAO8	2	2	5	3	1	11	2.15
13	THUNGPHRAYA2	1	1	1	5	5	12	1.80
14	THUNGPHRAYA1	1	1	1	5	4	11	1.70
15	KLONG TAKRAO5	1	1	4	3	3	11	1.55
16	KLONG TAKRAO4	1	1	4	3	2	10	1.45

Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level

Table C.10 Priority of Potential Area (Using Land Price: Area for An Extension = 0.05:0.15)

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.4	AVERAGE OF DSWCC WEIGHT: 0.35	SD OF DSWCC WEIGHT: 0.05	PRICE OF LAND WEIGHT: 0.05	AREA FOR AN EXTENSION WEIGHT: 0.15		
1	LAD KRATHING2	5	5	2	2	4	13	4.55
2	KUYAIMEE1	5	5	1	3	2	11	4.25
3	KUYAIMEE2	5	5	1	3	1	10	4.10
4	KLONGTAKRAO2	4	4	3	3	5	15	4.05
5	THATAKIAB2	5	4	3	4	1	12	3.90
6	LADKRATHING1	4	5	2	2	2	11	3.85
7	THA TAKIAB1	4	4	2	4	1	11	3.45
8	KLONG TAKRAO6	3	3	5	3	5	16	3.40
9	KLONG TAKRAO1	3	3	5	3	3	14	3.10
10	THATAKIAB3	3	3	3	4	3	13	3.05
11	KLONG TAKRAO3	2	2	5	3	5	15	2.65
12	KLONG TAKRAO7	2	2	4	3	4	13	2.45
13	KLONG TAKRAO8	2	2	5	3	1	11	2.05
14	THUNGPHRAYA2	1	1	1	5	5	12	1.80
15	THUNGPHRAYA1	1	1	1	5	4	11	1.65
16	KLONG TAKRAO5	1	1	4	3	3	11	1.55
17	KLONG TAKRAO4	1	1	4	3	2	10	1.40

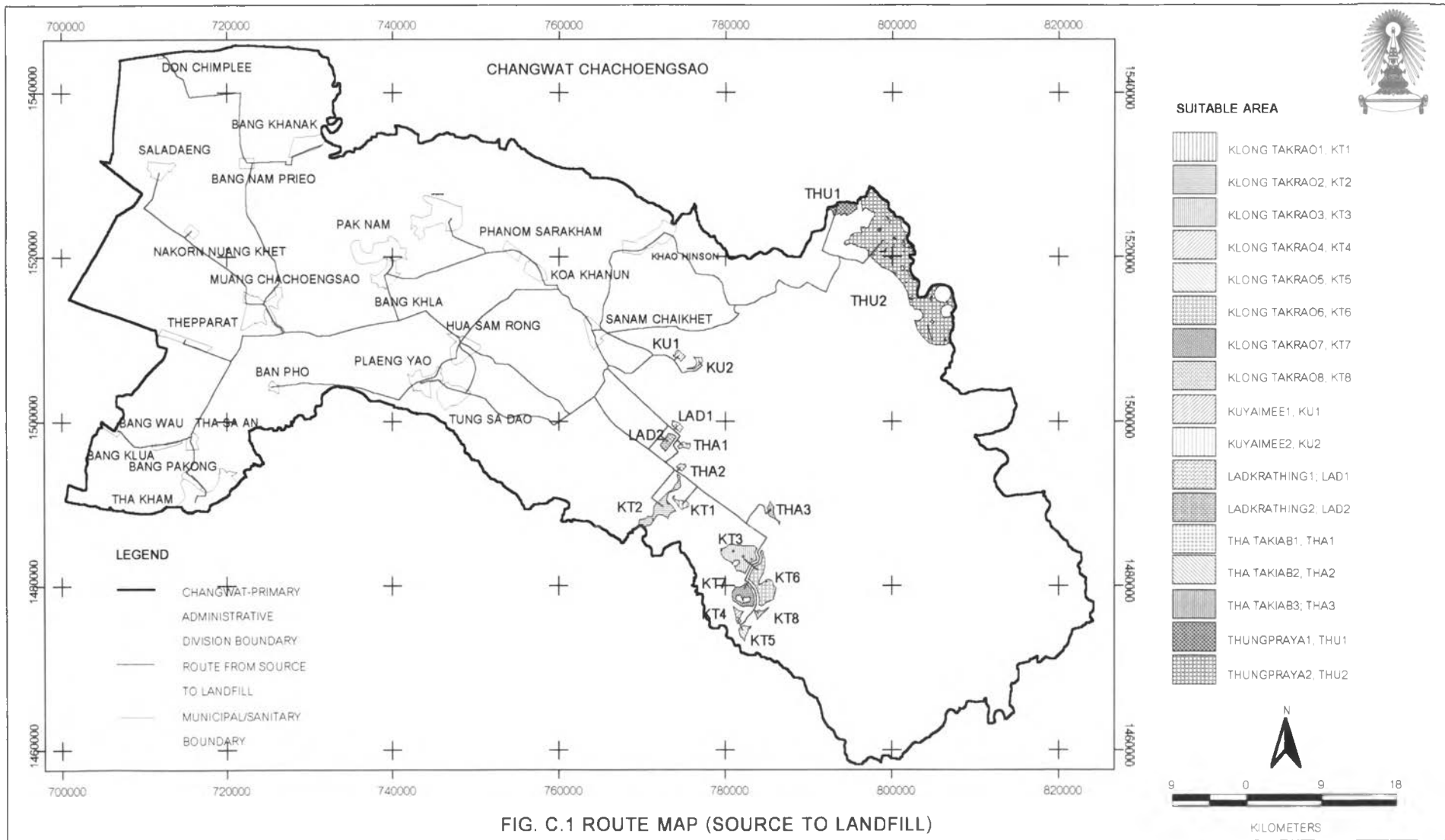
Remark Use Percentile 0.2, 0.4, 0.6, 0.8 for separated score level



Table C.11 Priority of Potential Area by Using 25 Percentile*

PRIORITY	LOCATION	SCORE OF EACH SOCIO-ECONOMIC CRITERIA					SUM OF RATING	SUM OF WEIGHTING
		DSWMC WEIGHT: 0.4	AVERAGE OF DSWCC WEIGHT: 0.35	SD OF DSWCC WEIGHT: 0.05	PRICE OF LAND WEIGHT: 0.15	AREA FOR AN EXTENSION WEIGHT: 0.05		
1	KUYAIMEE1	4	4	1	2	2	13	3.45
2	LAD KRATHING2	4	4	2	1	3	14	3.40
2	KUYAIMEE2	4	4	1	2	1	12	3.40
3	THATAKIAB2	4	3	2	3	1	13	3.25
4	LADKRATHING1	3	4	1	1	2	11	2.90
4	KLONG TAKRAO1	3	3	4	2	3	15	2.90
5	KLONGTAKRAO2	3	3	2	2	4	14	2.85
5	THA TAKIAB1	3	3	2	3	1	12	2.85
6	KLONG TAKRAO3	2	2	4	2	4	14	2.20
6	KLONG TAKRAO6	2	2	4	2	4	14	2.20
6	THATAKIAB3	2	2	3	3	2	12	2.20
7	KLONG TAKRAO7	1	2	3	2	4	12	1.75
8	THUNGPHRAYA2	1	1	1	4	4	11	1.60
9	THUNGPHRAYA1	1	1	1	4	3	10	1.55
10	KLONG TAKRAO5	1	1	3	2	3	10	1.35
11	KLONG TAKRAO4	1	1	3	2	2	9	1.30
11	KLONG TAKRAO8	1	1	4	2	1	9	1.30

Remark * : Use percentile 0.25, 0.5, 0.75 for separated score level



APPENDIX D

FIELD OBSERVATION

Table D.1 Soil Profile Description of Tha Takiab1

GEOLOGICAL DRILL CHART		
HOLE NO. 1	LOCATION: THA TAKIAB1(BAN SUAN PA PATTHANA)	
DATE: 28 MARCH 02	GRID REFERENCE: 775890E, 1497015N	
Depth (m)	Sample	Description
0.00		
0.30		Top soil; silty CLAY texture, brown color (10YR 4/6).
0.70		Silty CLAY texture, matrix color-bright yellowish brown (2.5YR 6/8), 10% mottled color-bright reddish brown (5YR 5/8).
1.50		Silty CLAY texture, matrix color-bright yellowish brown (2.5YR 6/8), 30% mottled color-orange (5YR 6/8).
End of Drilling		

Table D.2 Soil Profile Description of Ladkrathing1

GEOLOGICAL DRILL CHART		
HOLE NO. 2		LOCATION: LAD KRATHING1
DATE: 28 MARCH 02		GRID REFERENCE: 773918E, 1498933N
Depth (m)	Sample	Description
0.00		
0.30		Top soil; silty CLAY texture, dull yellowish brown color
0.50		Silty CLAY texture, matrix color-dull yellow orange (10YR 6/4),
0.90		Silty CLAY texture, matrix color-dull yellow orange (10YR 6/4), 20% mottled color-yellow orange (10YR 7/8).
1.70		Silty CLAY texture, matrix color-dull yellow orange (10YR 6/4), 30% mottled color-reddish brown (2.5YR 4/8).
2.50		Silty CLAY trace of gravel texture, matrix color-dull yellow orange (10YR 6/4), 30% mottled color-bright brown (7.5YR 5/8).
End of Drilling		
Remark : Groundwater can be found at 2.00 m. from ground surface.		



BIOGRAPHY

Miss Utanawan Boonruang was born in Changwat Chachoengsao on April 4, 1973. In 1995, she graduated with a B.Sc. degree in Geotechnology from Khon Kaen University. After graduation, she worked at K. Engineering Consultant Company Limited. Then, she has been working at Pyramid Development International Corporation Limited. Later on, she decided to continue her post-graduated study leading to the M.Sc. degree in Geology at Chulalongkorn University.