CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

After research analysis, the result concluded as follow.

1. Segments area discharge result disclosed that there are 14 segments, 15 segments, and 16 segments inadequate after comparing design discharge in 2, 5, and 10 years return period and existing discharge from segments area,
2. Research area discharge result evince which research area design discharge for 2, 5, and 10 return period is inadequate compared with research canal existing discharge.
3. Combining segments area discharge result and research area discharge result revealed that solutions needed are the solutions that can solve inadequate canal of random location of segments, one trajectory segments, and research canal.
4. Certain canal unable to accommodate design discharge because of canal dimension lacking or canal capacity is not able to hold rainwater from design rainfall and needed to be expanded.
5. In solving segments area discharge result for C1, C2, D2, D6, D8, D9, D18, D19, D24, E4, and E8 segment, infiltration wells needed in the calculation simultaneously are 3, 2, 3, 4, 3, 2, 15, 29, 33, 8, and 17 with location of infiltration wells of C2 located in D24 area of segment.

6. Increasing dimension of canal (drainage canal renovation) needs to be proceeded in E2 segment with expected dimension will be 1.2 m depth and 0.5 width, F1 segment with 1 m depth and 0.7 width, F3 segment with 1 m depth and 0.7 width, F5 segment with 1.2 m depth and 1 m width and research canal with 1.5 m depth and and 1.5 width.
7. Drainage canal renovation of research canal expected to be held in between Sembung River and Gajah Wong River.

5.2. Recommendation

After research result is found, suggested decision from research result detailed in description below.

1. Increasing of dimension in certain drainage areas and placement of infiltration wells is needed to be executed, so that rainwater accommodated easily.
2. Cleaning and maintaining drainage is important to keep the condition of canal with cooperation between government or related institutions and residents in research area to keep good condition of drainage.
3. Ensuring data or documents (especially canal data) which needed as parameters from government or related institutions is able to be obtained so as to make analysis easier and as the genuine data source.
4. Government or related institutions with drainage, water resources, and roads can immediately completing and working with public works data, so it can be used for further research.

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APPENDICES

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
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BALAI BESAR WILAYAH SUNGAI SERAYU OPAK
Alamat : Jl. Solo Km. 6 Yogyakarta 55281 Telp. (0274) 489172 Fax. (0274) 489552; http: //www.bbwsso.net/

TANDA TERIMA

2381

Asal Surat : Ulogy Evita Anikasma (UAJY)

Perihal : Permohonan Data & Ijin Survey

Yogyakarta, 8 oktober 20 18

(F. Sigmoto)

PEMERINTAH KABUPATEN SLEMAN
DINAS PEKERJAAN UMUM DAN PERUMAHAN
DAN KAWASAN PERMUKIMAN
Jl. Magelang Km.10 Tridadi Sleman, 55511 Yogyakarta, Telp. (0274) 868501, Fax 869472

TANDA TERIMA

Telah Terima Surat Dari :

Dari : Gioba Erik Anibusmo (Laksanapat Atmojoyo).
Nomor : 070/Laksanapat/3537/18
Tanggal : 7-11-18
Lampiran : -
Perihal : permohon penelitian + Data

Sleman, 7-11-2018
AN. KEPALA SUBAG UMUM
PENERIMA

DINAS PUP KP
KABUPATEN SLEMAN
Nomor : 070/2678
Tanggal : 7-11-18

(Isnaini)

PEMERINTAH KABUPATEN SLEMAN
DINAS PEKERJAAN UMUM DAN PERUMAHAN
DAN KAWASAN PERMUKIMAN

Jl. Magelang Km.10 Tridadi Sleman, 55511 Yogyakarta, Telp. (0274) 868501, Fax 869472

TANDA TERIMA

Telah Terima Surat Dari :

Dari : Kesbangpol (Liola Elvita Anitasuma)
Nomor : 070 / Kesbangpol / 3844 / 2018
Tanggal : 7 - 12 - 2018
Lampiran : 1 bendel
Perihal : Izin penelitian

DINAS PUP KP
KABUPATEN SLEMAN
Nomor : 070 / 2930
Tanggal : 10 - 12 - 2018

Sleman, 10 - 12 - 2018
AN. KEPALA SUBAG UMUM
PENERIMA

(SRIANTA)

UNIVERSITAS ATMA JAYA YOGYAKARTA
Fakultas Teknik

Nomor : 3363/XI/U/2018
Hal : Permohonan Data dan Ijin Survey

Yogyakarta, 5 Agustus 2018

Kepada
Yth. Kepala Dinas PU, Perumahan Dan Kawasan Permukiman Kab. Sleman
Jl. Magelang KM. 10 Tridadi
Sleman

Dengan hormat,

Dalam rangka menyelesaikan Pendidikan Tingkat Sarjana pada Program Studi Teknik Sipil Kelas Internasional, Fakultas Teknik, Universitas Atma Jaya Yogyakarta, setiap mahasiswa yang menempuh mata kuliah Final Project sangat membutuhkan data pendukung secara nyata dan lengkap.

Untuk itu kami mohon Bapak/Ibu berkenan memberikan data tentang "Peta Jaringan Jalan Dan Peta Jaringan Drainase Kabupaten Sleman Dan DIY" kepada :

Nama	: Lioba Evita Anikusuma
NPM	: 141315584
Program Studi	: Teknik Sipil Kelas Internasional
Semester	: Gasal T.A. 2018/2019

Atas perhatian dan kerjasamanya, kami ucapkan terima kasih.

Dekan

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UNIVERSITAS ATMA JAYA YOGYAKARTA
Fakultas Teknik

Nomor : 3363/XI/U/2018
H a l : Permohonan Data dan ijin Survey

5 November 2018

Kepada
Yth. Bupati Sleman
c.q. Kepala Badan Kesatuan Bangsa dan Politik Kab. Sleman
Jl. Candi Gebang No. 1, Beran, Tridadi
Sleman

Dengan hormat,

Dalam rangka menyelesaikan Pendidikan Tingkat Sarjana pada Program Studi Teknik Sipil Fakultas Teknik Universitas Atma Jaya Yogyakarta, setiap mahasiswa yang menempuh mata kuliah Final Project sangat membutuhkan data pendukung secara nyata dan lengkap.

Untuk itu kami mohon Bapak/Ibu berkenan memberikan data tentang **"Peta Jaringan Jalan, Drainase, Data Curah Hujan, Peta Sebaran Stasiun Hujan, Peta Rencana Struktur Tataguna Tanah dan Peta Rupa Bumi Digital"** kepada mahasiswa :

Nama	: Lioba Evita Anikusuma
N P M	: 141315584
Program Studi	: Teknik Sipil Kelas Internasional
Semester	: Gasal T.A. 2018/2019

Atas perhatian dan kerjasamanya, kami ucapkan terima kasih.

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PEMERINTAH KABUPATEN SLEMAN
BADAN KESATUAN BANGSA DAN POLITIK

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Telepon (0274) 864650, Faksimilie (0274) 864650
Website: www.slemankab.go.id, E-mail : kesbang.sleman@yahoo.com

SURAT IZIN

Nomor : 070 / Kesbangpol / 3537 / 2018

TENTANG PENELITIAN

KEPALA BADAN KESATUAN BANGSA DAN POLITIK

Dasar : Peraturan Bupati Sleman Nomor : 32 Tahun 2017 Tentang Izin Penelitian, Izin Praktik Kerja Lapangan, Dan Izin Kuliah Kerja Nyata.

Menunjuk : Surat dari Dekan Fak. Teknik UAJY
Nomo : 3363/XI/U/2018 Tanggal : 05 Nopember 2018
Hal : Ijin Permohonan Data

MENGIZINKAN :

Kepada	:
Nama	: LIOBA EVITA ANIKUSUMA
No.Mhs/NIM/NIP/NIK	: 141315584
Program/Tingkat	: S1
Instansi/Perguruan Tinggi	: Universitas Atma Jaya Yogyakarta
Alamat instansi/Perguruan Tinggi	: Jl. Babarsari No. 44 Yogyakarta
Alamat Rumah	: Jonggrangan Sendangmulyo Minggir Sleman
No. Telp / HP	: 081902101734
Untuk	: Mengadakan Penelitian / Pra Survey / Uji Validitas / PKL dengan judul **MENCARI DATA TENTANG PETA JARINGAN JALAN, DRAINASE, DATA CURAH HUJAN, PETA SEBARAN STASIUN HUJAN PETA RENCANA STRUKTUR TATAGUNA TANAH DAN PETA RUPA BUMI DIGITAL**
Lokasi	: DPUPKP Sleman, Dinas Pertanahan dan Tata Ruang Sleman dan Wilayah Jl. Laksda Adisucipto
Waktu	: Selama 1 Bulan mulai tanggal 07 Nopember 2018 s/d 07 Desember 2018

Dengan ketentuan sebagai berikut :

1. *Wajib melaporkan diri kepada Pejabat Pemerintah setempat (Camat/ Kepala Desa) atau Kepala Instansi untuk mendapat petunjuk seperlunya.*
2. *Wajib menjaga tata tertib dan mentaati ketentuan-ketentuan setempat yang berlaku.*
3. *Izin tidak disalahgunakan untuk kepentingan-kepentingan di luar yang direkomendasikan.*
4. *Wajib menyampaikan laporan hasil penelitian berupa 1 (satu) CD format PDF kepada Bupati diserahkan melalui Kepala Badan Kesatuan Bangsa dan Politik Kab. Sleman.*
5. *Izin ini dapat dibatalkan sewaktu-waktu apabila tidak dipenuhi ketentuan-ketentuan di atas.*

Demikian izin ini dikeluarkan untuk digunakan sebagaimana mestinya, diharapkan pejabat pemerintah/non pemerintah setempat memberikan bantuan seperlunya.

Setelah selesai pelaksanaan penelitian Saudara wajib menyampaikan laporan kepada kami 1 (satu) bulan setelah berakhirnya penelitian.

Dikeluarkan di Sleman
Pada Tanggal : 7 Nopember 2018
a.n. Kepala Badan Kesatuan Bangsa dan Politik
Sekretaris

Drs. Ahmad Yunfo Nurkaryadi, M.M
Pembina Tingkat I, IV/b
NIP 19621002 198603 1 010

Tembusan :
1. Bupati Sleman (sebagai laporan)
2. Kepala Dinas PUPKP Kab. Sleman
3. Kepala Dinas Pertanahan Dan Tata Ruang Kab. Sleman
4. Camat Depok
5. Kepala Desa Caturtunggal, Depok
6. Yang Bersangkutan

PEMERINTAH KABUPATEN SLEMAN
BADAN KESATUAN BANGSA DAN POLITIK
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SURAT IZIN

Nomor : 070 / Kesbangpol / 3844 / 2018

TENTANG PENELITIAN

KEPALA BADAN KESATUAN BANGSA DAN POLITIK

Dasar : Peraturan Bupati Sleman Nomor : 32 Tahun 2017 Tentang Izin Penelitian, Izin Praktik Kerja Lapangan, Dan Izin Kuliah Kerja Nyata.

Menunjuk : Surat dari Dekan Fak. Teknik UAJY
Nomo : 3043/XI/U/2018 Tanggal : 09 Oktober 2018
Hal : Ijin Penelitian

MENGIZINKAN :

Kepada	:
Nama	: LIOBA EVITA ANIKUSUMA
No.Mhs/NIM/NIP/NIK	: 141315584
Program/Tingkat	: S1
Instansi/Perguruan Tinggi	: Universitas Atma Jaya Yogyakarta
Alamat instansi/Perguruan Tinggi	: Jl. Babarsari No. 44 Yogyakarta
Alamat Rumah	: Jonggrangan Sendangmulyo Minggir Sleman
No. Telp / HP	: 081902101734
Untuk	: Mengadakan Penelitian / Pra Survey / Uji Validitas / PKL dengan judul **INUNDATION ANALYSIS: LAKSDA ADISUCIPTO ROAD NEAR AMBARRUKMO PLAZA CASE STUDY**
Lokasi	: Jalan Laksda Adisucipto Yogyakarta
Waktu	: Selama 3 Bulan mulai tanggal 07 Desember 2018 s/d 08 Maret 2019

Dengan ketentuan sebagai berikut :

1. *Wajib melaporkan diri kepada Pejabat Pemerintah setempat (Camat/ Kepala Desa) atau Kepala Instansi untuk mendapat petunjuk seperlunya.*
2. *Wajib menjaga tata tertib dan mentaati ketentuan-ketentuan setempat yang berlaku.*
3. *Izin tidak disalahgunakan untuk kepentingan-kepentingan di luar yang direkomendasikan.*
4. *Wajib menyampaikan laporan hasil penelitian berupa 1 (satu) CD format PDF kepada Bupati diserahkan melalui Kepala Badan Kesatuan Bangsa dan Politik Kab. Sleman.*
5. *Izin ini dapat dibatalkan sewaktu-waktu apabila tidak dipenuhi ketentuan-ketentuan di atas.*

Demikian izin ini dikeluarkan untuk digunakan sebagaimana mestinya, diharapkan pejabat pemerintah/non pemerintah setempat memberikan bantuan seperlunya.

Setelah selesai pelaksanaan penelitian Saudara wajib menyampaikan laporan kepada kami 1 (satu) bulan setelah berakhirnya penelitian.

Dikeluarkan di Sleman
Pada Tanggal : 7 Desember 2018
a.n. Kepala Badan Kesatuan Bangsa dan Politik

Tembusan :
1. Bupati Sleman (sebagai laporan)
2. Kepala Dinas Perhubungan Kab. Sleman
3. Kepala Dinas PUPKP Kab. Sleman
4. Camat Depok
5. Yang Bersangkutan

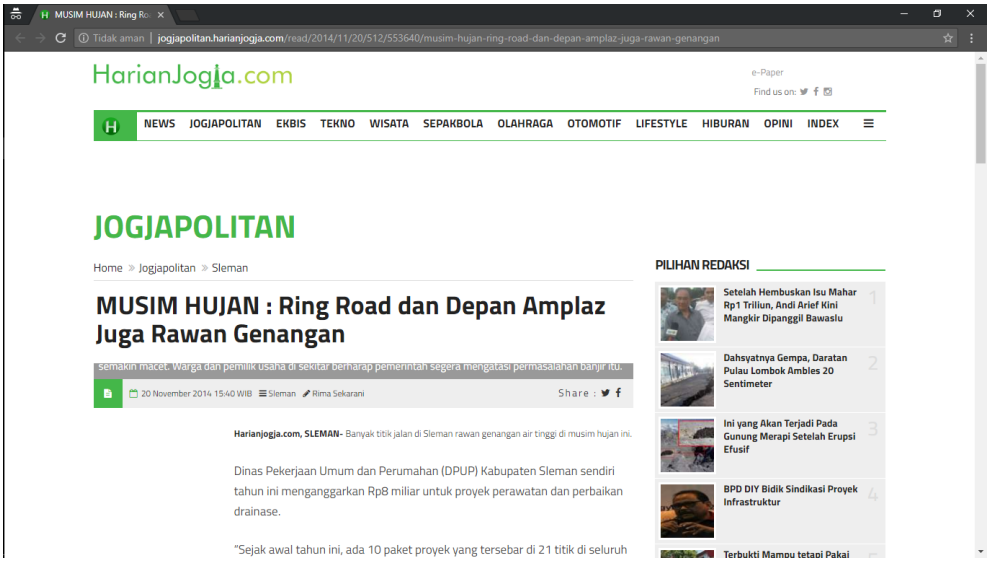
PEMERINTAH KABUPATEN SLEMAN
BADAN KESATUAN BANGSA DAN POLITIK

Drs. Ahmad Yuno Nurkaryadi, M.M
Pembina Tingkat I, IV/b
NIP 19621002 198603 1 010

Appendix 1

Inundation in East Side of Ambarrukmo Plaza.

Source: Jogja, 2013



Inundation in Front of Ambarrukmo Plaza.

Source: Sekarani, 2014

Inundation in the West Side of Perumnas Street T-Junction.

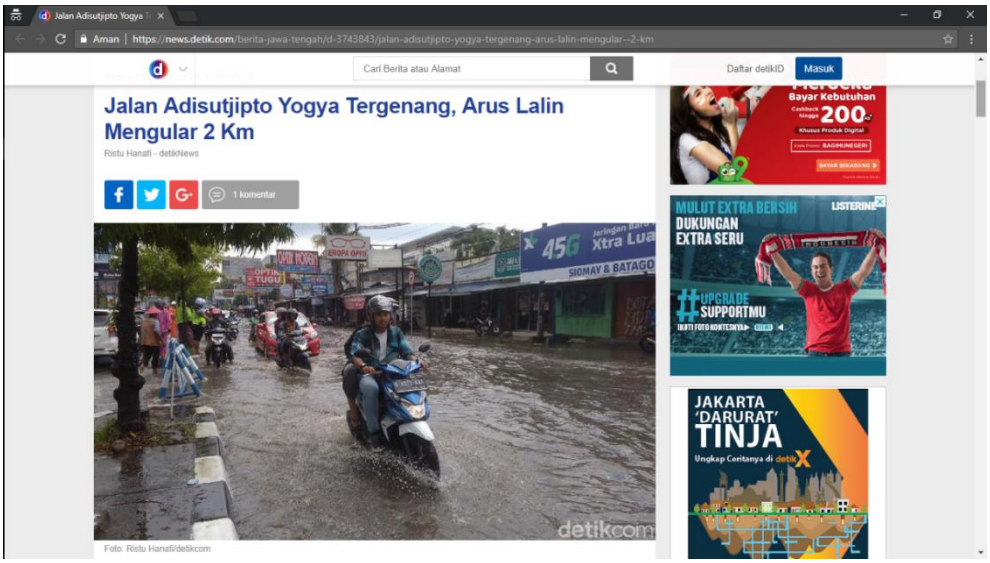
Source: Reza, 2015

Inundation Caused by Rain Intensity in the West Side of Perumnas Street T-Junction.

Source: Mustaqim, 2016

Inundation in Laksda Adisucipto Road in the West Side of Perumnas Street T-Junction.

Source: Waskita, 2016



Traffic Jam Caused by Inundation.

Source: Hanafi, 2017

Inundation in the West Side of Perumnas Street T-Junction.

Source: Prasetya, 2017

Poor Drainage Causing Traffic Jam Caused by Inundation in the West Side of Perumnas Street T-Junction.

Source: Nurdiyansyah, 2017

Heavy Rain with Strong Wind Happened in Sleman.

Source: Sleman, 2017

Inundation in the West Side of Perumnas Street T-Junction Subsided.

Source: Nugroho, 2017(b)

Appendix 2

CRITICAL VALUE OF T-DISTRIBUTION TABLE

df	One-Tailed Test						
	0,25	0,10	0,05	0,025	0,01	0,005	0,001
	Two-Tailed Test						
	0,50	0,20	0,10	0,05	0,02	0,01	0,002
1	1,000000	3,077684	6,313752	12,706205	31,820516	63,656741	318,308839
2	0,816497	1,885618	2,919986	4,302653	6,964557	9,924843	22,327125
3	0,764892	1,637744	2,353363	3,182446	4,540703	5,840909	10,214532
4	0,740697	1,533206	2,131847	2,776445	3,746947	4,604095	7,173182
5	0,726687	1,475884	2,015048	2,570582	3,364930	4,032143	5,893430
6	0,717558	1,439756	1,943180	2,446912	3,142668	3,707428	5,207626
7	0,711142	1,414924	1,894579	2,364624	2,997952	3,499483	4,785290
8	0,706387	1,396815	1,859548	2,306004	2,896459	3,355387	4,500791
9	0,702722	1,383029	1,833113	2,262157	2,821438	3,249836	4,296806
10	0,699812	1,372184	1,812461	2,228139	2,763769	3,169273	4,143700
11	0,697445	1,363430	1,795885	2,200985	2,718079	3,105807	4,024701
12	0,695483	1,356217	1,782288	2,178813	2,680998	3,054540	3,929633
13	0,693829	1,350171	1,770933	2,160369	2,650309	3,012276	3,851982
14	0,692417	1,345030	1,761310	2,144787	2,624494	2,976843	3,787390
15	0,691197	1,340606	1,753050	2,131450	2,602480	2,946713	3,732834
16	0,690132	1,336757	1,745884	2,119905	2,583487	2,920782	3,686155
17	0,689195	1,333379	1,739607	2,109816	2,566934	2,898231	3,645767
18	0,688364	1,330391	1,734064	2,100922	2,552380	2,878440	3,610485
19	0,687621	1,327728	1,729133	2,093024	2,539483	2,860935	3,579400
20	0,686954	1,325341	1,724718	2,085963	2,527977	2,845340	3,551808
21	0,686352	1,323188	1,720743	2,079614	2,517648	2,831360	3,527154
22	0,685805	1,321237	1,717144	2,073873	2,508325	2,818756	3,504992
23	0,685306	1,319460	1,713872	2,068658	2,499867	2,807336	3,484964
24	0,684850	1,317836	1,710882	2,063899	2,492159	2,796940	3,466777
25	0,684430	1,316345	1,708141	2,059539	2,485107	2,787436	3,450189
26	0,684043	1,314972	1,705618	2,055529	2,478630	2,778715	3,434997
27	0,683685	1,313703	1,703288	2,051831	2,472660	2,770683	3,421034
28	0,683353	1,312527	1,701131	2,048407	2,467140	2,763262	3,408155
29	0,683044	1,311434	1,699127	2,045230	2,462021	2,756386	3,396240
30	0,682756	1,310415	1,697261	2,042272	2,457262	2,749996	3,385185
31	0,682486	1,309464	1,695519	2,039513	2,452824	2,744042	3,374899
32	0,682234	1,308573	1,693889	2,036933	2,448678	2,738481	3,365306
33	0,681997	1,307737	1,692360	2,034515	2,444794	2,733277	3,356337
34	0,681774	1,306952	1,690924	2,032245	2,441150	2,728394	3,347934
35	0,681564	1,306212	1,689572	2,030108	2,437723	2,723806	3,340045
36	0,681366	1,305514	1,688298	2,028094	2,434494	2,719485	3,332624
37	0,681178	1,304854	1,687094	2,026192	2,431447	2,715409	3,325631
38	0,681001	1,304230	1,685954	2,024394	2,428568	2,711558	3,319030
39	0,680833	1,303639	1,684875	2,022691	2,425841	2,707913	3,312788
40	0,680673	1,303077	1,683851	2,021075	2,423257	2,704459	3,306878

Source: Wijaya, 2016

Appendix 3

F-table 0.05

Table of F-statistics P=0.05

df2 \df1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	35	40	45	50	60	70	80	100	200	500	1000	>1000	df1/ df2
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.76	8.74	8.73	8.71	8.70	8.69	8.68	8.67	8.67	8.66	8.65	8.64	8.63	8.62	8.62	8.60	8.59	8.59	8.58	8.57	8.57	8.56	8.55	8.54	8.53	8.53	8.54	3
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.94	5.91	5.89	5.87	5.86	5.84	5.83	5.82	5.81	5.80	5.79	5.77	5.76	5.75	5.75	5.73	5.72	5.71	5.70	5.69	5.68	5.67	5.66	5.65	5.64	5.63	5.63	4
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.70	4.68	4.66	4.64	4.62	4.60	4.59	4.58	4.57	4.56	4.54	4.53	4.52	4.50	4.50	4.48	4.46	4.45	4.44	4.43	4.42	4.42	4.41	4.39	4.37	4.37	4.36	5
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00	3.98	3.96	3.94	3.92	3.91	3.90	3.88	3.87	3.86	3.84	3.83	3.82	3.81	3.79	3.77	3.76	3.75	3.74	3.73	3.72	3.71	3.69	3.68	3.67	3.67	6
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.60	3.57	3.55	3.53	3.51	3.49	3.48	3.47	3.46	3.44	3.43	3.41	3.40	3.39	3.38	3.36	3.34	3.33	3.32	3.30	3.29	3.29	3.27	3.25	3.24	3.23	3.23	7
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.31	3.28	3.26	3.24	3.22	3.20	3.19	3.17	3.16	3.15	3.13	3.12	3.10	3.09	3.08	3.06	3.04	3.03	3.02	3.01	2.99	2.99	2.97	2.95	2.94	2.93	2.93	8
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.10	3.07	3.05	3.03	3.01	2.99	2.97	2.96	2.95	2.94	2.92	2.90	2.89	2.87	2.86	2.84	2.83	2.81	2.80	2.79	2.78	2.77	2.76	2.73	2.72	2.71	2.71	9
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.94	2.91	2.89	2.86	2.85	2.83	2.81	2.80	2.79	2.77	2.75	2.74	2.72	2.71	2.70	2.68	2.66	2.65	2.64	2.62	2.61	2.60	2.59	2.56	2.55	2.54	2.54	10
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.82	2.79	2.76	2.74	2.72	2.70	2.69	2.67	2.66	2.65	2.63	2.61	2.59	2.58	2.57	2.55	2.53	2.52	2.51	2.49	2.48	2.47	2.46	2.43	2.42	2.41	2.41	11
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.72	2.69	2.66	2.64	2.62	2.60	2.58	2.57	2.56	2.54	2.52	2.51	2.49	2.48	2.47	2.44	2.43	2.41	2.40	2.38	2.37	2.36	2.35	2.32	2.31	2.30	2.30	12
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.63	2.60	2.58	2.55	2.53	2.51	2.50	2.48	2.47	2.46	2.44	2.42	2.41	2.39	2.38	2.36	2.34	2.33	2.31	2.30	2.28	2.27	2.26	2.23	2.22	2.21	2.21	13
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.57	2.53	2.51	2.48	2.46	2.44	2.43	2.41	2.40	2.39	2.37	2.35	2.33	2.32	2.31	2.28	2.27	2.25	2.24	2.22	2.21	2.20	2.19	2.16	2.14	2.14	2.13	14
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.51	2.48	2.45	2.42	2.40	2.38	2.37	2.35	2.34	2.33	2.31	2.29	2.27	2.26	2.25	2.22	2.20	2.19	2.18	2.16	2.15	2.14	2.12	2.10	2.08	2.07	2.07	15
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.46	2.42	2.40	2.37	2.35	2.33	2.32	2.30	2.29	2.28	2.25	2.24	2.22	2.21	2.19	2.17	2.15	2.14	2.12	2.11	2.09	2.08	2.07	2.04	2.02	2.02	2.01	16
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.41	2.38	2.35	2.33	2.31	2.29	2.27	2.26	2.24	2.23	2.21	2.19	2.17	2.16	2.15	2.12	2.10	2.09	2.08	2.06	2.05	2.03	2.02	1.99	1.97	1.97	1.96	17
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.37	2.34	2.31	2.29	2.27	2.25	2.23	2.22	2.20	2.19	2.17	2.15	2.13	2.12	2.11	2.08	2.06	2.05	2.04	2.02	2.00	1.99	1.98	1.95	1.93	1.92	1.92	18
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.34	2.31	2.28	2.26	2.23	2.21	2.20	2.18	2.17	2.16	2.13	2.11	2.10	2.08	2.07	2.05	2.03	2.01	2.00	1.98	1.97	1.96	1.94	1.91	1.89	1.88	1.88	19
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.31	2.28	2.25	2.23	2.20	2.18	2.17	2.15	2.14	2.12	2.10	2.08	2.07	2.05	2.04	2.01	1.99	1.98	1.97	1.95	1.93	1.92	1.91	1.88	1.86	1.85	1.84	20
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.26	2.23	2.20	2.17	2.15	2.13	2.11	2.10	2.08	2.07	2.05	2.03	2.01	2.00	1.98	1.96	1.94	1.92	1.91	1.89	1.88	1.86	1.85	1.82	1.80	1.79	1.78	22
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.22	2.18	2.15	2.13	2.11	2.09	2.07	2.05	2.04	2.03	2.00	1.98	1.97	1.95	1.94	1.91	1.89	1.88	1.86	1.84	1.83	1.82	1.80	1.77	1.75	1.74	1.73	24
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.18	2.15	2.12	2.09	2.07	2.05	2.03	2.02	2.00	1.99	1.97	1.95	1.93	1.91	1.90	1.87	1.85	1.84	1.82	1.80	1.79	1.78	1.76	1.73	1.71	1.70	1.69	26
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.15	2.12	2.09	2.06	2.04	2.02	2.00	1.99	1.97	1.96	1.93	1.91	1.90	1.88	1.87	1.84	1.82	1.80	1.79	1.77	1.75	1.74	1.73	1.69	1.67	1.66	1.66	28
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.13	2.09	2.06	2.04	2.01	1.99	1.98	1.96	1.95	1.93	1.91	1.89	1.87	1.85	1.84	1.81	1.79	1.77	1.76	1.74	1.72	1.71	1.70	1.66	1.64	1.63	1.62	30
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.08	2.04	2.01	1.99	1.96	1.94	1.92	1.91	1.89	1.88	1.85	1.83	1.82	1.80	1.79	1.76	1.74	1.72	1.70	1.68	1.66	1.65	1.63	1.60	1.57	1.57	1.56	35
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.04	2.00	1.97	1.95	1.92	1.90	1.89	1.87	1.85	1.84	1.81	1.79	1.77	1.76	1.74	1.72	1.69	1.67	1.66	1.64	1.62	1.61	1.59	1.55	1.53	1.52	1.51	40
45	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05	2.01	1.97	1.94	1.92	1.89	1.87	1.86	1.84	1.82	1.81	1.78	1.76	1.74	1.73	1.71	1.68	1.66	1.64	1.63	1.60	1.59	1.57	1.55	1.51	1.49	1.48	1.47	45
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.99	1.95	1.92	1.89	1.87	1.85	1.83	1.81	1.80	1.78	1.76	1.74	1.72	1.70	1.69	1.66	1.63	1.61	1.60	1.58	1.56	1.54	1.52	1.48	1.46	1.45	1.44	50
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.95	1.92	1.89	1.86	1.84	1.82	1.80	1.78	1.76	1.75	1.72	1.70	1.68	1.66	1.65	1.62	1.59	1.57	1.56	1.53	1.52	1.50	1.48	1.44	1.41	1.40	1.39	60
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.93	1.89	1.86	1.84	1.81	1.79	1.77	1.75	1.74	1.72	1.70	1.67	1.65	1.64	1.62	1.59	1.57	1.55	1.53	1.50	1.49	1.47	1.45	1.40	1.37	1.36	1.35	70
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.91	1.88	1.84	1.82	1.79	1.77	1.75	1.73	1.72	1.70	1.68	1.65	1.63	1.62	1.60	1.57	1.54	1.52	1.51	1.48	1.46	1.45	1.43	1.38	1.35	1.34	1.33	80
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.89	1.85	1.82	1.79	1.77	1.75	1.73	1.71	1.69	1.68	1.65	1.63	1.61	1.59	1.57	1.54	1.52	1.49	1.48	1.45	1.43	1.41	1.39	1.34	1.31	1.30	1.28	100
200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.84	1.80	1.77	1.74	1.72	1.69	1.67	1.66	1.64	1.62	1.60	1.57	1.55	1.53	1.52	1.48	1.46	1.43	1.41	1.39	1.36	1.35	1.32	1.26	1.22	1.21	1.19	200
500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.81	1.77	1.74	1.71	1.69	1.66	1.64	1.62	1.61	1.59	1.56	1.54	1.52	1.50	1.48	1.45	1.42	1.40	1.38	1.35	1.32	1.30	1.28	1.21	1.16	1.14	1.12	500
1000	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.80	1.76	1.73	1.70	1.68	1.65	1.63	1.61	1.60	1.58	1.55	1.53	1.51	1.49	1.47	1.43	1.41	1.38	1.36	1.33	1.31	1.29	1.26	1.19	1.13	1.11	1.08	1000
>1000	1.04	3.00	2.61	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.79	1.75	1.72	1.69	1.67	1.64	1.62	1.61	1.59	1.57	1.54	1.52	1.50	1.48	1.46	1.42	1.40	1.37	1.35	1.32	1.30	1.28	1.25	1.17	1.11	1.08	1.03	>1000
df2/ df1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	35	40	45	50	60	70	80	100	200	500	1000	>1000	df1 \df2

Source: Szafron, 2008

Appendix 4

Frequency Factors K for Gamma and Log-Pearson Type III Distributions

SKEW COEFFICIENT Cs	Recurrence Interval In Years							
	1.0101	2	5	10	25	50	100	200
	Percent Chance (>=) = 1-F							
	99	50	20	10	4	2	1	0.5
3	-0.667	-0.396	0.420	1.180	2.278	3.152	4.051	4.970
2.9	-0.690	-0.390	0.440	1.195	2.277	3.134	4.013	4.904
2.8	-0.714	-0.384	0.460	1.210	2.275	3.114	3.973	4.847
2.7	-0.740	-0.376	0.479	1.224	2.272	3.093	3.932	4.783
2.6	-0.769	-0.368	0.499	1.238	2.267	3.071	3.889	4.718
2.5	-0.799	-0.360	0.518	1.250	2.262	3.048	3.845	4.652
2.4	-0.832	-0.351	0.537	1.262	2.256	3.023	3.800	4.584
2.3	-0.867	-0.341	0.555	1.274	2.248	2.997	3.753	4.515
2.2	-0.905	-0.330	0.574	1.284	2.240	2.970	3.705	4.444
2.1	-0.946	-0.319	0.592	1.294	2.230	2.942	3.656	4.372
2	-0.990	-0.307	0.609	1.302	2.219	2.912	3.605	4.298
1.9	-1.037	-0.294	0.627	1.310	2.207	2.881	3.553	4.223
1.8	-1.087	-0.282	0.643	1.318	2.193	2.848	3.499	4.147
1.7	-1.140	-0.268	0.660	1.324	2.179	2.815	3.444	4.069
1.6	-1.197	-0.254	0.675	1.329	2.163	2.780	3.388	3.990
1.5	-1.256	-0.240	0.690	1.333	2.146	2.743	3.330	3.910
1.4	-1.318	-0.225	0.705	1.337	2.128	2.706	3.271	3.828
1.3	-1.383	-0.210	0.719	1.339	2.108	2.666	3.211	3.745
1.2	-1.449	-0.195	0.732	1.340	2.087	2.626	3.149	3.661
1.1	-1.518	-0.180	0.745	1.341	2.066	2.585	3.087	3.575
1	-1.588	-0.164	0.758	1.340	2.043	2.542	3.022	3.489
0.9	-1.660	-0.148	0.769	1.339	2.018	2.498	2.957	3.401
0.8	-1.733	-0.132	0.780	1.336	1.993	2.453	2.891	3.312
0.7	-1.806	-0.116	0.790	1.333	1.967	2.407	2.824	3.223
0.6	-1.880	-0.099	0.800	1.328	1.939	2.359	2.755	3.132
0.5	-1.955	-0.083	0.808	1.323	1.910	2.311	2.686	3.041
0.4	-2.029	-0.066	0.816	1.317	1.880	2.261	2.615	2.949
0.3	-2.104	-0.050	0.824	1.309	1.849	2.211	2.544	2.856
0.2	-2.178	-0.033	0.830	1.301	1.818	2.159	2.472	2.763
0.1	-2.252	-0.017	0.836	1.292	1.785	2.107	2.400	2.67
0	-2.326	0.000	0.842	1.282	1.751	2.054	2.326	2.576
-0.1	-2.4	0.017	0.846	1.27	1.716	2.000	2.252	2.482
-0.2	-2.472	0.033	0.850	1.258	1.680	1.945	2.178	2.388
-0.3	-2.544	0.050	0.853	1.245	1.643	1.890	2.104	2.294
-0.4	-2.615	0.066	0.855	1.231	1.606	1.834	2.029	2.201
-0.5	-2.686	0.083	0.856	1.216	1.567	1.777	1.955	2.108
-0.6	-2.755	0.099	0.857	1.200	1.528	1.720	1.880	2.016
-0.7	-2.824	0.116	0.857	1.183	1.488	1.663	1.806	1.926
-0.8	-2.891	0.132	0.856	1.166	1.448	1.606	1.733	1.837
-0.9	-2.957	0.148	0.854	1.147	1.407	1.549	1.660	1.749

Frequency Factors K for Gamma and Log-Pearson Type III Distributions

(Continued)

SKEW COEFFICIENT Cs	Recurrence Interval In Years							
	5	10	25	50	100	200		
	Percent Chance (>=) = 1-F							
	20	10	4	2	1	0.5		
-1	-3.022	0.164	0.852	1.128	1.366	1.492	1.588	1.664
-1.1	-3.087	0.180	0.848	1.107	1.324	1.435	1.518	1.581
-1.2	-3.149	0.195	0.844	1.086	1.282	1.379	1.449	1.501
-1.3	-3.211	0.210	0.838	1.064	1.240	1.324	1.383	1.424
-1.4	-3.271	0.225	0.832	1.041	1.198	1.270	1.318	1.351
-1.5	-3.33	0.240	0.825	1.018	1.157	1.217	1.256	1.282
-1.6	-3.880	0.254	0.817	0.994	1.116	1.166	1.197	1.216
-1.7	-3.444	0.268	0.808	0.970	1.075	1.116	1.140	1.155
-1.8	-3.499	0.282	0.799	0.945	1.035	1.069	1.087	1.097
-1.9	-3.553	0.294	0.788	0.920	0.996	1.023	1.037	1.044
-2	-3.605	0.307	0.777	0.895	0.959	0.980	0.990	0.995
-2.1	-3.656	0.319	0.765	0.869	0.923	0.939	0.946	0.949
-2.2	-3.705	0.330	0.752	0.844	0.888	0.900	0.905	0.907
-2.3	-3.753	0.341	0.739	0.819	0.855	0.864	0.867	0.869
-2.4	-3.800	0.351	0.725	0.795	0.823	0.830	0.832	0.833
-2.5	-3.845	0.360	0.711	0.711	0.793	0.798	0.799	0.800
-2.6	-3.899	0.368	0.696	0.747	0.764	0.768	0.769	0.769
-2.7	-3.932	0.376	0.681	0.724	0.738	0.740	0.740	0.741
-2.8	-3.973	0.384	0.666	0.702	0.712	0.714	0.714	0.714
-2.9	-4.013	0.390	0.651	0.681	0.683	0.689	0.690	0.690

Source: Haan, 1977

Appendix 5

Table Z: Areas under the standard normal curve (negative Z)

Second decimal place in z										
0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	**z**
									* 0.0000	-3.9
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-3.8
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	-3.7
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	-3.6
0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	-3.5
0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-3.4
0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005	-3.3
0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	-3.2
0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010	-3.1
0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	-3.0
0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	-2.9
0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026	-2.8
0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035	-2.7
0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047	-2.6
0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062	-2.5
0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082	-2.4
0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107	-2.3
0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139	-2.2
0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179	-2.1
0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228	-2.0
0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287	-1.9
0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359	-1.8
0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446	-1.7
0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548	-1.6
0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668	-1.5
0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808	-1.4
0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968	-1.3
0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151	-1.2
0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357	-1.1
0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587	-1.0
0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841	-0.9
0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119	-0.8
0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420	-0.7
0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743	-0.6
0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085	-0.5
0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446	-0.4
0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821	-0.3
0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207	-0.2
0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602	-0.1
0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000	-0.0

* For values of $z \leq -3.90$, the areas are 0.0000 to four decimal places

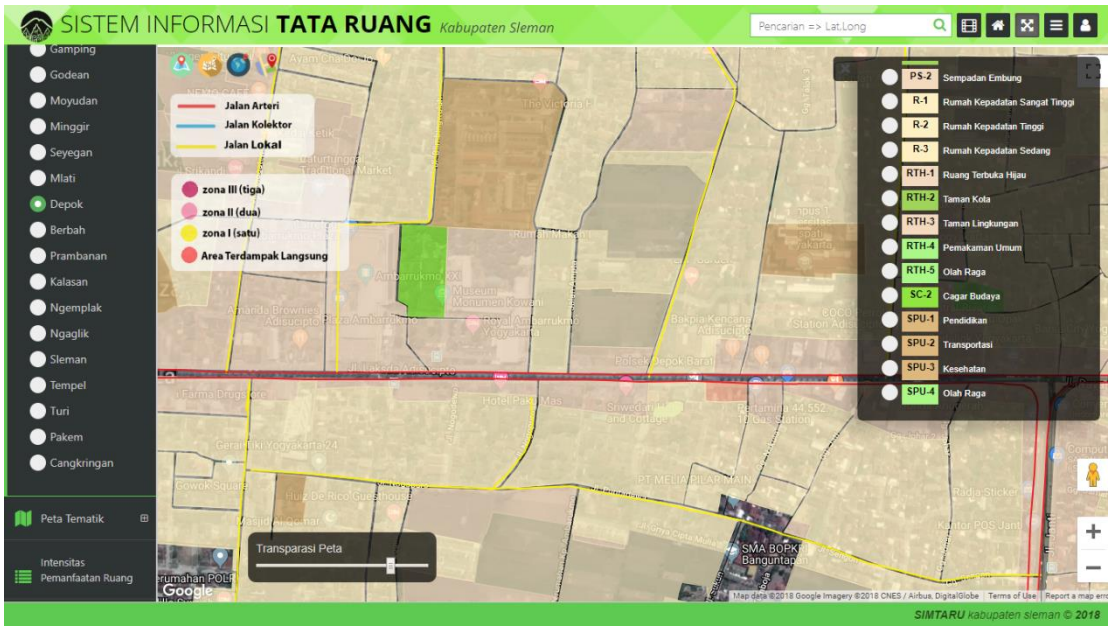
Table Z: Areas under the standard normal curve (positive Z)

	Second decimal place in z									
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	* 1.0000									

* For values of $z \geq 3.90$, the areas are 1.0000 to four decimal places

Source: James, 2007

Appendix 6



Source: Simtaru, 2018

Appendix 7

Beran Validation

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
1	1983	Beran	Original			-	80	43	49	63	0	0	0	0	43	73	69
		Bronggang	Comparation	9.76	95.31	105											
		Santan	Comparation	10.86	117.99	75											
		Tanjung Tirto	Comparation	12.24	149.76	51											
		Pundong	Comparation	21.18	448.38	90											
		Px (mm)				81.7432											
2	2010	Beran	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Nyemengan	Comparation	13.97	195.16	23.8	43.8	59	48.1	57.5	50	49	28.8	47.8	30.8	70	57.6
		Pundong	Comparation	21.18	448.38	33	25	45	106	106	28	3.5	25	87	51	46	67
		Siluk	Comparation	27.09	733.73	40	26	27.8	55	80	32.9	10	25	38.1	52.9	56.4	48.1
		Wanagama	Comparation	33.96	1153.45	114	55.4	50	60	75	5.3	30	0	0	67.5	42	58
		Px (mm)				36.40	37.94	50.49	63.63	73.57	38.41	31.15	24.77	51.22	41.96	59.95	58.47
3	2016	Beran	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Angin-angin	Comparation	4.95	24.50	55.8	42.5	61	42.4	23.6	64	44.3	15.2	34.6	21.2	49.9	86.8
		Plataran	Comparation	9.76	95.31	37.5	91.5	89	41.5	37	127	34.5	70.9	39.4	44.8	65	65
		Nyemengan	Comparation	13.97	195.16	32.5	32.5	73.8	90	55.7	76	55.8	32	10.4	75	64	70.4
		Karang Ploso	Comparation	14.16	200.58	25.8	77	82	75	34	75	42	69	46	64	36.2	75
		Px (mm)				48.29	52.84	68.56	48.86	29.41	76.66	43.40	30.49	34.33	33.20	52.54	80.75

Santan Validation

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
1	1984	Santan	Original			82	102	38	91	-	-	-	-	-	-	-	-
		Tanjung Tirto	Comparation	1.65	2.7225					26	26	22	31	32	48	53	108
		Beran	Comparation	10.8625	117.99					28	65	10	26	76	70	59	105
		Prumpung	Comparation	11.4125	130.25					25.8	54.3	3	100	78	53	44	77.2
		Bronggang	Comparation	12.1	146.41					0	11	6	9	70	80	75	125
		Px (mm)								25.58	27.14	21.09	31.86	34.53	49.14	53.34	107.63
2	1985	Santan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Tanjung Tirto	Comparation	1.65	2.7225	56	58	95	59	53	14	2	10	1	52	45	56
		Beran	Comparation	10.8625	117.99	41	84	73	53	47	105	8	19	6	15	65	115
		Prumpung	Comparation	11.4125	130.25	78	75	43	48	48	65	9	33	6	54	51	70
		Bronggang	Comparation	12.1	146.41	80	55	52	52	54	75	7	25	36	85	115	77
		Px (mm)				56.53	58.85	92.75	58.53	52.79	18.05	2.36	10.91	1.82	51.81	46.78	57.92
3	1986	Santan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Tanjung Tirto	Comparation	1.65	2.7225	120	111	78	40	6	32	2	0	29	22	67	96
		Beran	Comparation	10.8625	117.99	81	81	86	75	15	29	11	5	37	52	76	30
		Prumpung	Comparation	11.4125	130.25	22	2	65	43	7	46	1	21	49	79	56	38
		Bronggang	Comparation	12.1	146.41	71	43	145	105	11	36	5	17	45	38	70	49
		Px (mm)				116.37	107.01	79.09	41.96	6.30	32.28	2.23	0.82	29.85	24.05	67.03	92.60

Santan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
4	1987	Santan	Original			-	-	-	32	71	8	8	0	0	5	75	140
		Tanjung Tirto	Comparation	1.65	2.7225	88	50	50									
		Beran	Comparation	10.8625	117.99	94	114	73									
		Prumpung	Comparation	11.4125	130.25	90	99	53									
		Bronggang	Comparation	12.1	146.41	168	50	59									
		Px (mm)				89.57	52.35	50.72									
5	2010	Santan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Nyemengan	Comparation	12.375	153.14	23.8	43.8	59	48.1	57.5	50	49	28.8	47.8	30.8	70	57.6
		Pundong	Comparation	18.5625	344.57	33	25	45	106	106	28	3.5	25	87	51	46	67
		Siluk	Comparation	21.3125	454.22	40	26	27.8	55	80	32.9	10	25	38.1	52.9	56.4	48.1
		Wanagama	Comparation	23.375	546.39	114	55.4	50	60	75	5.3	30	0	0	67.5	42	58
		Px (mm)				40.69	38.41	49.66	63.33	74.01	36.39	30.23	23.44	48.17	43.76	58.80	58.13
6	2016	Santan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Karang Ploso	Comparation	5.5	30.25	25.8	77	82	75	34	75	42	69	46	64	36.2	75
		Plataran	Comparation	10.23	104.65	37.5	91.5	89	41.5	37	127	34.5	70.9	39.4	44.8	65	65
		Nyemengan	Comparation	12.375	153.14	32.5	32.5	73.8	90	55.7	76	55.8	32	10.4	75	64	70.4
		Angin-angin	Comparation	14.025	196.7	55.8	42.5	61	42.4	23.6	64	44.3	15.2	34.6	21.2	49.9	86.8
		Px (mm)				31.48	70.96	80.28	67.85	36.17	83.25	42.56	59.84	39.48	57.93	45.91	73.79

Nyemengan Validation

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
1	1983	Nyemengan	Original			50	60	60	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11				23	65	9	0	0	0	47	100	52
		Santan	Comparation	12.38	153.14				56	57	25	0	0	0	55	45	47
		Tanjung Tirto	Comparation	13.61	185.30				45	58	10	0	0	0	45	42	43
		Beran	Comparation	13.97	195.16				49	63	0	0	0	0	43	73	69
		Px (mm)							36.03	62.2	10.78	0	0	0	47.58	77.41	52.16
2	1984	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Tanjung Tirto	Comparation	13.61	185.30	86	66	59	101	26	26	22	31	32	48	53	108
		Beran	Comparation	13.97	195.16	58	129	56	40	28	65	10	26	76	70	59	105
		Prumpung	Comparation	16.64	276.81	64.7	122.4	44.1	44.2	25.8	54.3	3	100	78	53	44	77.2
		Bronggang	Comparation	21.73	471.98	55	113	53	50	0	11	6	9	70	80	75	125
		Px (mm)				68.40	104.53	53.96	62.49	23.20	42.63	11.91	41.89	61.05	60.22	55.76	102.42
3	1985	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	87	83	108	33	32	32	0	0	5	24	164	48
		Tanjung Tirto	Comparation	13.61	185.30	56	58	95	59	53	14	2	10	1	52	45	56
		Beran	Comparation	13.97	195.16	41	84	73	53	47	105	8	19	6	15	65	115
		Prumpung	Comparation	16.64	276.81	78	75	43	48	48	65	9	33	6	54	51	70
		Px (mm)				73.79	78.19	93.31	42.01	39.52	44.02	2.56	8.21	4.61	30.47	116.74	62.14

Nyemengan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
4	1986	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	74	68	108	6	8	123	4	0	12	4	93	25
		Tanjung Tirto	Comparation	13.61	185.30	120	111	78	40	6	32	2	0	29	22	67	96
		Beran	Comparation	13.97	195.16	81	81	86	75	15	29	11	5	37	52	76	30
		Prumpung	Comparation	16.64	276.81	22	2	65	43	7	46	1	21	49	79	56	38
		Px (mm)				76.92	69.83	95	26.35	8.65	85.05	4.43	3.08	22.72	22.63	82.05	38.83
5	1987	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	115	68	17	11	0	12	0	0	0	0	123	167
		Tanjung Tirto	Comparation	13.61	185.30	88	50	50	10	20	7	12	0	0	0	27	61
		Beran	Comparation	13.97	195.16	94	114	73	11	23	20	1	1	1	1	52	102
		Prumpung	Comparation	16.64	276.81	90	99	53	53	20	9	8	1	1	0	59	118
		Px (mm)				104.58	75.6	35.1	15.44	9.04	12.10	3.00	0.27	0.27	0.16	89.23	134.17
6	1988	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Santan	Comparation	12.38	153.14	115	252	161	87	111	96	5	10	0	141	85	79
		Tanjung Tirto	Comparation	13.61	185.30	46	150	40	24	86	82	10	8	0	55	33	73
		Beran	Comparation	13.97	195.16	73	150	45	15	47	29	1	8	3	112	47	56
		Angin-angin	Comparation	18.84	354.85	68	35	18	11	42	8	2	2	4.5	40	68	54
		Px (mm)				78.761	167.2	77.9	40.54	77.9	62.437	4.90	7.81	1.41	95.84	58.66	67.89

Nyemengan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
7	1989	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	23	62	71	19	56	54	57	27	0	29	47	52
		Santan	Comparation	12.38	153.14	92	115	116	38	52	114	263	106	0	208	141	99
		Tanjung Tirto	Comparation	13.61	185.30	46	66	42	21	20	85	115	40	0	57	31	78
		Beran	Comparation	13.97	195.16	60	46	105	47	21	117	70	24	5	68	65	93
		Px (mm)				44.301	69.96	79.7	26.76	44.9	78.58	105.07	42.90	0.71	71.36	64.27	70.32
8	1990	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	63	42	52	27	13	9	7	16	0	13	17	66
		Santan	Comparation	12.38	153.14	158	112	97	76	11	52	36	59	11	54	19	132
		Tanjung Tirto	Comparation	13.61	185.30	66	86	50	66	10	22	7	27	14	15	29	75
		Beran	Comparation	13.97	195.16	74	53	68	60	56	32	31	63	2	25	55	147
		Px (mm)				82.311	62.93	62.2	46.5	18.3	22.07	15.71	32.19	4.39	22.48	24.60	90.93
9	1991	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	110	98	95	27	28	2	0	0	0	0	35	38
		Karang Ploso	Comparation	11.55	133.40	62	102	80.5	36	4	0	0	0	0	15	23	42
		Santan	Comparation	12.38	153.14	141	259	101	109	25	0	0	0	0	0	127	143
		Tanjung Tirto	Comparation	13.61	185.30	88	129	82	47	68	0	0	0	0	0	20	64
		Px (mm)				102.78	130.6	91.3	45.58	28.4	0.98	0	0	0	2.94	46.24	60.38

Nyemengan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
10	1992	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Karang Ploso	Comparation	11.55	133.40	42	53	71	112	27.5	12	8	88	25	38.5	51	65
		Santan	Comparation	12.38	153.14	149	207	195	156	110	113	35	41	83	84	85	83
		Tanjung Tirto	Comparation	13.61	185.30	69	83	120	86	34	2	26	90	22	82	55	47
		Beran	Comparation	13.97	195.16	65	126	39	110	10	8	0	0	0	1	76	53
		Px (mm)				81.201	115.8	108	117.6	47.2	35.83	17.47	57.57	34.55	52.34	66.14	63.33
11	1993	Nyemengan	Original														
		Pundong	Comparation	7.29	53.11	70	76	70	32	15	8	17	0	0	0	43	64
		Santan	Comparation	12.38	153.14	98	40	60	87	21	45	0	8	0	0	41	84
		Tanjung Tirto	Comparation	13.61	185.30	97	29	42	76	37	14	2	1	0	0	73	80
		Beran	Comparation	13.97	195.16	86	28	56	90	54	22	0	1	0	3	119	74
		Px (mm)				81.442	55.52	62	56.91	25	17.64	9.22	1.75	0	0.43	58.00	71.47
12	1995	Nyemengan	Original			-	62	39	45	0	41	19	0	0	20	95	120
		Pundong	Comparation	7.29	53.11	30											
		Karang Ploso	Comparation	11.55	133.40	81.4											
		Santan	Comparation	12.38	153.14	56											
		Tanjung Tirto	Comparation	13.61	185.30	92											
		Px (mm)				53.258											

Nyemengan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
13	1996	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Santan	Comparation	12.38	153.14	78	57	40	25	11	0	0	5	0	49	125	76
		Tanjung Tirto	Comparation	13.61	185.30	56	59	19	49	13	0	14	23	0	55	74	59
		Beran	Comparation	13.97	195.16	41	49	28	54	26	8	1	7	0	47	86	79
		Bronggang	Comparation	21.73	471.98	67	27	60	27	16	23	0	13	0	27	87	74
		Px (mm)				60.70	52.11	33.1	39.73	16.1	4.68	4.21	11.49	0	47.72	96.02	71.79
14	1997	Nyemengan	Original			-	-	-	-	-	-	-	-	-	-	-	-
		Pundong	Comparation	7.29	53.11	108	98	25	22	8	0	0	0	0	0	0	61
		Santan	Comparation	12.38	153.14	67	72	12	90	10	0	0	0	0	0	10	34
		Tanjung Tirto	Comparation	13.61	185.30	54	78	25	52	10	0	0	0	0	3	24	37
		Beran	Comparation	13.97	195.16	51	148	25	27	58	0	6	0	0	1	22	51
		Px (mm)				84.28	97.4	22.6	39.6	15.8	0	0.86	0	0	0.59	8.57	51.05
15	2000	Nyemengan	Original			-	-	105	76	25	76	0	0	0	51	78	50
		Pundong	Comparation	7.29	53.11	29.7	56.8										
		Karang Ploso	Comparation	11.55	133.40	65	13.4										
		Santan	Comparation	12.38	153.14	54	81										
		Tanjung Tirto	Comparation	13.61	185.30	58	61										
		Px (mm)				44.76	53.02										

Nyemengan Validation (Continued)

No.	Year	Station	Types of Station	L_1 (km)	L_1^2 (km)	Monthly Maximum Rainfall Data (mm)											
						January	February	March	April	May	June	July	August	September	October	November	December
16	2002	Nyemengan	Original			76	73	58	98	40	0	0	0	0	0	-	-
		Bedugan	Comparation	5.78	33.35											41	29
		Pundong	Comparation	7.29	53.11											44	16
		Gemawang	Comparation	9.76	95.31											57	32
		Karang Ploso	Comparation	11.55	133.40											36	29
		Px (mm)				0	0	0	0	0	0	0	0	0	0	43.80	25.81

Appendix 8

Maximum Rainfall

No.	Year	Station	Monthly Maximum Rainfall Data (mm)												Max. Rainfall (mm)	3 Stations Max. Rainfall (mm)
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1	1983	Beran	81.74	80	43	49	63	0	0	0	0	43	73	69	81.74	
		Santan	75	65	68	56	57	25	0	0	0	55	45	47	75	81.74
		Nyemengan	50	60	60	36.03	62.21	10.78	0	0	0	47.58	77.41	52.16	77.41	
2	1984	Beran	58	129	56	40	28	65	10	26	76	70	59	105	129	
		Santan	82	102	38	91	25.58	27.14	21.09	31.86	34.53	49.14	53.34	107.63	107.63	129
		Nyemengan	68.40	104.53	53.96	62.49	23.20	42.63	11.91	41.89	61.05	60.22	55.76	102.42	102.42	
3	1985	Beran	41	84	73	53	47	105	8	19	6	15	65	115	115	
		Santan	56.53	58.85	92.75	58.53	52.79	18.05	2.36	10.91	1.82	51.81	46.78	57.92	92.75	116.74
		Nyemengan	73.79	78.19	93.31	42.01	39.52	44.02	2.56	8.21	4.61	30.47	116.74	62.14	116.74	
4	1986	Beran	81	81	86	75	15	29	11	5	37	52	76	30	86	
		Santan	116.37	107.01	79.09	41.96	6.30	32.28	2.23	0.82	29.85	24.05	67.03	92.60	116.37	116.37
		Nyemengan	76.92	69.83	94.96	26.35	8.65	85.05	4.43	3.08	22.72	22.63	82.05	38.83	94.96	
5	1987	Beran	94	114	73	11	23	20	1	1	1	1	52	102	114	
		Santan	89.57	52.35	50.72	32	71	8	8	0	0	5	75	140	140	140
		Nyemengan	104.58	75.60	35.05	15.44	9.04	12.10	3.00	0.27	0.27	0.16	89.23	134.17	134.17	
6	1988	Beran	73	150	45	15	47	29	1	8	3	112	47	56	150	
		Santan	115	252	161	87	111	96	5	10	0	141	85	79	252	252
		Nyemengan	78.76	167.21	77.94	40.54	77.92	62.44	4.90	7.81	1.41	95.84	58.66	67.89	167.21	
7	1989	Beran	60	46	105	47	21	117	70	24	5	68	65	93	117	
		Santan	92	115	116	38	52	114	263	106	0	208	141	99	263	263
		Nyemengan	44.30	69.96	79.68	26.76	44.86	78.58	105.07	42.90	0.71	71.36	64.27	70.32	105.07	

Maximum Rainfall (Continued)

No.	Year	Station	Monthly Maximum Rainfall Data (mm)												Max. Rainfall (mm)	3 Stations Max. Rainfall (mm)
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8	1990	Beran	74	53	68	60	56	32	31	63	2	25	55	147	147	
		Santan	158	112	97	76	11	52	36	59	11	54	19	132	158	158
		Nyemengan	82.31	62.93	62.17	46.50	18.33	22.07	15.71	32.19	4.39	22.48	24.60	90.93	90.93	
9	1991	Beran	65	126	39	110	10	8	0	0	0	1	76	53	126	
		Santan	141	259	101	109	25	0	0	0	0	0	127	143	259	259
		Nyemengan	102.78	130.64	91.35	45.58	28.43	0.98	0	0	0	2.94	46.24	60.38	130.64	
10	1992	Beran	98	77	48	107	56	6	17	86	32	99	93	44	107	
		Santan	149	207	195	156	110	113	35	41	83	84	85	83	207	207
		Nyemengan	81.20	115.80	108.08	117.57	47.22	35.83	17.47	57.57	34.55	52.34	66.14	63.33	117.57	
11	1993	Beran	86	28	56	90	54	22	0	1	0	3	119	74	119	
		Santan	98	40	60	87	21	45	0	8	0	0	41	84	98	119
		Nyemengan	81.44	55.52	61.97	56.91	24.97	17.64	9.22	1.75	0	0.43	58.00	71.47	81.44	
12	1994	Beran	70	65	82	52	37	0	0	0	0	24	43	55	82	
		Santan	55	94	123	53	25	0	0	0	0	16	37	90	123	123
		Nyemengan	36.3	49.4	62.9	55.3	5.5	0	0	0	0	0.2	14.8	23	62.9	
13	1995	Beran	75	64	63	43	27	43	59	0	4	41	131	66	131	
		Santan	56	84	51	98	10	38	36	0	0	30	138	99	138	138
		Nyemengan	53.258	62	39	45	0	41	19	0	0	20	95	120	120	
14	1996	Beran	41	49	28	54	26	8	1	7	0	47	86	79	86	
		Santan	78	57	40	25	11	0	0	5	0	49	125	76	125	125
		Nyemengan	60.70	52.11	33.09	39.73	16.13	4.68	4.21	11.49	0	47.72	96.02	71.79	96.02	

Maximum Rainfall (Continued)

No.	Year	Station	Monthly Maximum Rainfall Data (mm)												Max. Rainfall (mm)	3 Stations Max. Rainfall (mm)
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
15	1997	Beran	51	148	25	27	58	0	6	0	0	1	22	51	148	
		Santan	67	72	12	90	10	0	0	0	0	0	10	34	90	148
		Nyemengan	84.28	97.40	22.63	39.60	15.81	0	0.86	0	0	0.59	8.57	51.05	97.40	
16	1998	Beran	38	124	43	46	34	99	51	23	17	78	71	96	124	
		Santan	71	94	56	94	23	112	42	42	17	93	102	35	112	129
		Nyemengan	61	81	61	69	13	129	92	26	20	78	76	60	129	
17	1999	Beran	53	72	86	74	73	15	39	1	5	66	47	59	86	
		Santan	91	49	131	113	100	12	40	0	8	20	74	90	131	131
		Nyemengan	91	50	69	71	67	0	35	0	0	35	53	58	91	
18	2000	Beran	94	90	82	74	55	27	15	2	1	105	78	0	105	
		Santan	54	81	82	48.8	18.7	51.3	3.5	16.7	10	21	44.5	60.1	82	105
		Nyemengan	44.758	53.019	105	76	25	76	0	0	0	51	78	50	105	
19	2001	Beran	58	49	101	38	33	66	6	0	2	114	134	37	134	
		Santan	99	41	54.8	101	0	63	0	0	0	52	80	84	101	134
		Nyemengan	123	71	61	67	30	18	7	0	0	50	77	42	123	
20	2002	Beran	54	93	56	41	49	0	4	0	0	4	96	101	101	
		Santan	80	80	57	63	34	0	0	0	0	0	53	48	80	101
		Nyemengan	76	73	58	98	40	0	0	0	0	0	43.80	25.81	98	
21	2003	Beran	87	93	63	49	57	11	0	0	11	27	59	69	93	
		Santan	58	196	52	25	86	9	0	0	0	0	50	51	196	196
		Nyemengan	83.2	146	75	10	56	7.9	0	0	0	38	50.6	57.5	146	

Maximum Rainfall (Continued)

No.	Year	Station	Monthly Maximum Rainfall Data (mm)												Max. Rainfall (mm)	3 Stations Max. Rainfall (mm)
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
22	2004	Beran	101	64	52	25	39	6	17	3	2	29	83	169	169	
		Santan	110	184	76	26	55	0	0	0	0	13	76	86	184	184
		Nyemengan	148.5	84	129.5	96	38.7	9.5	15	0	0	18.4	33.2	66.7	148.5	
23	2005	Beran	79	62	57	45	6	16	13	7	18	60	31	144	144	
		Santan	145	80	55	45	0	0	0	0	0	68	37	77	145	171.5
		Nyemengan	106.3	107	93	46.2	0	24.5	33.6	0	0	50	46.8	171.5	171.5	
24	2006	Beran	63	59	41	33	44	19	3	0	18	3	12	144	144	
		Santan	65	92	52	34	20	0	0	0	0	68	23	86	92	185
		Nyemengan	185	59.2	87.5	36.2	76.2	0	0	0	0	0	12	53.5	185	
25	2007	Beran	18	81	82	67	55	14	0	1	1	69	92	84	92	
		Santan	37	72	58	49	0	0	0	0	0	26	58	157	157	157
		Nyemengan	20.8	85.3	51	60	19	27.5	9.8	9	0	36	50.7	80.6	85.3	
26	2008	Beran	53	76	122	48	33	21	0	0	23	66	129	41	129	
		Santan	65	55	27	68	64	10	0	0	0	59	42	46	68	129
		Nyemengan	30	76.8	46.9	44.8	0	16.8	0	0	9.5	79.5	78.5	46.5	79.5	
27	2009	Beran	70	48	112	105	61.5	10	1	0	2	32	101	93	112	
		Santan	60	98	97	57	68	14.5	1	0	0.5	74	45	57	98	133.5
		Nyemengan	63	77	48.4	40	66	49.5	1	0	0.2	22	51	133.5	133.5	
28	2010	Beran	36.40	37.94	50.49	63.63	73.57	38.41	31.15	24.77	51.22	41.96	59.95	58.47	73.57	
		Santan	40.69	38.41	49.66	63.33	74.01	36.39	30.23	23.44	48.17	43.76	58.80	58.13	74.01	74.01
		Nyemengan	23.8	43.8	59	48.1	57.5	50	49	28.8	47.8	36.4	70	57.6	70	

Maximum Rainfall (Continued)

No.	Year	Station	Monthly Maximum Rainfall Data (mm)												Max. Rainfall (mm)	3 Stations Max. Rainfall (mm)
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
29	2011	Beran	121	97	45	59.1	67.5	0	0	0	3.04	18.8	64	77	121	
		Santan	60	53.7	94	75.6	70	0	0.4	0	0.3	6	97	80	97	121.00
		Nyemengan	59.5	67	49.2	114	83.3	10	0	0	0	40	78	80	114	
30	2012	Beran	220	106	78	63	68	1.4	1	0	2	54	135	104	220	
		Santan	80	74	58	49	33	3.3	0	0	0	34	129	101	129	220
		Nyemengan	120	126.7	71.6	72.5	31.5	1.8	0	0	0	60.7	59	110.6	126.7	
31	2013	Beran	94	77	76.1	109	72	58	36	11	4.9	97	46.8	87	109	
		Santan	67	105	56	105	67	95	46	1.1	1.7	26	96	99	105	109
		Nyemengan	101	63.5	36.3	90.2	41.5	30.8	21	0	0	31	54.5	84	101	
32	2014	Beran	67	121	66	60	83.1	29.1	37.2	1	0	0	71.4	84	121	
		Santan	77	55	46	93	7.7	5.4	10.4	2.6	0	0	77	57	93	121
		Nyemengan	49.5	56.8	81	110.3	17.6	85	49.7	0	0	0	84.5	73	110.3	
33	2015	Beran	87	53.3	78.3	111	47.3	0.4	0	0	0	0	45	62.6	111	
		Santan	65.6	123	53.3	101	77.9	35.7	0	0	0	0	38.6	68	123	123
		Nyemengan	65.6	70.5	68.5	84.5	41.2	46.2	0	0	0	0	63.4	20.7	84.5	
34	2016	Beran	48.29	52.84	68.56	48.86	29.41	76.66	43.40	30.49	34.33	33.20	52.54	80.75	80.75	
		Santan	31.48	70.96	80.28	67.85	36.17	83.25	42.56	59.84	39.48	57.93	45.91	73.79	83.25	90
		Nyemengan	32.5	73.8	90	55.7	76	55.8	32	10.4	75	64	70.4	51	90	

Appendix 9

Segments Area Covered Table

Segments	Type of Area	Area (m^2)	Area (Ha)	Coef.	Runoff Coefficient (C)	Segments	Type of Area	Area (m^2)	Area (Ha)	Coef.	Runoff Coefficient (C)
A1	Asphalt	1395.10	0.14	0.95	0.95	D2	High Density Housing	2788.00	0.28	0.6	0.62
A2	Asphalt	637.65	0.06	0.95	0.95		Asphalt	131.40	0.01	0.95	
A3	Asphalt	946.43	0.09	0.95	0.95	D3	Asphalt	131.40	0.01	0.95	0.95
B1	Asphalt	21.45	0.00	0.95	0.95	D4	Asphalt	107.00	0.01	0.95	
B2	Asphalt	239.50	0.02	0.95	0.95	D5	Asphalt	107.00	0.01	0.95	0.95
B3	Asphalt	14.75	0.00	0.95	0.95	D6	High Density Housing	3536.00	0.35	0.6	0.61
B4	Asphalt	98.50	0.01	0.95	0.95		Asphalt	74.00	0.01	0.95	
B5	Asphalt	10.10	0.00	0.95	0.95	D7	Asphalt	74.00	0.01	0.95	0.95
B6	Asphalt	199.00	0.02	0.95	0.95	D8	High Density Housing	2315.00	0.23	0.6	0.62
B7	Asphalt	9.40	0.00	0.95	0.95		Asphalt	138.50	0.01	0.95	
B8	Asphalt	114.50	0.01	0.95	0.95	D9	High Density Housing	1814.00	0.18	0.6	0.61
B9	Asphalt	14.85	0.00	0.95	0.95		Asphalt	66.50	0.01	0.95	
B10	Asphalt	710.80	0.07	0.95	0.95	D10	Asphalt	8.80	0.00	0.95	0.95
B11	Asphalt	639.03	0.06	0.95	0.95	D11	Asphalt	136.50	0.01	0.95	0.95
B12	Asphalt	931.50	0.09	0.95	0.95	D12	Asphalt	5.15	0.00	0.95	0.95
C1	Education	2049.00	0.20	0.9	0.9	D13	Asphalt	100.50	0.01	0.95	0.95
C2	Asphalt	786.00	0.08	0.95	0.95	D14	Asphalt	10.40	0.00	0.95	0.95
C3	Single Trade and Services	10814.00	1.08	0.95	0.95	D15	Asphalt	327.35	0.03	0.95	0.95
	Asphalt	803.95	0.08	0.95		D16	Asphalt	290.50	0.03	0.95	0.95
D1	Asphalt	610.50	0.06	0.95	0.95	D17	Asphalt	439.20	0.04	0.95	0.95

Segments Area Covered Table (Continued)

Segments	Type of Area	Area (m^2)	Area (Ha)	Coef.	Runoff Coefficient (C)	Segments	Type of Area	Area (m^2)	Area (Ha)	Coef.	Runoff Coefficient (C)
D18	High Density Housing	15704.00	1.57	0.6	0.61	E3	Asphalt	26.20	0.00	0.95	0.95
	Asphalt	313.00	0.03	0.95		E4	High Density Housing	7228.00	0.72	0.6	0.62
D19	Education	9708.00	0.97	0.9	0.80		Asphalt	452.50	0.05	0.95	
	High Density Housing	4993.00	0.50	0.6		E5	Asphalt	271.50	0.03	0.95	0.95
	Asphalt	506.70	0.05	0.95		E6	Asphalt	14.45	0.00	0.95	0.95
D20	Asphalt	18.60	0.00	0.95	0.95	E7	Asphalt	271.50	0.03	0.95	0.95
D21	Asphalt	506.70	0.05	0.95	0.95	E8	High Density Housing	16772.00	1.68	0.6	0.62
D22	Asphalt	17.90	0.00	0.95	0.95		Asphalt	967.40	0.10	0.95	
D23	High Density Housing	2167.00	0.22	0.6	0.62	E9	Asphalt	32.05	0.00	0.95	0.95
	Asphalt	118.50	0.01	0.95		E10	Asphalt	879.50	0.09	0.95	0.95
D24	Single Trade and Services	21319.00	2.13	0.95	0.95	F1	Very High Density Housing	13233.00	1.32	0.95	0.95
	Asphalt	973.05	0.10	0.95			Asphalt	594.45	0.06	0.95	
D25	Asphalt	17.05	0.00	0.95	0.95	F2	Asphalt	332.50	0.03	0.95	0.95
D26	Asphalt	575.50	0.06	0.95	0.95	F3	Asphalt	967.40	0.10	0.95	0.95
D27	Asphalt	12.95	0.00	0.95	0.95	F4	Asphalt	332.50	0.03	0.95	0.95
D28	Asphalt	164.00	0.02	0.95	0.95	F5	Tier Trade and Services	13191.00	1.32	0.7	
D29	Asphalt	15.45	0.00	0.95	0.95		High Density Housing	12173.00	1.22	0.6	0.58
D30	Asphalt	176.95	0.02	0.95	0.95		Wetland Agriculture	28973.00	2.90	0.5	
D31	Asphalt	526.50	0.05	0.95	0.95		Asphalt	1730.55	0.17	0.95	
E1	Asphalt	19.60	0.00	0.95	0.95	G1	Asphalt	296.50	0.03	0.95	0.95
E2	Very High Density Housing	8989.00	0.90	0.95	0.95	G2	Asphalt	633.50	0.06	0.95	0.95
	Asphalt	313.00	0.03	0.95		G3	Asphalt	11.00	0.00	0.95	0.95

Segments Area Covered Table (Continued)

Segments	Type of Area	Area (m^2)	Area (Ha)	Coef.	Runoff Coefficient (C)
G4	Asphalt	1206.00	0.12	0.95	0.95
H1	Tier Trade and Services	4063.00	0.41	0.95	0.73
	Asphalt	460.50	0.05	0.95	
H2	Asphalt	132.25	0.01	0.95	0.95
H3	High Density Housing	9538.00	0.95	0.6	0.61
	Asphalt	183.00	0.02	0.95	
H4	Asphalt	78.65	0.01	0.95	0.95
H5	Single Trade and Services	60222.00	6.02	0.95	0.95
	Asphalt	1178.50	0.12	0.95	
H6	Asphalt	170.25	0.02	0.95	0.95