

# APPENDIX 7 RESULT OF SECOND RISK ASSESSMENT

## Result of Second Risk Assessment in Cambodia

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminari Risk Assessment

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Phnom Penh	1,242,992	1,229,819	99%	5,531	4	2	68	
Battambang	140,533	140,533	100%	473	0	0	62	
Kampong Cham	47,300	47,300	100%	223	0	0	60	

The Project Team recommends Phnom Penh city as representative of flood hazard.

## Result of Second Risk Assessment in Indonesia

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Earthquake

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Bandar Lampung	1,167,101	233,441	20%	2,961	2	2	28	
Ambon	395,423	197,712	50%	875	0	0	32	
Denpasar	880,600	176,120	20%	871	1	3	41	
Banda Aceh	249,499	49,900	20%	783	1	1	53	
Bima	156,400	30,906	20%	572	0	0	16	
Bitung	202,204	0	0%	0	2	1	33	
Gorontalo	197,970	0	0%	0	0	0	51	
Kota Semarang	1,672,999	0	0%	0	6	0	36	
Samarinda	797,006	0	0%	0	0	0	38	

The Project Team recommends Bandar Lampung or Ambon as representative of earthquake hazard.

### Tsunami

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Bandar Lampung	1,167,101	438,239	38%	5,520	2	2	28	
Banda Aceh	249,499	185,414	74%	2,908	1	1	53	
Ambon	395,423	384,192	97%	1,708	0	0	32	
Denpasar	880,600	288,601	33%	1,427	1	3	41	
Bima	156,400	59,995	38%	1,320	0	0	16	
Bitung	202,204	169,907	84%	838	2	1	33	
Gorontalo	197,970	10,735	5%	236	0	0	51	
Samarinda	797,006	495	0%	6	0	0	38	
Kota Semarang	1,672,999	0	0%	0	6	0	36	

The Project Team recommends Bandar Lampung or Banda Aceh as representative of tsunami hazard.

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Samarinda	797,006	709,164	89%	9,136	0	0	38	
Gorontalo	197,970	169,810	86%	3,876	0	0	51	
Banda Aceh	249,499	217,095	87%	3,405	1	1	53	
Bandar Lampung	1,167,101	0	0%	0	2	2	28	
Bitung	202,204	0	0%	0	2	1	33	
Denpasar	880,600	0	0%	0	1	3	41	
Ambon	395,423	0	0%	0	0	0	32	
Bima	156,400	0	0%	0	0	0	16	
Kota Semarang	1,672,999	0	0%	0	6	0	36	

The Project Team recommends Samarinda city as representative of flood hazard.

## Result of Second Risk Assessment in Lao PDR

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Thakhek	90,800	90,446	100%	2,471	2	2	94	
Pakxane	45,000	44,937	100%	2,185	0	0	89	
Luangprabang	90,300	82,976	92%	1,113	2	1	94	

The Project Team recommends Thakhek city as representative of flood hazard.

## Result of Second Risk Assessment in Malaysia

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminari Risk Assessment

### Tsunami

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Timur Laut	520,242	453,042	87%	29,832	4	0	36	
Kuala Terengganu	343,284	236,596	69%	8,385	3	0	38	
Langkawi kedha	94,777	81,571	86%	1,976	4	0	27	
Kota Setar	366,787	20,401	6%	588	3	1	21	
Kuala Muda	456,605	5,702	1%	101	3	1	24	
Sibu	247,995	1,556	1%	40	3	0	44	

The Project Team recommends Timur Laut(George Town) as representative of tsunami hazard.

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Kota Setar	366,787	354,883	97%	12,502	3	1	21	
Kuala Muda	456,605	87,470	19%	2,436	3	1	24	
Kuala Terengganu	343,284	65,154	19%	2,123	3	0	38	
Sibu	247,995	35,099	14%	1,389	3	0	44	Some project had conducted
Timur Laut	520,242	0	0%	0	4	0	36	
Langkawi kedha	94,777	0	0%	0	4	0	27	

The Project Team recommends Kota Setar city as representative of flood hazard.

## Result of Second Risk Assessment in Myanmar

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Earthquake

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Amarapura	237,618	172,608	73%	1,253	2	2	62	
Kale	348,573	278,860	80%	998	2	1	59	
Myingyan	276,096	138,048	50%	964	2	1	66	
Nyaung-U	239,947	66,854	28%	424	0	0	56	
Pwinbyu	163,692	37,980	23%	210	0	0	49	
Rathedaung	111,974	16,779	15%	174	0	0	56	
Mrauk-U	189,630	37,926	20%	166	0	0	52	
Hakha	48,352	26,390	55%	120	0	0	54	
Kyaukpyu	165,352	0	0%	0	2	3	42	
Kyimyindaing	111,514	0	0%	0	5	3	60	Considering the Sagaing fault and the back up function for Yangon area
Manaung	56,966	0	0%	0	0	0	49	
Taungup	158,341	0	0%	0	0	0	55	

The Project Team recommends Amarapura or Kyimyindaing as representative of earthquake hazard.

### Tsunami

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Rathedaung	111,974	72,195	64%	750	0	0	56	
Kyaukpyu	165,352	134,800	82%	540	2	3	42	
Kyimyindaing	111,514	12,324	11%	389	5	3	60	
Manaung	56,966	34,629	61%	186	0	0	49	
Taungup	158,341	63,374	40%	185	0	0	55	
Mrauk-U	189,630	15,220	8%	67	0	0	52	
Amarapura	237,618	0	0%	0	2	2	62	
Hakha	48,352	0	0%	0	0	0	54	
Kale	348,573	0	0%	0	2	1	59	
Myingyan	276,096	0	0%	0	2	1	66	
Nyaung-U	239,947	0	0%	0	0	0	56	
Pwinbyu	163,692	0	0%	0	0	0	49	

The Project Team recommends Rathedaung or Kyaukpyu as representative of tsunami hazard.

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Amarapura	237,618	216,678	91%	1,543	2	2	62	
Myingyan	276,096	178,089	65%	1,345	2	1	66	
Kale	348,573	315,297	90%	1,128	2	1	59	
Mrauk-U	189,630	178,450	94%	780	0	0	52	
Nyaung-U	239,947	113,865	47%	763	0	0	56	
Pwinbyu	163,692	132,003	81%	730	0	0	49	
Rathedaung	111,974	40,544	36%	421	0	0	56	
Taungup	158,341	132,467	84%	387	0	0	55	
Hakha	48,352	11,200	23%	51	0	0	54	
Kyaukpyu	165,352	0	0%	0	2	3	42	
Kyimyindaing	111,514	0	0%	0	5	3	60	
Manaung	56,966	0	0%	0	0	0	49	

The Project Team recommends Amarapura city as representative of flood hazard.

### Cyclone/Wind

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Rathedaung	111,974	67,208	60%	698	0	0	56	
Nyaung-U	239,947	92,239	38%	579	0	0	56	
Pwinbyu	163,692	81,846	50%	452	0	0	49	
Mrauk-U	189,630	94,815	50%	415	0	0	52	
Kyaukpyu	165,352	82,676	50%	334	2	3	42	
Taungup	158,341	79,171	50%	231	0	0	55	
Manaung	56,966	28,805	51%	155	0	0	49	
Hakha	48,352	18,157	38%	83	0	0	54	
Amarapura	237,618	0	0%	0	2	2	62	
Kale	348,573	0	0%	0	2	1	59	
Kyimyindaing	111,514	0	0%	0	5	3	60	
Myingyan	276,096	0	0%	0	2	1	66	

### Cyclone/Surge

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Kyimyindaing	111,514	111,514	100%	3,826	5	3	60	
Rathedaung	111,974	101,961	91%	1,059	0	0	56	
Kyaukpyu	165,352	165,351	100%	668	2	3	42	
Taungup	158,341	156,238	99%	456	0	0	55	
Mrauk-U	189,630	99,303	52%	434	0	0	52	
Manaung	56,966	51,158	90%	275	0	0	49	
Amarapura	237,618	0	0%	0	2	2	62	
Hakha	48,352	0	0%	0	0	0	54	
Kale	348,573	0	0%	0	2	1	59	
Myingyan	276,096	0	0%	0	2	1	66	
Nyaung-U	239,947	0	0%	0	0	0	56	
Pwinbyu	163,692	0	0%	0	0	0	49	

The Project Team recommends Rathedaung city as representative of cyclone hazard.

## Result of Second Risk Assessment in Philippines

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Earthquake

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Meycauayan	199,154	99,577	50%	7,158	4	7	55	
Butuan City	309,709	244,745	79%	4,007	0	0	31	
Mandaue City	331,320	66,264	20%	1,331	6	4	20	
Dagupan City	163,676	79,860	49%	1,240	0	0	26	
Iloilo City	424,619	57,783	14%	1,008	2	2	51	
Laoag City	104,904	49,677	47%	664	2	3	52	
Batangas City	305,607	120,484	39%	553	5	4	22	Considering active fault close to Batangas city and expected Maximum PGA
Olongapo City	221,178	65,081	29%	290	6	4	14	
Cavite city	101,120	46,700	46%	115	4	7	57	

The Project Team recommends Meycauayan or Butuan as representative of earthquake hazard.

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Butuan City	309,709	251,969	81%	4,515	0	0	31	
Laoag City	104,904	96,954	92%	1,350	2	3	52	
Dagupan City	163,676	53,663	33%	783	0	0	26	
Batangas City	305,607	0	0%	0	5	4	22	
Cavite city	101,120	0	0%	0	4	7	57	
Iloilo City	424,619	0	0%	0	2	2	51	
Mandaue City	331,320	0	0%	0	6	4	20	
Meycauayan	199,154	0	0%	0	4	7	55	
Olongapo City	221,178	0	0%	0	6	4	14	

The Project Team recommends Butuan city as representative of flood hazard.

### Cyclone/Wind

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Meycauayan	199,154	199,154	100%	14,315	4	7	55	
Mandaue City	331,320	331,320	100%	6,657	6	4	20	
Iloilo City	424,619	318,464	75%	5,516	2	2	51	
Butuan City	309,709	232,282	75%	3,783	0	0	31	
Dagupan City	163,676	163,676	100%	2,540	0	0	26	
Laoag City	104,904	104,904	100%	1,407	2	3	52	
Batangas City	305,607	305,607	100%	1,402	5	4	22	
Olongapo City	221,178	221,178	100%	997	6	4	14	
Cavite city	101,120	101,120	100%	249	4	7	57	

### Cyclone/Surge

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Butuan City	309,709	183,197	59%	3,563	0	0	31	
Dagupan City	163,676	163,676	100%	2,540	0	0	26	
Laoag City	104,904	80,276	77%	1,200	2	3	52	
Batangas City	305,607	0	0%	0	5	4	22	
Cavite city	101,120	0	0%	0	4	7	57	
Iloilo City	424,619	0	0%	0	2	2	51	
Mandaue City	331,320	0	0%	0	6	4	20	
Meycauayan	199,154	0	0%	0	4	7	55	
Olongapo City	221,178	0	0%	0	6	4	14	

The Project Team recommends Butuan city as representative of cyclone hazard, too.

## Result of Second Risk Assessment in Thailand

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Pak Phanang	85,487	85,407	100%	3,535	0	0	58	
Rayong	364,544	132,703	36%	3,213	1	0	35	
Wiang Sa	67,861	46,771	69%	783	0	0	54	
Ranot	62,220	15,917	26%	626	0	0	48	
Pathum Thani	220,154	0	0%	0	3	1	53	

The Project Team recommends Pak Phanang and Rayong cities as representative of flood hazard.

### Cyclone/Surge

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Pak Phanang	85,487	0	0%	0	0	0	58	
Pathum Thani	154,412	0	0%	0	3	1	53	
Ranot	62,220	0	0%	0	0	0	48	
Rayong	56,010	0	0%	0	1	0	35	
Wiang Sa	67,861	0	0%	0	0	0	54	



## Result of Second Risk Assessment in Viet Nam

Legend	
Red letter	Recommendation city by JICA Project Team
shaded	Excluded cities by the result of the 2nd Preliminary Risk Assessment

### Tsunami

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Qui Nhon	255,463	203,954	80%	1,855	3	1	55	
Ha Long	201,990	193,708	96%	450	5	4	46	
Hoi An	69,222	48,921	71%	363	2	2	65	
Ha Tinh	63,415	4,386	7%	54	0	0	65	
Bac Lieu	109,529	13,148	12%	42	0	0	52	
Dong Hoi	76,058	7,069	9%	32	2	1	59	
Anh Khe	63,118	0	0%	0	0	0	70	
Hue	302,983	0	0%	0	1	1	63	
Son La	56,848	0	0%	0	0	0	67	

The Project Team recommends Qui Nhon, Ha long or Hoi An as representative of tsunami hazard.

### Flood

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Hue	302,983	302,983	100%	1,137	1	1	63	
Ha Tinh	63,415	63,415	100%	759	0	0	65	
Qui Nhon	255,463	87,596	34%	675	3	1	55	
Hoi An	69,222	61,278	89%	442	2	2	65	
Bac Lieu	109,529	109,529	100%	308	0	0	52	
Anh Khe	63,118	51,692	82%	160	0	0	70	
Dong Hoi	76,058	13,635	18%	30	2	1	59	
Son La	56,848	5,153	9%	8	0	0	67	
Ha Long	201,990	0	0%	0	5	4	46	

The Project Team recommends Hue city as representative of flood hazard.

### Cyclone/Wind

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Qui Nhon	255,463	191,597	75%	1,720	3	1	55	
Hue	302,983	227,237	75%	853	1	1	63	
Ha Tinh	63,415	47,561	75%	569	0	0	65	
Hoi An	69,222	51,917	75%	376	2	2	65	
Ha Long	201,990	151,493	75%	352	5	4	46	
Dong Hoi	76,058	57,044	75%	215	2	1	59	
Son La	56,848	28,424	50%	193	0	0	67	
Anh Khe	63,118	47,339	75%	144	0	0	70	
Bac Lieu	109,529	0	0%	0	0	0	52	

### Cyclone/Surge

City Name	Population	Exposure Population	Rate per Population	Exposure GDP	Infrastructure	Infrastructure with hazard risk	Lack of Capacity	Remarks
Hue	302,983	263,781	87%	1,016	1	1	63	
Ha Tinh	63,415	63,415	100%	759	0	0	65	
Hoi An	69,222	69,217	100%	502	2	2	65	
Ha Long	201,990	197,701	98%	459	5	4	46	
Dong Hoi	76,058	64,518	85%	246	2	1	59	
Qui Nhon	255,463	18,402	7%	52	3	1	55	
Anh Khe	63,118	0	0%	0	0	0	70	
Bac Lieu	109,529	0	0%	0	0	0	52	
Son La	56,848	0	0%	0	0	0	67	

The Project Team recommends Hue city as representative of cyclone hazard, too.