Attachment 5: Comments of Dr Gamage

1. The December 2008 rainfall is 200% of average December rainfall. (100 % of average rainfall is the average rainfall)

2. As illustrated in Figure 15, averaging of parameters after a flood can produce elevated average in comparison to annual average of the parameter. Therefore use of average values of 4 months after a flood event could produce an elevated TLI estimate.

3. Table 6 shows that December 2008 rainfall is the 6th highest rainfall received during December months of last 45 years. The return period of this type of 30 day average event is about 2 years, (i.e the annual exceedance probability is about 50%). Therefore we can expect TN and TP spikes associated with this type of rainfall once in 2 years. Consequently averaging of these type of spikes during a shorter period (4 months) would result in an elevated TLI estimate as evidence in 2009 December to 2009 April NIWA data set.

4. The basis of TLI is average condition of the lake. It is not the condition of the lake during floods. Average condition of the lake cannot be altered by floods.

Figure 15 Illustration of averaging parameters after a flood and annual average

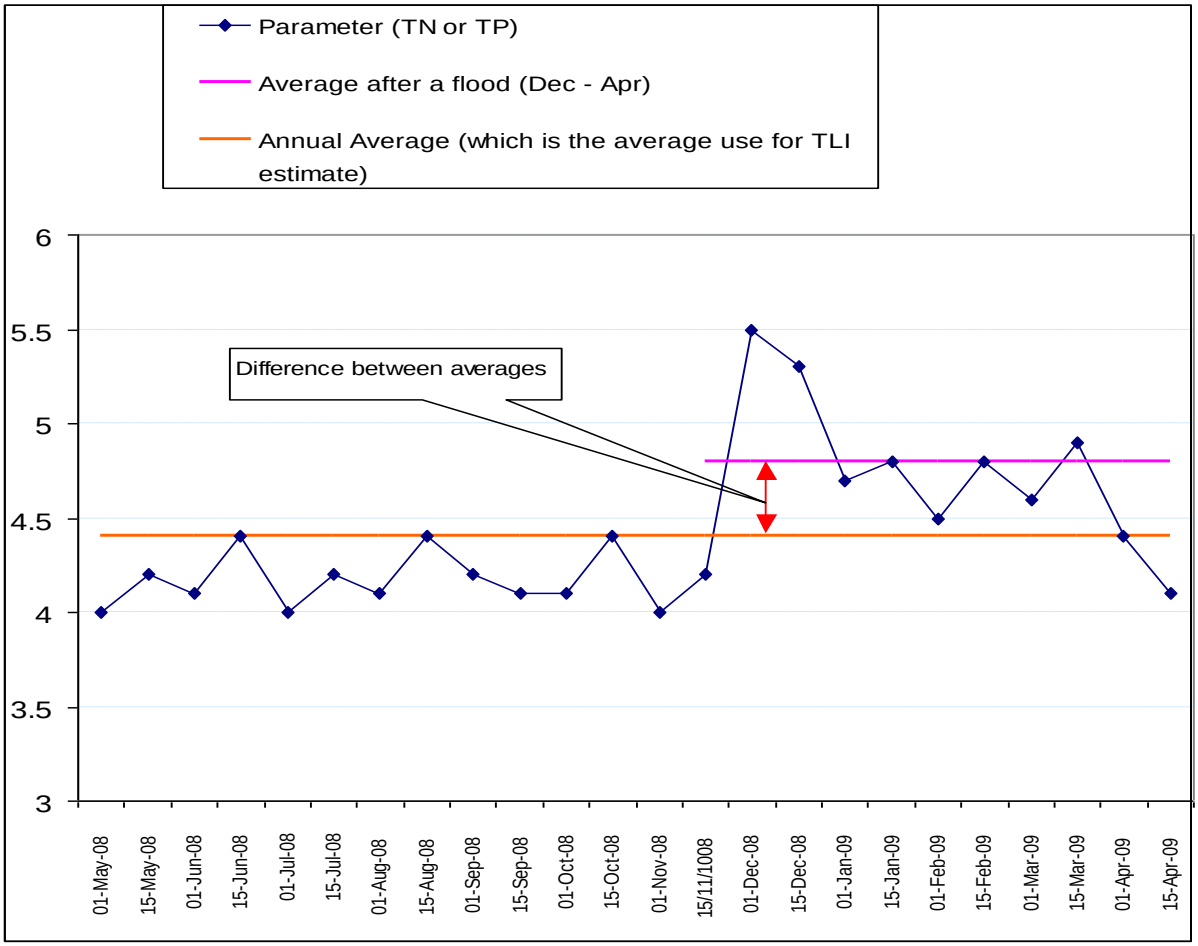

Table 5 Rank of 2008 December rainfall in terms of December rainfalls-

Rank	Year	Average December Rainfall (mm)
1	1995	199.7
2	1979	168.4
3	1984	167.6
4	1989	159.8
5	1976	154.6
6	2008	151.1
7	1969	131.6
8	2001	120.4
9	1993	104
10	2004	99.2
11	1983	97.7
12	2006	95.4
13	1985	90.9
14	1997	84.4
15	2002	82.7
16	1968	82.4
17	1990	81.8
18	1978	80
19	2000	75.7
20	1987	74.3
21	1972	69.4
22	1999	66.3
23	1996	66
24	1981	64.1
25	1967	63.4
26	1965	61.1
27	1964	60.2
28	1977	59.2
29	1973	57.1
30	1982	56.2
31	1975	51.3
32	1992	49.8
33	1998	47.9
34	1974	41.7
35	1970	40.1
36	1980	38.8
37	1966	33.9
38	1991	33.8
39	2003	32.2
40	1988	29.4
41	2005	28.8
42	2007	24.6
43	1986	22.2
44	1971	21.6
45	1994	2.1

Table 6 Return period of 2008 December (30 day) rainfall-

12 mth	30.0 days	maximum	(		
partition	mean	measured		Annual	Return Period
starts	starts	Rainfall (mm)		probability.	Years
yyyymm	yyyymmdd:hhmmss			1/y	y
197001	19700827:090000	448	A	0.013	75
199101	19910719:090000	303	B	0.035	28
196701	19671105:090000	253	C	0.058	17
200001	20000527:090000	244	D	0.08	13
199401	19940218:090000	243	E	0.102	10
198301	19830611:090000	224	F	0.124	8
199501	19951123:080000	214	G	0.146	7
198701	19870210:090000	213	H	0.168	6
198401	19841122:080000	211	I	0.19	5
198801	19881002:080000	204	J	0.212	5
199701	19970728:090000	203	K	0.235	4
198601	19860514:090000	202	L	0.257	4
199301	19931217:080000	202	M	0.279	4
197101	19710911:090000	200	N	0.301	3
196901	19690827:090000	200	O	0.323	3
197201	19720909:090000	193	P	0.345	3
199201	19920720:090000	192	Q	0.367	3
196501	19650104:090000	188	R	0.389	3
196801	19680811:090000	188	S	0.412	2
199801	19980930:090000	186	T	0.434	2
197801	19780729:090000	186	U	0.456	2
199001	19900423:090000	186	V	0.478	2
200201	20020607:090000	183	W	0.5	2
197901	19791218:080000	179	X	0.522	2
199901	19991019:080000	178	Y	0.544	2
200101	20011112:080000	175	Z	0.566	2
200801	20081121:080000	175	a	0.588	2
198901	19891208:080000	172	b	0.611	2
200701	20070922:090000	171	c	0.633	2
196401	19640429:090000	169	d	0.655	2
200301	20030830:090000	167	e	0.677	1
198001	19800512:090000	167	f	0.699	1
197601	19761208:080000	164	g	0.721	1
199601	19960331:090000	162	h	0.743	1
200401	20040615:090000	154	i	0.765	1
198501	19850808:090000	152	j	0.788	1
200601	20061110:080000	152	k	0.81	1
197301	19730419:090000	148	l	0.832	1
197501	19750725:090000	146	m	0.854	1
200501	20050808:090000	142	n	0.876	1
198201	19820506:090000	139	o	0.898	1
198101	19810223:080000	134	p	0.92	1
196601	19660101:090000	116	q	0.942	1
197401	19740215:090000	115	r	0.965	1
197701	19770101:080000	110	s	0.987	1