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STEYN CITY DEVELOPMENT

RIVERSIDE VIEW EXT 84

STORMWATER MANAGMENT REPORT

AUGUST 2020

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TEKCIV CONSULTING ENGINEERS

25 Arend Avenue, Randpark Randburg

Gauteng



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1. Background

The site for the proposed township of Riverside View Extension 84 is situated in Riverside View, north of Johannesburg within the City of Johannesburg's Region A. The site is surrounded by the Steyn City Development, Riverside View and Riversands.

The intention of the development is to create a place of instruction, residential buildings, and offices with ancillary purposes such as restaurants and shops. Refer to *Annexure A* for the Site Development Plan.

Tekciv Consulting Engineers has been appointed as the engineers to prepare a Stormwater Management Report for the proposed development.

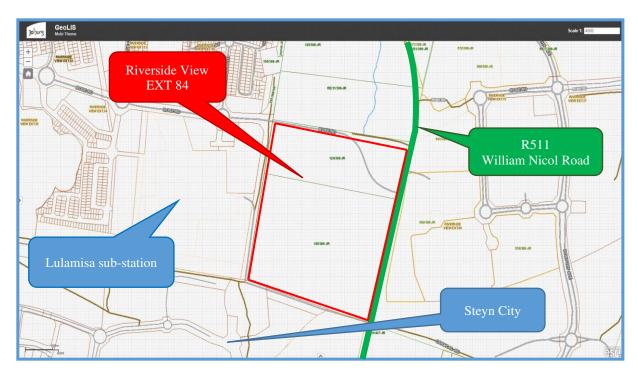
This report provides information regarding the stormwater drainage and sustainable management requirements of the new development for the approval by the City of Johannesburg.

2. Site Locality

The site is situated on Portion 124 and 185 of Farm Diepsloot 388-JR – Province of Gauteng. The site is bound by Porcupine Park Avenue to the north, a Provincial Road (William Nicol Drive, R511) to the east, Zeven Road to the south and View Road to the west.

The Lulamisa sub-station lies directly to the west of the site.

The Joburg GeoLIS map extract below indicates the location of the site. See *Annexure B* for a larger version.





3. Site Characteristics

3.1 Area and Rainfall

The total site measures some 25 570 m². Elevation across the site ranges from 1422m to 1392m.

The annual rainfall in this area is 750 mm.

3.2 Site Topography

The site currently has no buildings on it and is covered in veld grass and several medium and large trees which are scattered around the site.

The site is at an elevation of 1422m on the southern boundary and falls to 1392m at the northern boundary. The average grade across the whole site is 6.73%.

There is a wetland area flowing northward through the site. As per the SDP a wetland and buffer area of approximately 5500 m² has been created.

The Joburg GeoLIS map extract below shows the topography and vegetation of the site.



4. Zoning

The site is currently zoned as "undetermined". The proposed township will consist of 3 erven, namely erf 1, 2 and 3. The new zoning for the site will be:

ERF	1&2	3
Zoning	Special	Private Open Space
FAR	0.6	0.01
Density	Shall not exceed 20 du/ha	N/A
Height Restriction	5 storeys	1 storey
Parking	As per scheme	As per scheme
	As per scheme	As per scheme



5. Storm water Management

Storm water management of the site is crucial to ensure that the developer complies with the City of Joburg regulations in terms of attenuation and control of the run-off as well as the protection of the environment. The management system proposed is in line with the latest SUDS guidelines.

5.1 Existing Storm Water Infrastructure

A survey of the site, as well as information supplied by the Johannesburg Roads Agency have indicated that there is currently no formal stormwater infrastructure in the area into which the site can connect. However, there are three temporary culverts under Porcupine Park Avenue that allows site drainage to the lower lying area.

The stormwater pipes in View Road discharges onto the north western side of the property and then drains overland towards the wetland portion of the site.

Bigen Africa have calculated the flow for both the 1: 50 and the1:100-year flood line for the wetland, considering the full catchment, the existing infrastructure as well as future development of the William Nicol Road to the east of the site.

A copy of the flood line with catchment area is attached as **Annexure C.**

The Joburg GeoLIS map below indicates the position of the external stormwater infrastructure.



A larger copy of the map is available as **Annexure D.**



5.2 Storm Water Run-Off and Model Selection

The Rational method is an accepted method to determine the peak flow in terms of run-off from a site and has been selected to calculate the run-off and attenuation requirements for the full extent of the site.

Due to the layout and topography of the site, and the constraints caused by the wetland area, as well as an Eskom Servitude running through the northern portion of the site, it is proposed that site be split into separate catchments and create separate attenuation ponds to manage the flow from each section. See *Annexure E* for drawing 1574/84/310 showing the separate attenuation ponds with their respective catchment area.

The runoff for each respective catchment area is summarised below:

5.2.1 Catchment Area #1 (School Parking):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed		
Area	14 200 m ²	14 200 m ²		
Longest watercourse	60 m	280 m		
Average slope	0.069 m/m	0.017 m/m		
Roughness C	0.29	0.98		

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	70.8	96.2	116.4	159.4	177.1	212.5	258.0
Flow Q m3/s	0.06	0.09	0.11	0.16	0.18	0.23	0.30

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	166.4	196.0	244.8
Flow Q m3/s	0.24	0.34	0.46	0.55	0.64	0.79	0.94

5.2.2 Catchment Area #2 (School buildings):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed		
Area	71 000 m ²	71 000 m ²		
Longest watercourse	340 m	200 m		
Average slope	0.057 m/m	0.041 m/m		
Roughness C	0.29	0.40		

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	49.0	69.8	89.8	111.7	131.3	153.0	195.5
Flow Q m3/s	0.21	0.32	0.44	0.58	0.68	0.83	1.12



Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	166.4	196.0	244.8
Flow Q m3/s	0.50	0.70	0.95	1.14	1.32	1.55	1.94

5.2.3 Catchment Area #3 (Office Area):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed
Area	60 150 m ²	60 150 m ²
Longest watercourse	395 m	360 m
Average slope	0.063 m/m	0.067 m/m
Roughness C	0.28	0.39

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	43.5	63.4	82.2	102.7	113.4	132.9	166.9
Flow Q m3/s	0.16	0.24	0.33	0.44	0.49	0.60	0.79

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	166.4	196.0	244.8
Flow Q m3/s	0.41	0.57	0.78	0.93	1.08	1.27	1.59

5.2.4 Catchment Area #4 (Office Park and Residential Area East):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed		
Area	16 050 m ²	16 050 m ²		
Longest watercourse	150 m	145 m		
Average slope	0.057 m/m	0.033 m/m		
Roughness C	0.29	0.69		

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	58.3	75.7	98.1	127.1	142.2	167.2	214.2
Flow Q m3/s	0.06	0.08	0.11	0.15	0.17	0.21	0.28

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	166.4	196.0	244.8
Flow Q m3/s	0.19	0.27	0.37	0.44	0.51	0.60	0.74



5.2.5 Catchment Area #5 (Office Park and Residential Area West):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed		
Area	21 600 m ²	8 700 m ²		
Longest watercourse	250 m	240 m		
Average slope	0.079 m/m	0.039 m/m		
Roughness C	0.29	0.43		

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	53.8	72.5	88.5	111.7	135.1	159.9	191.6
Flow Q m3/s	0.07	0.10	0.13	0.17	0.21	0.26	0.33

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	1664	196.0	244.8
Flow Q m3/s	0.16	0.22	0.31	0.37	0.42	0.50	0.62

5.2.5 Catchment Area #6 (Courtyard Area and Soccer Field):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed
Area	15 150 m ²	15 150 m ²
Longest watercourse	140 m	140 m
Average slope	0.071 m/m	0.033 m/m
Roughness C	0.29	0.36

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	55.1	78.1	104.4	130.5	145.9	175.0	213.7
Flow Q m3/s	0.05	0.08	0.11	0.14	0.16	0.20	0.26

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	1443.6	166.4	196.0	244.8
Flow Q m3/s	0.10	0.14	0.18	0.22	0.25	0.30	0.37



5.2.5 Catchment Area #7 (Total Site):

Table showing Site run-off characteristics

	Pre-Developed	Post-Developed
Area	199 890 m ²	199 860 m ²
Longest watercourse	600 m	620 m
Average slope	0.069 m/m	0.045 m/m
Roughness C	0.29	0.47

Table showing Results for Pre-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	3832	55.3	71.0	88.6	104.7	121.8	151.0
Flow Q m3/s	0.46	0.71	0.97	1.28	1.53	1.86	2.43

Table showing Results for Post-Developed run off:

Return Period	1:2	1:5	1:10	1:20	1:25	1:50	1:100
Point Intensity mm/hr	63.2	88.4	120.4	143.6	166.4	196.0	244.8
Flow Q m3/s	1.63	2.28	3.11	3.71	4.30	5.06	6.32

The calculation of all the catchment areas of storm water run-off for both pre-and post-development is attached as *Annexure F*.

5.3 Stormwater Attenuation

The Johannesburg Roads Agency requirements regarding attenuation are that for new developments, the run-off difference between the 1:25 year post and 1:5-year predevelopment volume is to be stored on site.

Both the City of Johannesburg and the Johannesburg Roads Agency also require that the attenuation facility discharge at the rate of the 1:5 year pre-developed flow rate.

5.3.1 Method of Attenuation

The run-off from the site has been spilt into separate catchments. The proposed method of attenuation will comprise of the following:

- Grass lined attenuation ponds
- Use of the soccer field to attenuate stormwater and allow for ground water recharge
- Bio swales with stone filled sumps to allow for run-off retardation, encourage sheet flow and absorption into the underlying soil
- Throttled outlet structures
- Energy dissipation slabs to limit erosion and encourage sheet flow at outlets.



5.4 Attenuation Calculation

The combined attenuation volumes for the future development was calculated using the Hydrograph Generation and Reservoir Routing calculation sheet as made available by Chris Brooker of CBA Specialist Engineers for each catchment area.

Flood routing through the ponds were performed by considering the inflow volume, the stage height in the pond and the outflow volume.

5.4.1 Required Attenuation for each catchment

The tables below summarize the results of each catchment-attenuation calculation wherein the results of the stored volume and outlet flow is noted.

Catchment Area 1	1:5 year	1:25 year	1:50 year
Pond Storage m ³	272	457	508
Flow in Pipe m ³ /s	0.061	0.082	0.387
Flow over Tower m ³ /s	0.000	0.000	0.000
Flow over Spillway m ³ /s	0.000	0.000	0.000

Catchment Area 2	1:5 year	1:25 year	1:50 year
Pond Storage m ³	745	1210	1520
Flow in Pipe m ³ /s	0.053	0.070	0.077
Flow over Tower m ³ /s	0.000	0.000	0.000
Flow over Spillway m ³ /s	0.000	0.000	0.000

Catchment Area 3	1:5 year	1:25 year	1:50 year
Pond Storage m ³	656	1185	1407
Flow in Pipe m ³ /s	0.246	0.309	0.527
Flow over Tower m ³ /s	0.000	0.000	0.029
Flow over Spillway m ³ /s	0.000	0.000	0.000

Catchment Area 4	1:5 year	1:25 year	1:50 year
Pond Storage m ³	213	366	422
Flow in Pipe m ³ /s	0.061	0.079	0.482
Flow over Tower m ³ /s	0.000	0.000	0.130
Flow over Spillway m ³ /s	0.000	0.000	0.000



Catchment Area 5	1:5 year	1:25 year	1:50 year
Pond Storage m ³	166	290	333
Flow in Pipe m ³ /s	0.073	0.096	0.479
Flow over Tower m ³ /s	0.000	0.000	0.000
Flow over Spillway m ³ /s	0.000	0.000	0.000

Catchment Area 6	1:5 year	1:25 year	1:50 year
Pond Storage m ³	126	200	242
Flow in Pipe m ³ /s	0.030	0.059	0.082
Flow over Tower m ³ /s	0.000	0.000	0.000
Flow over Spillway m ³ /s	0.000	0.000	0.000

As seen in the above tables, should the site experience a 1:50 year storm, the water level will to rise to the top of the outlet tower but will not reach the spill way for any of the Attenuation Areas. Thus, the volume will be contained within the attenuation ponds.

The calculation of required attenuation is attached as **Annexure G**

5.5 Effectiveness of the Scheme

Due to the layout of the site and wanting to adhere to best practice principles for stormwater management, the option to create separate catchments with their own attenuation areas was chosen.

For this option of individual catchment areas to be effective, the combined release of each attenuation pond may not exceed the 1:5 pre-developed flow for the total site.

The table below indicates the combined release from each pond and compares it to the 1:5 yr pre-developed run-off for the site.

Attenuation Pond	<u>#1</u>	<u>#2</u>	<u>#3</u>	<u>#4</u>	<u>#5</u>	<u>#6</u>	Sum:	Total Site - 1:5 Year Pre Develop ed
Area m ²	14 200	71 000	60 150	16 050	21 600	15450	198 450	199 860
Flow out (m ³ /s)	0.082	0.070	0.309	0.079	0.096	0.059	0.695	0.71
Stored Volume (m³)	457	1210	1185	366	290	200	3708	3574

The 1:5 year pre-developed flow for the whole site is 0.71 m³/s. The combined outflow from all six attenuation ponds is 0.695 m³/s. The results noted in the table show that the combined release of each catchment is less than the 1:5 yr pre-developed flow for the total site, thus conforming to the City of Joburg environmental regulations.



5.6 Stormwater Run-off and control

All run-off from the site will be routed to the attenuation ponds of each respective catchment.

Each catchment area drains into an attenuation pond whereby the run-off from the area is throttled to release into the wetland and buffer zone at the 1:5 year pre-developed flow. Energy dissipating structures will be constructed at each outlet to limit any erosion and encourage sheet flow into the wetland area.

5.6.1 Developed Site

The developed site will comprise of both kerb and grid inlets connecting to underground pipe systems that will flow into the either the attenuation ponds or open soccer field.

5.6.2 Road Crossing

Once the site is developed, a road crossing is to be constructed to allow access to the offices and residential development on the eastern side of the site. A road-bridge will be constructed which allows for the 1:100 year flow of 8.7 m³/s to pass under the road.

The bridge is to be constructed of pre-cast portal culverts and will extend the full width of the flood line. To cater for animal crossings, smaller culverts will be placed above the flood line to all for migration.

A drawing of the proposed bridge is included as Drawing 1574/84/320 in Annexure H.

5.6.3 Future Upgrade of William Nicol and Porcupine Park Avenue

The run-off from the site currently flow through 3 temporary culverts under Porcupine Park Avenue. The future upgrade of the William Nicol and Porcupine Park Avenue intersection allows for a gabion-type cascading structure that caters for the 1:100 year flow to pass under the road and connect to future infrastructure.

The layout of the future upgrade is included on drawing 1574/84/310 and included as **Annexure E.**

6. Recommendation

The stormwater flow will be collected in a formal stormwater system which drains into grass-lined attenuation ponds, bio swales and open fields with the required storage meeting the municipal regulations. The combined discharge from each attenuation structure will be reduced to pre-developed flows and allowed to discharge into the wetland area

We trust that this stormwater management report meets with your approval and avail ourselves should there be clarification needed on any aspect.

Yours faithfully,

AM Comey

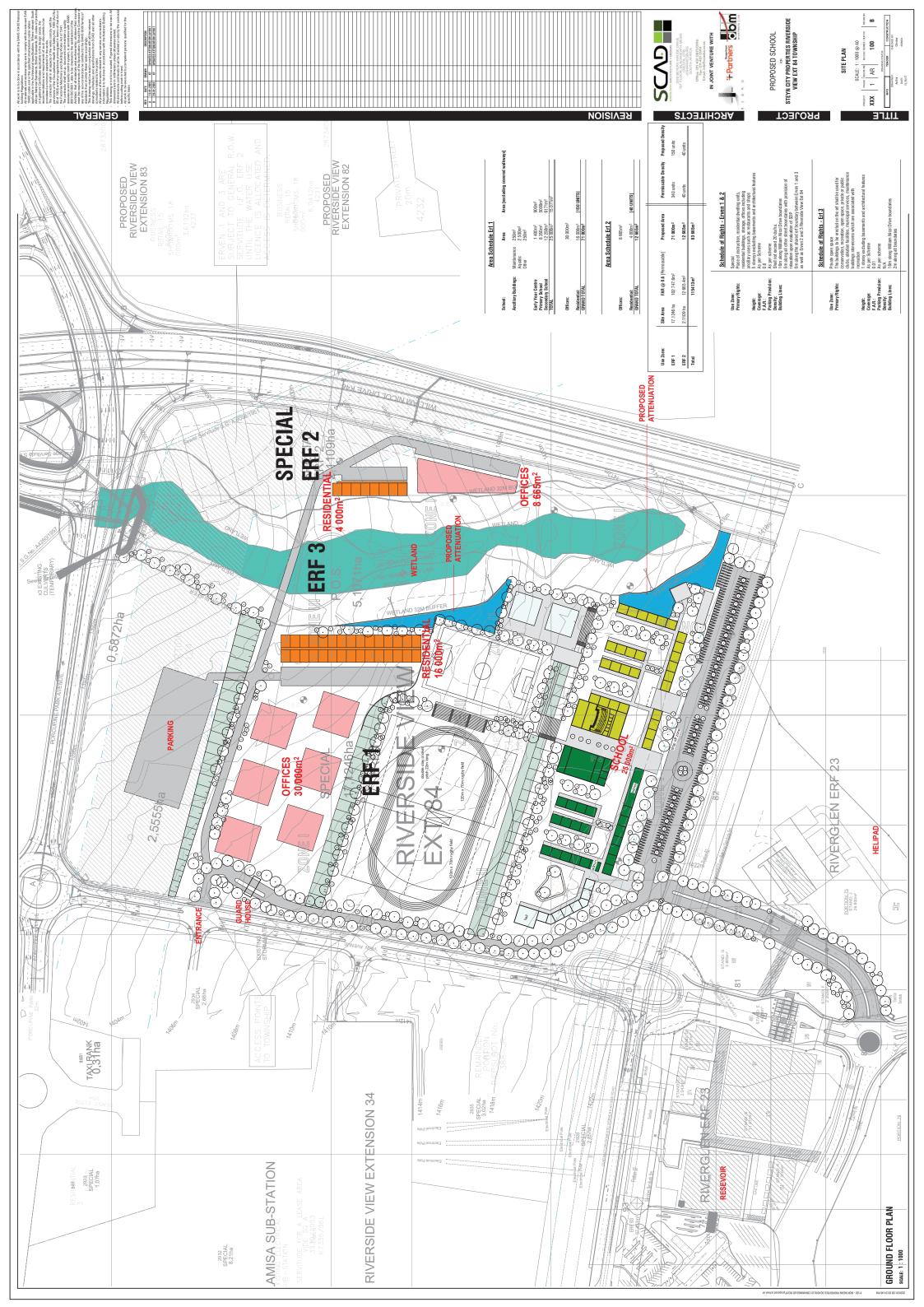
Tekciv Consulting Engineers

Andrew Comley Pr Tech Eng

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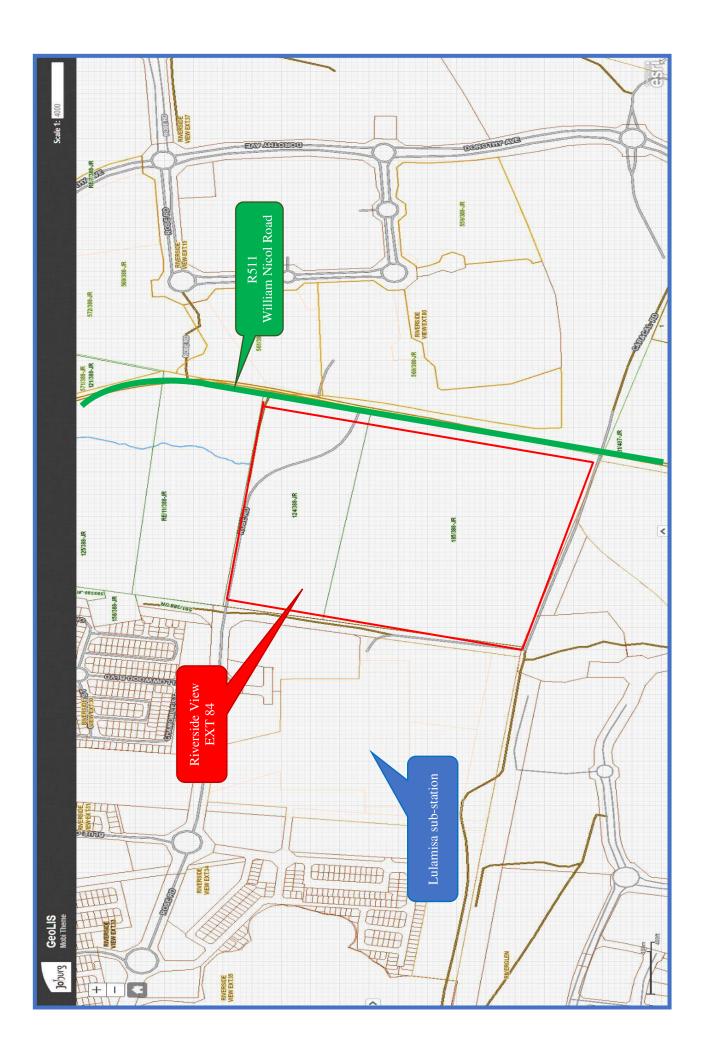


Annexure A Site Layout Plan





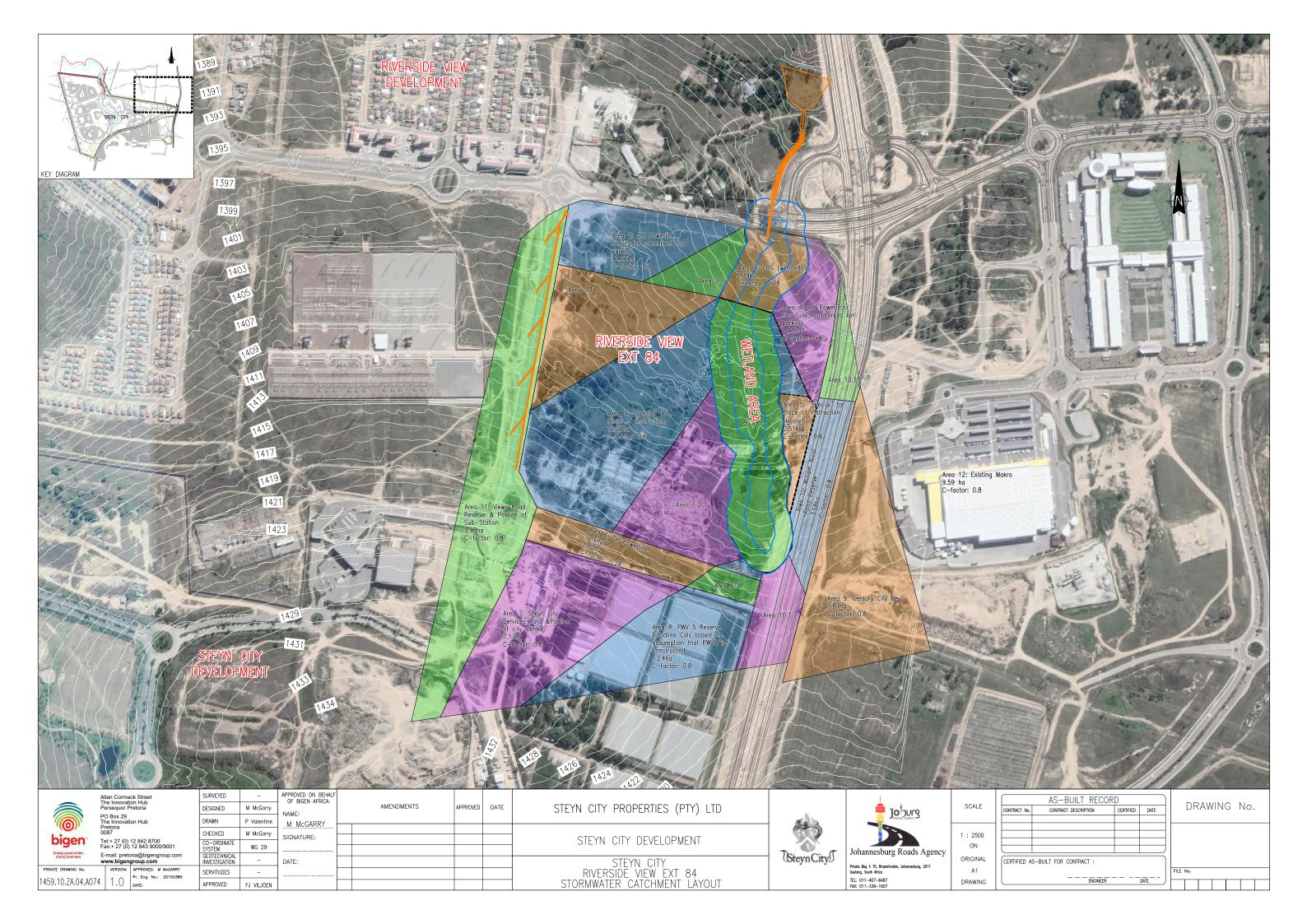
Annexure B City of Johannesburg GeoLIS Locality





Annexure C

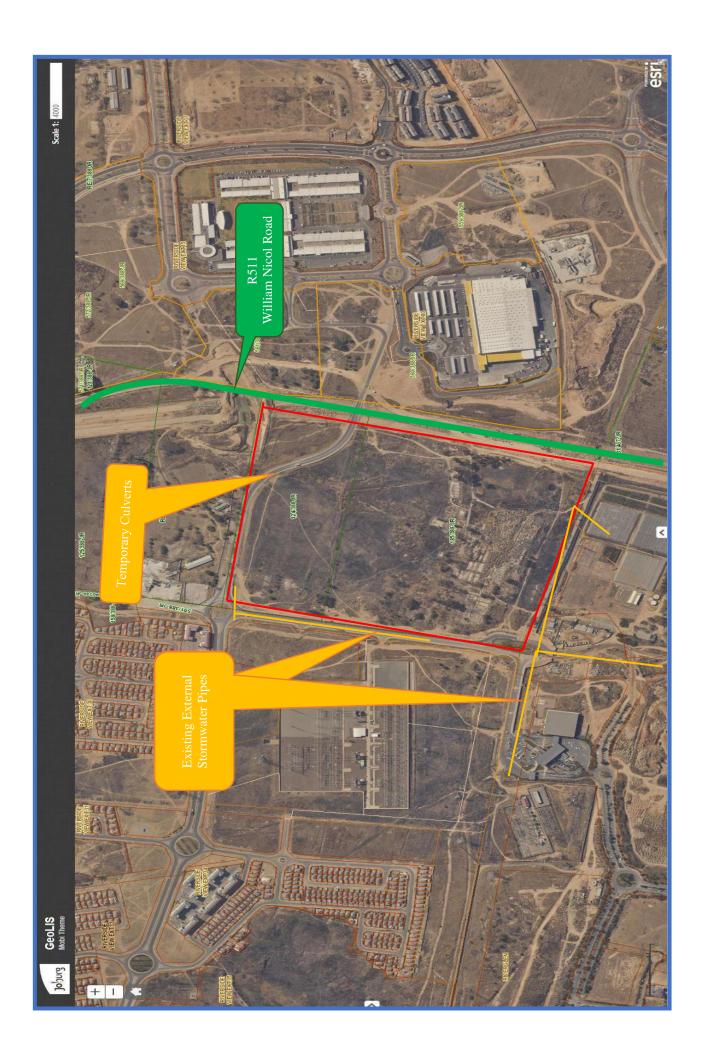
Bigen Africa Floodline Catchment Area Drawing





Annexure D

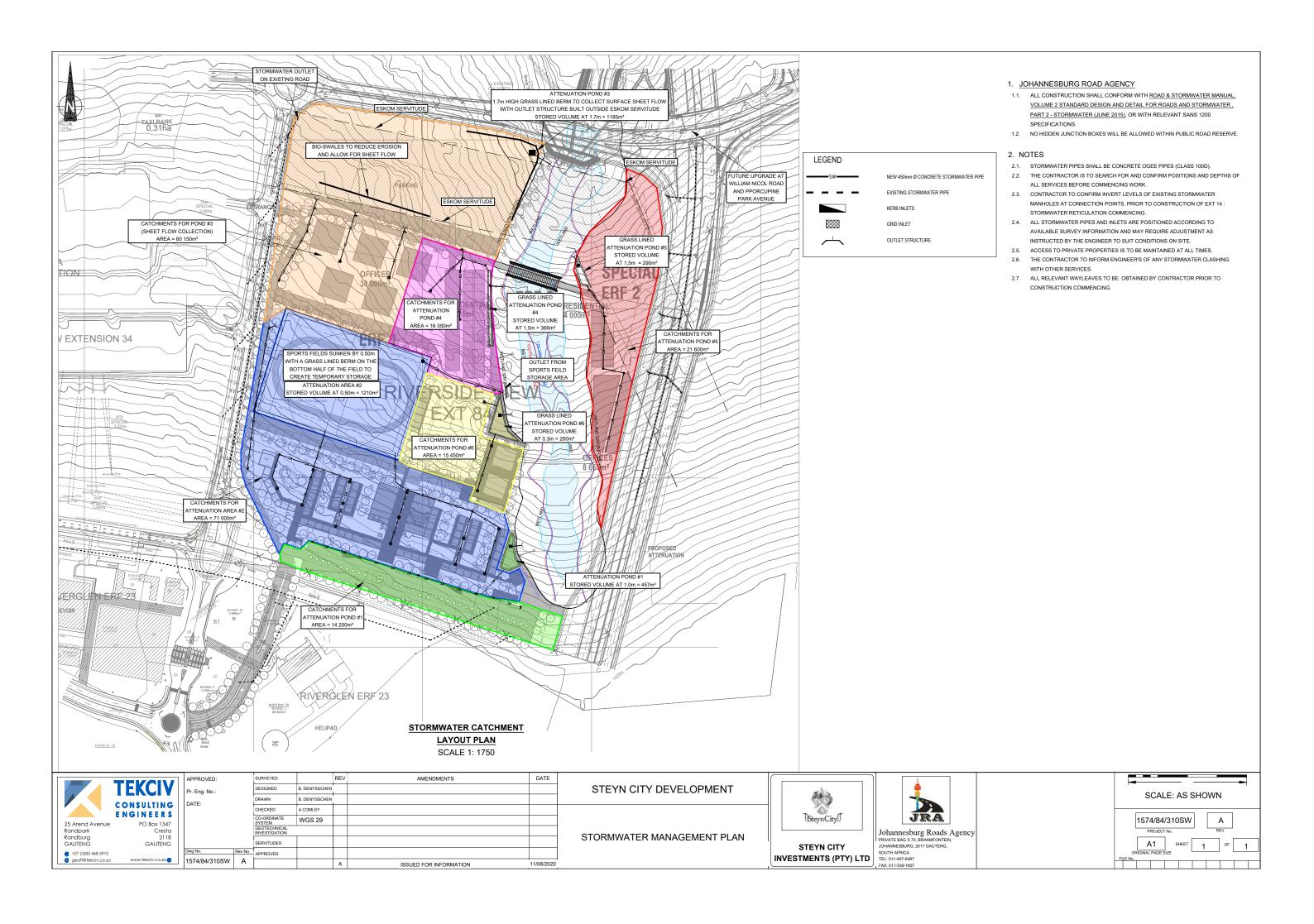
Existing Stormwater Infrastructure





Annexure E

Drawing 1574/84/310 – Stormwater Runoff Catchment Areas







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		ck bush & p			00					$\vdash \vdash$	_	10				1.247		L
Vegetation, Cp		nt bush & fa	arm lands		11		0.129			\vdash	_	20).261		
		ss lands			21 00					\vdash		25 50).264).276		H
	INO	vegetation	-	<u> </u>	UU					+	-	100).276).290		H
			Urba	n C						1	_	100			U	.230		H
				Assigne	d Duna	off		1		+	-				+	+	\vdash	
Component		Classifi	cation		a Kund ficient	/11	Weighted	I C	C ₂	-	-				+	+	\vdash	
	Şar	ndy, flat (<	(2%)		00										+	+	\Box	
		ndy, riat (<			00		0.00-				_				+	+	\Box	
Lawns		avy soil, fla			00		0.000											Г
			eep (>7%)		00													
Industrial areas	Lial	nt industry		0.	00		0.000											Г
minustridi areas	hea	avy industr	у		00		0.000		0.000									
Residential		uses (Res 1			00		0.000			\Box							Ш	
comciliui		ts (Res 2 +	·)		00		0.000								1			
		y centre			00						_						\sqcup	L
Business		ourban			00		0.000			\vdash	-				+	-	\vdash	-
		eets ximum Floo	vd.		00					\vdash					+	+	\vdash	-
	l*ia:	VIIIIIII FIOO	u	U.	00					-					+	+	+	
					1		Į.		_		-							
																		ĺ
		ıl Runoff (mitic Influ	Coefficient	Urban Ru Coefficie		Con	nbined run	off coeffic	cient			Retu	rn Pe	erioc	I C) _т [m³	/s]	l
		111110		Socialitie														L
																		Ĺ
2		0.218		0.000			0.2						2			0.06		Ĺ
5		0.232		0.000			0.2			\vdash			5			0.09		L
		0.247		0.000			0.2			\vdash			10			0.11		H
10		0.261		0.000			0.2			\vdash			20			0.16 0.18		H
10 20		0.264 0.276		0.000			0.2 0.2						25 50			0.18		L
10 20 25		0.2/0		0.000			0.2						100			0.23		H
10 20 25 50		0.290		0.000			0.2	.50		-			100			3.30		Н
10 20 25		0.290																
10 20 25 50 100		0.290	2	5	11	0	20	25		50	100	$\overline{}$			+	+		
10 20 25 50 100 Return Period [yrs]			2	5	10		20	25 35.0	_	50	100	_						F
10	*.dwg) [14.0	19.0	23	.0	31.5	35.0	4.	2.0	51.	0						
10 20 25 50 100 leturn Period [yrs]	*.dwg) [_	.37			4:			0 04						



Project & Job No.	:			School Par	rking					ulated l	by	:			enysso	hen		F
Catchment Reference	e :	Post D	eveloped	TAIR	т				Date	2		:	11.08	3.202	0			H
				INPU OUTP									-		-			⊦
Physical Characteris	tics: (Inl	and cat	chments)	0011	01													H
Size of catchment, A	(0.014	42		[km²]		To b	e comple	eted	onlv i	f defir	ned v	vatero	ourse		T
ongest water course,	L			0.28	8	_	[km]		_	lation of								Г
Average slope, S (Wat	ercourse	/ overlan	d)	0.016	67		[m / ɪ	n]	H _{0.85}		142			[m]				Г
Dolomitic percentage [0		_	[%]		H _{0.10}		141	6.5		[m]				Г
Overland flow (0) or w		e (1)		1		_	[.]		ΔΗ		3.	5		[m]				Г
Roughness coefficient,				0.02	2	_	[.]		0.751	_	21	0		[m]				Г
Rainfall region (winter	/ summe)		summ	ner	_	[.]		Sav		0.01	667		[m /	m]			Г
Mean annual precipitat	ion, MAP			750)		[mm]								T			Г
Steep & impermeable	(0), flat &	permea	ble (1)	0														
Time of Concentration,	T _c [hrs]			Areal	Distribu	tion Fact	tors											
Overland Flow	0.00			Rural	Urba			Lakes										L
Vatercourse	0.12		α	0.0000		.0000	φ	0.0000	Σ = .	1								L
	Tc	taken as		nmended mi	nimum)													L
		-	Ru										Urbar	_				L
Surface Slope	%		eability	%		getatio			%					_	split			L
leis & pans(<3%)	0.0		rmeable	0.0		k bush & p			0.0			& Park		_	0.0	_		L
lat areas (3-10%)	0.0	Permea		0.0		t bush & f	arm lar		0.0			rial Are			0.0			\vdash
filly (10-30%)	0.0		rmeable	0.0		ss lands			0.0			ntial A	reas	_	0.0	_		\vdash
teep areas(>30%)	0.0	Imperm	-	0.0	_	egetation	1		0.0		usines				0.00	_		H
= 100	0	∑ = 10	JU	0	Σ =	: 100			0	Σ	= 10	UU	_	1	100	-		\vdash
					Urban													H
awns & Parks	%	Indus	trial Area	s %		sidentia	I A ~~	36 '	%	Busine	ec				%	1		H
andy, flat (<2%)	100.0	Light in		0.0		siaentia ses (Res 1			%).0	City cent			-		0.0			\vdash
andy, riat (<2%) andy, steep (>7%)	0.0		ndustry	0.0		ses (Res 1 s (Res 2 +	•		0.0	Suburba	_		-		0.0			\vdash
leavy soil, flat (<2%)	0.0	neavy I	nuusti y	0.0	, riats	3 (NES Z +	,		,.U	Suburba	11				0.0			\vdash
eavy soil, flat (<2%)	0.0	1								Maximun	n Floo	d		_	0.0			\vdash
5 = 100	100	Σ = 10	00	0	7 =	: 100			0	$\Sigma = 100$	_				100	_		\vdash
- ''	130	2 - 10				.50			1	_ 100	-							
			Rura	I. Cı														H
				Assigned	Runoff				_									Н
Component		Classifi	cation	Coeffic		We	ighted	IC C	C ₁									Т
	Vleis	& pans(<	3%)	0.00							Dolon	nitic e	effect	on Ri	ural su	ırface	slope	Ĺ
	Flat	areas (3-1		0.00			0.00							fact				ſ
Surface Slope, C		(10-30%)		0.00			0.000					C _{1D}				000		Г
		ep areas(>		0.00								10						T
		permeabl		0.00							D :			Adi	usted	rural r	unoff	Ĺ
B	Port	neable		0.00			0.005		000		Ketu	rn Pe	rıod			ctor		r
Permeability, C _d		i permeabl	e	0.00			0.000	0.0	000			2				.000		
		ermeable		0.00								5				.000		Г
		k bush & p	lantation	0.00								10				.000		Г
Vegetation, Cp		t bush & fa		0.00	0		0.000					20			0.	.000		L
vegetation, Cp	Gras	ss lands		0.00			0.000					25				.000		Ĺ
	No v	egetation		0.00	0							50				.000		Ĺ
										, L		100			0.	.000		Ĺ
			Urba	1, C ₂														L
Component		Classifi	cation	Assigned		Wa	ighted		C₂									Ĺ
Component		Ciassill	cau011	Coeffic		vve	-911CC	. ` '	~									Ĺ
		dy, flat (<		0.08														L
Lawns		dy, steep		0.20		_ (0.080											L
		vy soil, fla		0.25		_												L
			ep (>7%)	0.35														L
Industrial areas		t industry		0.80		_	0.000											\vdash
	hea	vy industry		0.80				0.9	977					_				\vdash
Residential		ses (Res 1		0.50		_ (0.000				_							\vdash
	_	s (Res 2 +)	0.80							_							\vdash
		centre		0.95		_												\vdash
Business		urban		0.95		_ (0.977						-	-	-	-		\vdash
	Stre		4	0.98 1.00						\vdash	-		_		-	-		\vdash
	Max	imum Floo	u	1.00	<u> </u>					-			-	-	-			\vdash
																		H
			Coefficient	Urban Rund		Combine	d run	off coefficie	ent			Retu	ırn Pe	eriod	0	լ [m³	/s1	1
	incl Dolon	ntic Influ	епсе	Coefficien														1
					[Г
2	(0.000		0.977			0.9	77					2			0.24		Γ
5		0.000		0.977			0.9						5			0.34		
10		0.000		0.977			0.9						10			0.46		Ĺ
20		0.000		0.977			0.9						20			0.55		Ĺ
25		0.000		0.977			0.9						25			0.64		Ĺ
50		0.000		0.977			0.9						50			0.76		L
100	(0.000		0.977			0.9	77					100			0.94		L
											Î							Ĺ
Return Period [yrs]	·		2	5	10	20		25	_	50	10							Ĺ
	*.dwg) [r	nm]	15.8	22.1	30.1	35		41.6		9.0	61.							L
Point precipitation, P_t ((2.20	88.40	120.40	143	60	166.40	196	5.00	244.	ΩΩ						
oint intensity Pi [mm/			63.20			_			_					_	-	_		_
	nr]		100 63.2	100 88.4	100 120.4	10	0	100.40 100 166.4	1	00	10 244	0						E





Project & Job No.	:			School Are	ea					ulated by			ey De		hen		F
Catchment Reference	e :	Pre-E	Developed	INPL	п				Date	e	- :	11.08	3.2020)	+		\vdash
				OUTP											+		\vdash
Physical Characteris	tics: (Inl	and ca	tchments)														
Size of catchment, A				0.07	71		[km ²]		To b	e complete	d only	if defi	ned w	aterc	ourse		
ongest water course,	L			0.3	4		[km]		Calc	ulation of S	av						L
Average slope, S (Wate		/ overla	nd)	0.056			[m / n	1]	H _{0.85}		.420		[m]				L
Dolomitic percentage [^c				0			[%]		H _{0.10}	_	105.6		[m]				L
Overland flow (0) or wa				0			[.]		ΔΗ		14.4		[m]		+		H
Roughness coefficient, Rainfall region (winter ,	•			0.4 Sumn			[.]		0.75 S _{av}		255 05647		[m]	m]	+		H
Mean annual precipitati)		750			[mm]		Jav	0.0	J30 4 /		LIII /	111]	+		H
Steep & impermeable (perme	able (1)	0			Liiiiii										F
Fime of Concentration,	T _c [hrs]			Areal Rural		ibution Fa Irban	_	akes									İ
Watercourse	0.00		α	1.0000	β	0.0000	Ø	0.0000	Σ =	1					+		H
vater course	0.00	,,,	<u> </u>	1.0000	P	0.0000	Ψ.	0.0000							+		H
			Ru	ral								Urbai	n				T
Surface Slope	%	Pern	neability	%	١ ١	/egetation	on		%				%	split			Г
leis & pans(<3%)	30.0		ermeable	30.		Thick bush 8			0.0		ns & Parl			.0			
lat areas (3-10%)	70.0	Perme		20.	_	ight bush &			0.0		strial Ar			.0			L
Hilly (10-30%)	0.0		permeable	50.	_	Grass lands			0.0		dential A	reas		.0	<u>-</u>		\vdash
teep areas(>30%) = 100	0.0 100	Imper	meable	100	_	No vegetation $\overline{\Sigma} = 100$	วท		0.0 .00	Busin	ness 100			.0 0	4		\vdash
100	100	Σ = 1	100	100				1	.00	Σ=	100						İ
awns & Parks	%	Indu	strial Area	s %	Urba I	an Residenti	ial Area	is	%	Business				%	_		H
Sandy, flat (<2%)	0.0	_	ndustry	0.0) H	louses (Res	1)	C	0.0	City centre				.0			I
Sandy, steep (>7%)	0.0	heavy	industry	0.0) F	lats (Res 2	+)	C	0.0	Suburban				.0			L
leavy soil, flat (<2%)	0.0	_								Streets		-		.0	<u>-</u>		\vdash
neavy soil, steep (>7%)	0.0	<u></u>	100	0		C = 100	+-+	-	0	Maximum Flo	ood		_	0.0	4		\vdash
<u> </u>	0	<u>Σ</u> = 1	100	0		<u>S</u> = 100	+		U	∑ = 100				0	+		\vdash
			Rura	I. Cı					J						+		\vdash
		6:		Assigned	Runot	ff I .									+		\vdash
Component	[Classif	fication	Coeffic		W	eighted	<u> </u>	C ₁								
	Vleis	& pans(<3%)	0.0						Dolo	omitic	effect	on Ru	ral su	urface :	slope	
Curfoso Clana C	Flat	areas (3		0.0			0.065						C facto				
Surface Slope, C	Hilly	(10-30%	b)	0.1			0.005				C_{1D}			0.	290		
		ep areas(_	0.0													
		permeal	ble	0.0						Re	turn Pe	eriod	Adju		rural r	unoff	L
Permeability, C _d		neable		0.0			0.096	0.:	290						ctor		L
,,		i permeal		0.1		_					5	-			.218 .232		H
		ermeable k hush &	plantation	0.0						\vdash	10				.232 .247		-
			farm lands	0.0							20				.247		
Vegetation, C _p		s lands		0.2			0.129				25				.264		
	No v	egetatio	n	0.0	0						50			0.	.276		
											100			0.	.290		L
			Urba												<u> </u>		L
Component		Classif	fication	Assigned Coeffic		ff W	eighted	С	C ₂						-		H
		dy, flat (0.0	0												
Lawns		dy, steep	` ′	0.0			0.000								1		L
			at (<2%)	0.0			2.000								-		1
			teep (>7%)	0.0								-			+		-
Industrial areas		t industry vy indust		0.0			0.000				-				+		\vdash
		vy indust ses (Res		0.0				0.0	000		+	-			+		\vdash
Residential		ses (Res s (Res 2 -		0.0			0.000								+		\vdash
		centre		0.0													
Business		urban		0.0	0		0.000										I
DU3111C33	Stre			0.0			0.000										L
	Max	imum Flo	od	0.0	U										-		1
		<u> </u>															
	ted Rura ncl Dolon		Coefficient uence	Urban Run Coefficien		Combir	ned rund	ff coefficie	ent		Ret	urn Po	eriod	Q	t [m³/	/s]	
2).218		0.000			0.2	18				2			0.21		\vdash
5).218).232		0.000			0.2					5			0.21		-
10).232		0.000			0.2					10			0.32		
20).261		0.000			0.26					20			0.58		Г
25).264		0.000			0.26					25			0.68		
25	().276		0.000			0.27	76				50			0.83		
50	().290		0.000			0.29	90				100			1.12		_
															-		+
50 100			2	-	10	۱ I ۱	20	7.5		FΩ -	100						4
50 100 Return Period [yrs]		nm1	2 22.8	5	10 41		20 2.0	25 61.1	_		100				-		+
50 100 Return Period [yrs]	·.dwg) [n	nm]	2 22.8 48.99	5 32.5 69.83	41.	8 5	2.0	61.1	7	1.2	100 91.0 95.52						F
50 100 Return Period [yrs]	·.dwg) [n	nm]	22.8	32.5		8 5 31 11			7 15	1.2 9 2.98 19	91.0						F



Catchment Reference	:	Catc	hment #2 -	School Area					Calc	ulated b	у :	Brad	lley De	enysso	hen		
acciment Reference	e :	Post I	Developed						Date				8.202				Г
				INPUT													
				OUTPUT													
hysical Characteris	tics: (In	land ca	tchments)														L
ize of catchment, A				0.071]	[km²]		To b	e comple	ted only	if defi	ined v	vatero	ourse		
ongest water course,	_			0.34		[[km]		Calcu	ulation of	S_{av}						
Average slope, S (Wate	ercourse	/ overlar	nd)	0.0412		1	[m / r	n]	H _{0.851}	_	1416.2		[m]				
Dolomitic percentage [0			[%]		H _{0.101}		1405.7		[m]				
Overland flow (0) or wa		se (1)		1			[.]		ΔΗ	_	10.5		[m]				Н
Roughness coefficient,				0.02			[.]		0.751		255		[m]				Н
Rainfall region (winter	•			summer			[.]		Sav		0.04118		[m /	/ ml			Н
lean annual precipitati				750			[mm]		Jav		7.0 1110		L /	,	+	_	Н
Steep & impermeable (able (1)	0		1			_								Н
ccep a impermeable (oj, nace	Permee	able (1)	T Ĭ													Н
Time of Concentration,	T [brc]	\neg		Areal Di	ctributi	on Fact	ore		1								Н
Overland Flow	0.0	00		Rural	Urbar			akes	1					+		_	Н
Vatercourse	0.0	7.7	α	0.0000 β		0000	φ	0.0000	Σ = .	1							Н
rater course				mmended minir			<u> </u>	0.0000									Н
	10	turcii uc	Ru		ilaili)							Urba	n		1		Н
Surface Slope	%	Dorm	neability	%	Vor	etation			%	 		J. 130		split	+	_	\vdash
leis & pans(<3%)	0.0	_	nea bility bermeable	0.0		bush & p			0.0		wns & Pa	rkc		55.0	1-	-	\vdash
lat areas (3-10%)	0.0	Perme		0.0	_	bush & p bush & fa			0.0		wns & Pa dustrial A			0.0	1	+	\vdash
filly (10-30%)	0.0		ermeable	0.0		lands	arriridi'		0.0		sidential			0.0	1	_	\vdash
illy (10-30%) iteep areas(>30%)	0.0		meable	0.0		getation			0.0		siness	ru cas		85.0	1	_	\vdash
5 = 100	0.0	Σ = 1		0.0	νο ve			_	0.0		= 100	+	_	100	4	_	\vdash
100	U	2 = 1	UU	U	Σ= .	100			J	2	- 100	-	1	100	+	-	\vdash
					rban										1	-	\vdash
numa Q Davi	0'	T., .1.	obuic! # ···			do	LAcc		0/-	D!				0/.	4-	-	\vdash
awns & Parks	% 100.0	_	strial Area		_	dentia			%	Busines	-	-	_	%	4-	-	\vdash
andy, flat (<2%)	100.0		ndustry	0.0	_	es (Res 1	•		0.0	City cent		-		0.0	4	_	\vdash
andy, steep (>7%)	0.0	neavy	industry	0.0	riats ((Res 2 +)		0.0	Suburban		-		0.00	4	_	\vdash
leavy soil, flat (<2%)		4			-	\vdash				Streets	Elo : -'	+			4	-	\vdash
neavy soil, steep (>7%)	0.0	Σ = 1	100	0	-	100	_		0	Maximum		+	_	0.0	4	_	\vdash
= 100	100	<u>></u> = 1	UU	U	Σ = 1	100			U	∑ = 100	-	-	1	100	+	-	\vdash
				1.6							-	+		-	+	-	\vdash
			Rura			1					_	-	-	-	+	-	\vdash
Component		Classif	fication	Assigned Ru		Wei	ighted	C	C ₁		-	-	-		+	-	\vdash
•		-0	-20()	Coefficier	IÚ						olomeir.	off	07.5	ural -	urfo.c.	oler -	H
		s & pans(-		0.00						$\vdash \vdash \vdash$	olomitic				urtace :	siope	⊢
Surface Slope, C		t areas (3-		0.00		r	0.000			<u> </u>			C fact				L
use slope, o	Hilly	/ (10-30%		0.00		, °	.555			L	C ₁₀)		0.	.000		L_
	Ste	ep areas(:	>30%)	0.00													L
	Ver	y permeat	ble	0.00							Return F	Period	Adj		rural r	unoff	L
Permeability, C _d	Per	meable		0.00		,	0.000	0	000	L'		Cilou	L	fa	ictor		L
reineability, Cd	Ser	ni permeat	ble	0.00				J.			2				.000		L
	Imp	ermeable		0.00							5			0.	.000		L
	Thir	k bush &	plantation	0.00							10				.000		L
Vegetation, C _p	Ligh	it bush & f	farm lands	0.00		,	0.000				20			0.	.000		L
regeration, Cp	Gra	ss lands		0.00							25				.000		Ĺ
	No	vegetatio	n	0.00							50	_			.000		L
											100)		0.	.000		L
			Urba	n, C ₂													
		CI		Assigned Ru	noff	.,,											Г
		Classif	fication					L I									Г
Component				Coefficier	IL	wei	ighted		C ₂								\Box
Component	Sar	ndy, flat (<	<2%)	Coefficier 0.08	IL .	wei	ighted		C ₂						-		
<u> </u>		ndy, flat (<			IL .				C ₂								H
Component	Sar	ndy, steep	(>7%)	0.08	IL .).080		C ₂								F
<u> </u>	Sar Hea	ndy, steep avy soil, fla	o (>7%) at (<2%)	0.08 0.20	IL .				C ₂								
Lawns	Sar Hea hea	ndy, steep avy soil, fla avy soil, st	o (>7%) at (<2%) teep (>7%)	0.08 0.20 0.25 0.35		- 0	0.080		C ₂								
<u> </u>	Sar Hea hea Ligh	ndy, steep avy soil, fla avy soil, st nt industry	o (>7%) at (<2%) teep (>7%)	0.08 0.20 0.25		- 0											
Lawns Industrial areas	Sar Hea hea Ligh hea	ndy, steep avy soil, fla avy soil, st nt industry avy industr	o (>7%) at (<2%) teep (>7%) / ry	0.08 0.20 0.25 0.35 0.80		- 0	0.080		402								
Lawns	Sar Hea hea Ligh hea Hou	ndy, steep avy soil, fla avy soil, st nt industry avy industr uses (Res	o (>7%) at (<2%) teep (>7%) / ry	0.08 0.20 0.25 0.35 0.80 0.80		- 0	0.080										
Lawns Industrial areas	Sar Hea hea Ligh hea Hou Flat	ndy, steep avy soil, fla avy soil, st avy industry avy industr uses (Res ts (Res 2 +	o (>7%) at (<2%) teep (>7%) / ry	0.08 0.20 0.25 0.35 0.80 0.80 0.50		- 0	0.080										
Lawns Industrial areas Residential	Sar Hea hea Ligh hea Hou Flat	ndy, steep avy soil, fla avy soil, st nt industry avy industry uses (Res ts (Res 2 +	o (>7%) at (<2%) teep (>7%) / ry	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80		- C	0.080										
Lawns Industrial areas	Sar Hea hea Ligh hea Hou Flat City Sub	ndy, steep avy soil, fla avy soil, st nt industry avy industry uses (Res ts (Res 2 -	o (>7%) at (<2%) teep (>7%) / ry	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 0.95		- C	0.080										
Lawns Industrial areas Residential	Sar Hea hea Ligh hea Hou Flat City Sub	ndy, steep avy soil, fla avy soil, st nt industry avy industry uses (Res ts (Res 2 + centre ourban eets	o (>7%) at (<2%) teep (>7%) // ry	0.08 0.20 0.25 0.35 0.80 0.50 0.80 0.95 1.00		- C	0.080										
Lawns Industrial areas Residential	Sar Hea hea Ligh hea Hou Flat City Sub	ndy, steep avy soil, fla avy soil, st nt industry avy industry uses (Res ts (Res 2 -	o (>7%) at (<2%) teep (>7%) // ry	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 0.95		- C	0.080										
Lawns Industrial areas Residential	Sar Hea hea Ligh hea Hou Flat City Sub	ndy, steep avy soil, fla avy soil, st nt industry avy industry uses (Res ts (Res 2 + centre ourban eets	o (>7%) at (<2%) teep (>7%) // ry	0.08 0.20 0.25 0.35 0.80 0.50 0.80 0.95 1.00		- C	0.080										
Industrial areas Residential Business	Sar Hee hee Ligh hee Hou Flat City Sut Stre Max	ndy, steep avy soil, fla avy soil, st at industry avy industry avy industry ses (Res 2 + y centre burban eets kimum Floc	o (>7%) at (<2%) teep (>7%) / / / / / / / / / / / / / / / / / / /	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 0.95 1.00 1.00		- C	0.080										
Industrial areas Residential Business	Sar Hea hea Ligh hea Hou Flat City Sub Stre Max	ndy, steep avy soil, fla avy soil, st nt industry avy industry avy industry avy industry ave (Res 2 - 7 centre burban eets kimum Floc	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 Urban Runoff		- C C C	0.000		402		Re	turn P	Period		T [m ³	/s1	
Industrial areas Residential Business	Sar Hee hee Ligh hee Hou Flat City Sut Stre Max	ndy, steep avy soil, fla avy soil, st nt industry avy industry avy industry avy industry ave (Res 2 - 7 centre burban eets kimum Floc	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 0.95 1.00 1.00		- C C C	0.000	0.	402		Re	turn P	Period	I Q	r [m³/	/s]	
Industrial areas Residential Business	Sar Hea hea Ligh hea Hou Flat City Sub Stre Max	ndy, steep avy soil, fla avy soil, st nt industry avy industry avy industry avy industry ave (Res 2 - 7 centre burban eets kimum Floc	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 Urban Runoff		- C C C	0.000	0.	402		Re	turn P	Period	ll Q	τ [m³,	/s]	
Industrial areas Residential Business	Sar Hea hea Ligh hea Hou Flata City Sut: Stre Max	ndy, steep avy soil, fla avy soil, st nt industry avy industry avy industry avy industry ave (Res 2 - 7 centre burban eets kimum Floc	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 Urban Runoff		- C C C	0.000	0.	402		Re	turn P	Period	ll Q	0.50		
Industrial areas Residential Business Return Period Adjus	Sar Hea hea Ligh hea Hou Flat City Sub Stre Max	ndy, steep avy soil, fli avy soil, st tindustry avy industry aves (Res ts (Res 2 + y centre burban eets kimum Floc all Runoff mitic Infli	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 0.95 1.00 1.00 Urban Runoff		- C C C	0.080 0.000 0.000 1.000	0. Officients	402		Re		Period	II Q			
Lawns Industrial areas Residential Business Return Period Adjus	Sar Hea hea Ligh hea Hoo Flat City Sut Stre Max	ndy, steep avy soil, fli avy soil, st tindustry avy industry avy indus	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 1.00 Urban Runoff Coefficient		- C C C).080).000).000 d rune	O. Off coefficients 02 02	402		Re	2	eriod	ll Q	0.50		
Lawns Industrial areas Residential Business Return Period 2 5	Sar Hea hea Ligh hea Hoo Flat City Sut Stre Max	ndy, steep avy soil, flid avy soil, standstry avy industry avy industr	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 Urban Runoff Coefficient 0.402 0.402		- C C C	0.44 0.44	O. Off coefficients 02 02 02 02 02	402		Re	2 5	Period	ll Q	0.50 0.70		
Lawns Industrial areas Residential Business Return Period 2 5 10 20	Sar Hea hea Ligh hea Hoo Sit Sut Stre Max	ndy, steep avy soil, fla avy soil, st avy soil, st avy soil, st avy industry avy industry ave (Res av centre avrban aets avi Runoff antic Influ 0.000 0.000 0.000 0.000	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 Urban Runoff Coefficient 0.402 0.402 0.402 0.402		- C C C	0.4 0.4 0.4 0.4 0.4	0. off coefficients 02 02 02 02 02 02	402		Re	2 5 10 20	eriod	ll Q	0.50 0.70 0.95 1.14		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25	Sar Hea hea Ligh hea Hot City Sut Strr Max	andy, steep avy soil, fli avy soil, st avy soil, st avy soil, st avy industry avy industry ave (Res avy industry ave	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 1.00 0.402 0.402 0.402 0.402		- C C C	0.44 0.44 0.44 0.44 0.44	0. off coefficients 02 02 02 02 02 02 02	402		Re	2 5 10 20 25	Period	II Q	0.50 0.70 0.95 1.14 1.32		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50	Sar Hea Ligh hea Hou Flat City Sut Stre Max	ndy, steep avy soil, fla avy soil, sta avy centre avrban eets all Runoff mitic Infla 0.000 0.000 0.000 0.000 0.000 0.000	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 0.402 0.402 0.402 0.402 0.402 0.402		- C C C	0.44 0.44 0.44 0.44 0.44 0.44	0. Off coefficients 02 02 02 02 02 02 02 02 02 0	402		Re	2 5 10 20 25 50		ll Q	0.50 0.70 0.95 1.14 1.32 1.55		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25	Sar Hea Ligh hea Hou Flat City Sut Stre Max	andy, steep avy soil, fli avy soil, st avy soil, st avy soil, st avy industry avy industry ave (Res avy industry ave	0 (>7%) at (<2%) teep (>7%) / / / 1) +) Coefficient	0.08 0.20 0.25 0.35 0.80 0.80 0.50 0.80 1.00 1.00 1.00 0.402 0.402 0.402 0.402		- C C C	0.44 0.44 0.44 0.44 0.44	0. Off coefficients 02 02 02 02 02 02 02 02 02 0	402		Re	2 5 10 20 25		l Q	0.50 0.70 0.95 1.14 1.32		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100	Sar Hea Ligh hea Hou Flat City Sut Stre Max	ndy, steep avy soil, fla avy soil, sta avy centre avrban eets all Runoff mitic Infla 0.000 0.000 0.000 0.000 0.000 0.000	0 (>7%) at (<2%) teep (>7%) / / ry 1) +) Coefficient uence	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402	Co	- C C C	0.40 0.40 0.40 0.44 0.44 0.44 0.44	0. 02 02 02 02 02 02 02 02 02	402	50		2 5 10 20 25 50		ll Q	0.50 0.70 0.95 1.14 1.32 1.55		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 leturn Period [yrs]	Sar Hea hea Ligh hea Hoo Flat City Sut Stre Max	ndy, steep avy soil, fli avy soil, st avy soil, st avy soil, st avy soil, st avy soil, st avy soil, st avy industry avy industry ave (Res av centre burban eets av centre burban eets avi Runoff mitic Influ 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0 (>7%) at (<2%) teep (>7%) // ry 1) +) cod Coefficient uence	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402	C(- () () () () () () () () () (0.4d rune 0.4d 0.4d 0.4d 0.4d 0.4d 0.4d	0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	402	50	100	2 5 10 20 25 50		ll Q	0.50 0.70 0.95 1.14 1.32 1.55		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 Return Period [yrs] Point precipitation, Pt (**)	Sar Hea hea Ligh hea Hoo Flat City Sub Stre Max Stred Rura incl Dolor	ndy, steep avy soil, fli avy soil, st avy soil, st avy soil, st avy soil, st avy soil, st avy soil, st avy industry avy industry ave (Res av centre burban eets av centre burban eets avi Runoff mitic Influ 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	c (>7%) at (<2%) teep (>7%) // ry 1) +) cod Coefficient uence	0.08 0.20 0.25 0.35 0.80 0.80 0.95 1.00 1.00 1.00 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402 0.402	Co.	- () () () () () () () () () (0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.9	0. 002 002 002 002 002 002 002 0	402	9.0	100	2 5 10 20 25 50		II Q	0.50 0.70 0.95 1.14 1.32 1.55		
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Catchment Reference		:hment #3	- Office Area				Calc	ulated I	by			enysso	chen		L
	e : Pre-[Developed					Date	9		11.0	08.202	20			L
			INPUT	_					-		-	-	-		H
hysical Characteristi	ioci (Tuland or	tohmonto)	OUTPU	1			_					-	+		H
Physical Characteristi	CS: (Illianu Ca	(Ciments)	0.0601	_	[km²	1	Tob	e comple	atad ar	ly if do	finad s	water	COLUMNO		H
Size of catchment, A ongest water course, L			0.0601)	[km]		_	ulation of		iy ii dei	inea v	valero	Jourse		H
-	course / everts	nd)	0.0624	-					1410	_	[m]	_	+		H
Average slope, S (Water		.na)		<u> </u>	[m /	mj	H _{0.85}				[m]		+		H
Oolomitic percentage [% Overland flow (0) or wat			0		[%]		H _{0.10}	L	1391.! 18.5	<u> </u>	[m]		-		H
Roughness coefficient, r			0,4		[.] [.]		0.75		296.2		[m]		+		H
Rainfall region (winter /		,	Summe	r	[.]		Sav		0.0624	_		/ m]	+		H
Mean annual precipitatio			750	_	[mm	1	Jav		0.0027	J	Liii /	/ mj	-		Н
Steep & impermeable (0		able (1)	0		[111111		_					_	+		Н
	<i>),</i>														Т
ime of Concentration, T	[c [hrs]		Areal D	istributio	on Factors										Г
Overland Flow	0.488		Rural	Urbar	ı	Lakes									Т
Vatercourse	0.000	α	1.0000	3 0.0	<mark>000</mark> φ	0.0000	D ≥ = .	1							
			ıral							Urba	n				L
Surface Slope		neability	%	Vege	etation		%				_	split			L
leis & pans(<3%)		permeable	30.0	_	bush & planta		10.0		awns & l			0.0			L
lat areas (3-10%)	60.0 Perme		20.0	_	bush & farm la	nds	60.0		ndustrial		_	0.0	4		H
filly (10-30%)		permeable	50.0		lands	<u> </u>	30.0		esidenti	I Areas		0.0	4		\vdash
teep areas(>30%)	_	meable 100	0.0	_	getation	 	1.00		usiness	-		0.0	4	-	H
= 100	100 ∑ = ·	100	100	<u>Σ</u> = 1	100		100	Σ	= 100		+	0	+	-	H
				Urban									_		\vdash
awns & Parks	% Indu	strial Area			dential Are	226	%	Busine	ee			%	+		\vdash
iandy, flat (<2%)		istrial Area industry	0.0		dential Are es (Res 1)	5d5	0.0	City cent				0.0	-		H
andy, riat (<2%) andy, steep (>7%)		industry industry	0.0	_	(Res 2 +)	H	0.0	Suburba			_	0.0	1		H
leavy soil, flat (<2%)	0.0 fleavy	raubti y	0.0	i idts ((0.0	Streets				0.0	_		H
eavy soil, steep (>7%)	0.0							Maximun	n Flood		_	0.0			
F = 100	$0 \qquad \Sigma = \frac{1}{2}$	100	0	Σ = 1	100	\vdash	0	Σ = 100				0			
												T			
		Rura	ıl, Cı												Г
Component	Classi	fication	Assigned R	unoff	Weighte	d C	C:								
Component	Classi	ncauUII	Coefficie		vveignië	u C	C ₁								ſ
	Vleis & pans(0.03						Dolomit	ic effec			urface s	slope	Ĺ
Surface Slope, C _h	Flat areas (3	-10%)	0.08		0.060						C fac				Ĺ
Jui lace Jiupe, Ch	Hilly (10-30%	6)	0.16		0.000				С	lD		0.	.285		L
	Steep areas((>30%)	0.00												
	Very permea	ble	0.00						Return	Period	Adj	justed	rural ru	unoff	L
Permeability, C _d	Permeable		0.08		0.096		0.285						actor		Ĺ
	Semi permea		0.16		3.030			⊢⊢		2			.214		L
	Impermeable	_	0.00					<u> </u>		5			.228		L
	Thick bush &		0.00							0			.242		H
Vegetation, C _p	Light bush &	rarm lands	0.11		0.129)				0 5			257		H
•	Grass lands No vegetation	n l	0.21							0			.259 .271		H
	rvo vegetatio	9.1	0.00					+		00			.285		H
		lirka	n, C ₂					1 -	1	,,,			.203		-
			, -	unoff	1	1			-		-	+	+		H
		fication	Assigned R		Weighte		C ₂	1	_			-		\vdash	H
Component	Classi		Coofficia	art.	weignie	a C	-2								
Component		< 2%)	Coefficie		Weignte	a C	-2					-			Т
· · · · · · · · · · · · · · · · · · ·	Sandy, flat (0.00		-		-2								F
Component	Sandy, flat (Sandy, steep	o (>7%)	0.00		0.000		52								F
· · · · · · · · · · · · · · · · · · ·	Sandy, flat (Sandy, steep Heavy soil, fl	p (>7%) lat (<2%)	0.00 0.00 0.00		-		J 2								
Lawns	Sandy, flat (Sandy, steep	o (>7%) lat (<2%) teep (>7%)	0.00		0.000										
· · · · · · · · · · · · · · · · · · ·	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry	p (>7%) lat (<2%) teep (>7%)	0.00 0.00 0.00 0.00		-)									
Lawns Industrial areas	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry heavy indust	p (>7%) lat (<2%) teep (>7%) y	0.00 0.00 0.00 0.00 0.00		0.000	1	0.000								
Lawns	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry	p (>7%) lat (<2%) teep (>7%) y try	0.00 0.00 0.00 0.00 0.00 0.00		0.000	1									
Lawns Industrial areas	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res	p (>7%) lat (<2%) teep (>7%) y try	0.00 0.00 0.00 0.00 0.00 0.00		0.000	1									
Lawns Industrial areas Residential	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2	p (>7%) lat (<2%) teep (>7%) y try	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 - 0.000										
Lawns Industrial areas	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre	p (>7%) lat (<2%) teep (>7%) y try	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000										
Lawns Industrial areas Residential	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban	p (>7%) lat (<2%) teep (>7%) y try 1)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 - 0.000										
Lawns Industrial areas Residential	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets	p (>7%) lat (<2%) teep (>7%) y try 1)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 - 0.000										
Lawns Industrial areas Residential	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets	p (>7%) lat (<2%) teep (>7%) y try 1)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 - 0.000										
Industrial areas Residential Business Return Beriod Adjust	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000		0.000				Daria		F3	/c1	
Industrial areas Residential Business Return Period Adjust	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 - 0.000		0.000		R	eturn I	Perioo	ı Q	∂r [m³/	/s]	
Industrial areas Residential Business Return Period Adjust	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000		0.000		R	eturn I	Perioc	i Q	}₁ [m³/	/s]	
Lawns Industrial areas Residential Business Return Period Adjust in	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infi	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000	noff coeffi	0.000		R		Perioo	1 Q			
Industrial areas Residential Business Adjust	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000		0.000		R	2 2 5	Perioc	ı Q	O.16		
Lawns Industrial areas Residential Business Return Period Adjust in	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infi	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000	noff coeffi	0.000		R	2		ı i Q	0.16		
Lawns Industrial areas Residential Business Return Period Adjust in	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infil 0.214 0.228	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000	noff coeffi	0.000		R	2 5		ı p	0.16 0.24		
Lawns Industrial areas Residential Business Return Period Adjust in	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infi 0.214 0.228 0.242	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000	214 228 242	0.000		R	2 5 10		1 Q	0.16 0.24 0.33		
Lawns Industrial areas Residential Business Return Period 2 5 10 20	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257	0.000		R	2 5 10 20		i Q	0.16 0.24 0.33 0.44		
Lawns Industrial areas Residential Business Return Period Adjust in 2 5 10 20 25	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257 0.259	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257 259	0.000		R	2 5 10 20 25		i Q	0.16 0.24 0.33 0.44 0.49		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res Flats (Res Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257 0.259 0.271	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257 259 271	0.000		R	2 5 10 20 25 50		ı Q	0.16 0.24 0.33 0.44 0.49 0.60		
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res Flats (Res Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257 0.259 0.271	p (>7%) lat (<2%) teep (>7%) y try 11) +)	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f	0.000 0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257 259 271	0.000	50	RR	2 5 10 20 25 50		ı Q	0.16 0.24 0.33 0.44 0.49 0.60		
Lawns Industrial areas Residential Business Return Period Adjust in in 20 20 25 50 100 20 100 20 100 100 100 100 100 100	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257 0.259 0.271 0.285	p (>7%) lat (<2%) teep (>7%) y try 11) +) cod	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f co	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257 271 285	0.000	50 4.8		2 5 10 20 25 50		ı Q	0.16 0.24 0.33 0.44 0.49 0.60		
Lawns Industrial areas Residential Business Return Period Adjust in 2 5 10 20 25 50 100	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo ed Rural Runoff cl Dolomitic Infl 0.214 0.228 0.242 0.257 0.259 0.271 0.285	p (>7%) lat (<2%) teep (>7%) y try 11) ++) cod	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f Co	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	214 228 242 257 259 271 285	0.000 icient		100	2 5 10 20 25 50 100		1 Q	0.16 0.24 0.33 0.44 0.49 0.60		



Project & Job No.	:			Office Area						ulated b				enysso	hen		
Catchment Reference	e :	Post D	eveloped			_			Date	2	:	11.08	8.202	.0			L
		-		INPUT	-				-		_	-		-	-		\vdash
hydiaal Characterio	tica: (Tal	land cat	chmonto)	OUTPU	I									-	-		⊦
Physical Characteristize of catchment, A	LICS: (IIII	anu cat	chinents)	0.0601	-		[km²]		Tob	e complet	od only	if dofi	nod v	untore	OURCO		Н
ongest water course,				0.0601	5		[km]		_	e complet ulation of		ii deii	nea v	valero	.ourse		Н
-		/ overlan	d١	0.0667	,			m1			1408		[m]	+	+		H
Average slope, S (Wate		/ overlan	u)	0.0667			[m / r	nj	H _{0.85}			_	[m]		+		+
Dolomitic percentage [^c Overland flow (0) or wa		0 (1)		1			[%]		H _{0.10}	_	1390 18		[m]		-		H
Roughness coefficient,				0.02			[.] [.]		0.75		270		[m]		+		H
Rainfall region (winter ,	•			summe	r		[.]		Sav		.06667		[m /	_	+		Н
Mean annual precipitati)		750	.1		[mm]		Jav	U	.00007		Liii /		-		H
Steep & impermeable (permea	ble (1)	0		- ''	[]							+			Н
l l l l l l l l l l l l l l l l l l l	,uc c.	Permed	5.6 (1)			_											Н
Time of Concentration,	T _c [hrs]			Areal D	istribut	ion Fact	ors										Т
Overland Flow	0.00	00		Rural	Urba			Lakes							_		T
Vatercourse	0.08	36	α	0.0000 ß	3 1.0	0000	φ	0.0000	Σ = .	1							Г
	Tc	taken as	0.25 (reco	mmended mini	mum)												Г
			Ru	ral								Urbai	n				Г
Surface Slope	%	Perm	eability	%	Veg	jetatior	n	-	%				%	split			
leis & pans(<3%)	0.0	Very pe	ermeable	0.0	_	bush & p			0.0		vns & Par			0.0			L
lat areas (3-10%)	0.0	Permea		0.0		bush & fa	arm lar		0.0		lustrial Ar			0.0	<u> </u>		L
Hilly (10-30%)	0.0		ermeable	0.0	_	s lands			0.0		sidential A	Areas		0.0	4		-
teep areas(>30%)	0.0	Imperm		0.0	_	egetation	1		0.0		siness		_	10.0	4		-
= 100	0	∑ = 10	טע	0	Σ =	100			0	Σ:	= 100	-	-	100	-		\vdash
					lube :-										+		-
Duma Q David	0/	Ton eller	tuin! A		<u>Jrban</u>	ide	LAcci	'	0/-	Duraire -		1		0/	+		\vdash
awns & Parks	% 100.0		trial Area	s %		identia			%).0	Busines	-			% 0.0	1		\vdash
andy, flat (<2%) andy, steep (>7%)	0.0	Light in	ndustry	0.0	_	es (Res 1 (Res 2 +	-		0.0	City centr Suburban	-			0.00	1		\vdash
leavy soil, flat (<2%)	0.0	i leavy I	riduəti y	0.0	ı iats	(1.05 2 +	,		,,,,	Streets				0.0	1		\vdash
leavy soil, riat (<2%)	0.0				1					Maximum	Flood			0.0	1		\vdash
= 100	100	Σ = 10	00	0	Σ =	100			0	$\Sigma = 100$			_	100	_		+
		<u> </u>		Ť					İ	_ :::				Ť			
			Rura	I, C ₁													Т
C		Cl:6		Assigned R	unoff	14/		16	_								Т
Component		Classifi	cation	Coefficie		Wei	ighted	10	C ₁								Т
	Vleis	s & pans(<	3%)	0.00						Do	olomitic	effect	on R	ural sı	urface s	slope	
	Flat	areas (3-1	10%)	0.00		٦,						(C fact	tor			
Surface Slope, C	Hilly	(10-30%)		0.00		7	0.000				C _{1D}			0.	.000		
	Stee	ep areas(>	30%)	0.00		1											T
		permeable		0.00							eturn P	oriod	Adj	usted	rural ru	unoff	
Permeability, C _d		meable		0.00			0.000	0.4	000		eturn P	ei 100	Ľ		ctor		Γ
rei nieavility, Cd		i permeabl	le	0.00			0.000	0.0	550		2				.000		L
		ermeable		0.00							5				.000		L
		k bush & p		0.00							10				.000		L
Vegetation, Cp		t bush & fa	arm lands	0.00		_	0.000				20				.000		
то ў станан, ср		ss lands		0.00		_					25				.000		
	No v	/egetation		0.00	_				1	<u> </u>	50				.000		
										-	100			0.	.000		_
			Urba	<i>,</i> -		_		ı			_				-		1
Component		Classifi	cation	Assigned R		Wei	ighted	ıc d	C ₂					-	-		1
P. S				Coefficie	nt	1.5.	5		_					-	-		1
		dy, flat (<		0.08							-			+	+		+
Lawns		dy, steep (0.00		- 0	0.080							+	+		\vdash
		vy soil, fla		0.00										+	+		\vdash
			ep (>7%)	0.00										+	+		\vdash
Industrial areas		t industry	,	0.00		- C	0.000							+	+		\vdash
		vy industry		0.00				0.:	388		-			+	+		\vdash
Residential		ses (Res 1 s (Res 2 +		0.00		- 0	0.000				-			+	+		\vdash
		centre	'	0.00							-			+	+		\vdash
		urban		0.00										+	+		\vdash
Business	Stre			0.00		- 0	0.850							+	+		\vdash
		imum Floo	d	1.00										+	+		\vdash
	1.35																\top
	tod D	l Duncer o	Coefficient	Urban Runofi	.												
		ı Kunoff (1 itic Influ	Coefficient ence	Coefficient	' c	Combine	d run	off coefficie	ent		Ret	urn P	erioc	I Q	ի [m³/	/s]	ı
			-														L
		2000		2.2	_			00									L
2		0.000		0.388			0.3					2			0.41		<u> </u>
5		0.000		0.388			0.3					5			0.57		1
10		0.000		0.388			0.3					10			0.78		-
20		0.000 0.000		0.388			0.3					20 25			0.93 1.08		
20		0.000		0.388 0.388			0.3					50			1.08		1
25		0.000		0.388			0.3					100			1.59		1
25 50				0.500			0.5	-		-		100					1
25					1				1					1	1		-
25 50 100			2	5	10	20	n 1	25		50	100	1					
25 50 100 leturn Period [yrs]	(2	5	10	20		25	_	50	100						⊢
25 50 100 Return Period [yrs] Point precipitation, Pt ((c.dwg) [r		15.8	22.1	30.1	35.	.9	41.6	49	9.0	61.2						F
25 50 100 leturn Period [yrs]	(c.dwg) [r			22.1		_	.9 .60		190	9.0							





Project & Job No.			Office area	and Re	sidential V	/est		ulated b	-		ley De		hen	
Catchment Reference	: Pre-I	Developed					Date	9	:	11.08	8.2020	0		
			INPUT OUTPU											
Physical Characteristi	ccı (Inland ca	tchmontc)	OUTPU	<u> </u>										
Size of catchment, A	cs. (Illiana ca	termients)	0.0160	5	[km²	1	Toh	e comple	tod only	if defi	ned w	ıatoro	OUTCO	
Longest water course, L			0.0100	5	[km]	4		ulation of		ii deii	ileu w	ratere	oui se	
Average slope, S (Water	course / overla	nd)	0.0568	Q	[m /		H _{0.85}		1404.7		[m]			
Dolomitic percentage [%		ilu)	0.0300		[%]	,	H _{0.10}		1398.3	_	[m]			
Overland flow (0) or wat			0	_	[.]		ΔΗ	_	6.4		[m]			
Roughness coefficient, r			0.4		[.]		0.75		112.5		[m]			
Rainfall region (winter / summer)		Summe	er	[.]		Sav		.05689		[m /	ml			
Mean annual precipitatio			750	-	[mm	1	Cav				L /	,		
Steep & impermeable (0		able (1)	0		Linn									
Time of Concentration, T	c [hrs]		Areal [Distributi	on Factors									
Overland Flow	0.317		Rural	Urbar	ı	Lakes								
Vatercourse	0.000	α	1.0000	β 0.0	0000 φ	0.0000	Σ = .	1						
		Ru	ral							Urba	n			
Surface Slope		neability	%	Veg	etation		%				%	split		
leis & pans(<3%)		ermeable	30.0	_	bush & planta		10.0		vns & Par			0.0		
lat areas (3-10%)	70.0 Perme		20.0		bush & farm la	nds	60.0		lustrial Ar			0.0		
Hilly (10-30%)		ermeable	50.0		lands	_	30.0	-	sidential A	Areas		0.0		_
Steep areas(>30%)		meable	0.0		getation	\vdash	0.0		siness		_	0.0		_
<u>=</u> 100	100 ∑ = ·	100	100	Σ = .	100		100	Σ	= 100			0		_
													-	
	0/ 1	-4		Urban			0.1	In. ·		1		0/		-
awns & Parks		strial Area	-		dential Ar	eas	%	Busines	-		_	%		
landy, flat (<2%)		ndustry	0.0	_	es (Res 1)	<u> </u>	0.0	City centr				0.0	-	-
andy, steep (>7%) leavy soil, flat (<2%)	0.0 heavy	industry	0.0	riats ((Res 2 +)	 	0.0	Suburban Streets		-		0.0		-
leavy soil, flat (<2%)	0.0			_				Maximum	Flood).0		
= 100	0.0 Σ = -	100	0	Σ = .	100		0	$\Sigma = 100$	_		_	0		
_ 100	<u> </u>		0		. 50		J	_ 100				Ĭ		
		Rura	I. Cı					1						
			Assigned R	unoff										
Component	Classi	fication	Coefficie		Weighte	d C	C ₁							
	Vleis & pans(<3%)	0.03					D	olomitic	effect	on Ru	ıral sı	ırface sl	ope
		Flat areas (3-10%) Hilly (10-30%)			0.065						C facto			
Surface Slope, C _h									C _{1D}				290	
	Steep areas(-	0.00		_									
	Very permea		0.00					l .			Adiu	usted	rural ru	noff
Dawwaa kilitus C	Permeable			0.08		-	0.290		Return P	erioa	_		ctor	
Permeability, C _d	Semi permea				0.096		0.290		2				218	
	Impermeable		0.00						5			0.	232	
	Thick bush &	plantation	0.00						10			0.	247	
Vegetation, Cp	Light bush &	Light bush & farm lands Grass lands			0.129	.			20				261	
regetation, ep					0.129				25				0.264	
	No vegetatio	n	0.00				_		50				276	
									100			0.	290	
		Urba	<i>'</i> -		1									
Component	Classi	fication	Assigned R		Weighte	d C	C ₂							
Composition			Coefficie	<u>ent</u>	cigi itt		-2							
	Sandy, flat (0.00		_									_
Lawns	Sandy, steep		0.00		0.00)								
-	Heavy soil, f		0.00		_									-
	heavy soil, s		0.00											
	Light industry		0.00		0.00)				-				
Industrial areas	bearing to a con-	ıy	0.00				0.000			-				
Industrial areas	heavy indust	1)	0.00		0.00)								
Industrial areas	Houses (Res				0.00					1				
	Houses (Res Flats (Res 2		0.00		0.00									-
	Houses (Res Flats (Res 2 City centre		0.00										-	-
	Houses (Res Flats (Res 2 City centre Suburban		0.00 0.00 0.00		0.00									
Residential	Houses (Res Flats (Res 2 City centre Suburban Streets	+)	0.00 0.00 0.00 0.00		-)								
Residential	Houses (Res Flats (Res 2 City centre Suburban	+)	0.00 0.00 0.00		-)								
Residential	Houses (Res Flats (Res 2 City centre Suburban Streets	+)	0.00 0.00 0.00 0.00		-)								
Residential Business	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	+) od	0.00 0.00 0.00 0.00 0.00		-)								
Residential Business Petura Period Adjust	Houses (Res Flats (Res 2 City centre Suburban Streets	od Coefficient	0.00 0.00 0.00 0.00		-		cient		Ret	urn P	eriod	Q	_Τ [m³/s	s]
Residential Business Petura Period Adjust	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	od Coefficient	0.00 0.00 0.00 0.00 0.00		0.000		icient		Ret	urn P	eriod	Q	τ [m³/s	s]
Residential Business Return Period Adjust in	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo and Rural Runoff cl Dolomitic Infi	od Coefficient	0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient		0.000	noff coeffi	icient		Ret		eriod	Q		s]
Residential Business Return Period Adjust in	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Dolomitic Infil Co.218	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runol Coefficient		0.000	noff coeffi	icient		Ret	2	eriod	Q	0.06	s]
Residential Business Return Period Adjust in	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Dolomitic Infl 0.218 0.232	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient 0.000 0.000		0.000 ombined ru 0.000	noff coeffi	icient		Ret	2 5	eriod	Q	0.06 0.08	s]
Residential Business Return Period Adjust in	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Cit Dolomitic Infl 0.218 0.232 0.247	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient 0.000 0.000 0.000		0.000 ombined ru 0. 0.	218 232 247	icient		Ret	2 5 10	eriod	Q	0.06 0.08 0.11	s]
Residential Business Return Period Adjust in 2 5 10 20	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.218 0.232 0.247 0.261	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient 0.000 0.000 0.000 0.000		0.000 ombined ru 0. 0. 0.	218 232 247 261	icient		Ret	2 5 10 20	eriod	Q	0.06 0.08 0.11 0.15	s]
Residential Business Return Period Adjust in 2 5 10 20 25	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Ci Dolomitic Infl 0.218 0.232 0.247 0.261 0.264	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient 0.000 0.000 0.000 0.000 0.000		0.000 ombined ru 0. 0. 0. 0. 0. 0.	218 232 247 261 264	icient		Ret	2 5 10 20 25	eriod	Q	0.06 0.08 0.11 0.15 0.17	s]
Residential Business Return Period Adjust in 2 5 10 20 25 50	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.218 0.232 0.247 0.261 0.264 0.276	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 ombined ru 0. 0. 0. 0. 0. 0. 0.	218 232 247 261 264 276	icient		Ret	2 5 10 20 25 50	eriod	Q	0.06 0.08 0.11 0.15 0.17 0.21	s]
Residential Business Return Period Adjust in 2 5 10 20 25 25	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Ci Dolomitic Infl 0.218 0.232 0.247 0.261 0.264	od Coefficient	0.00 0.00 0.00 0.00 0.00 0.00 0.00 Urban Runof Coefficient 0.000 0.000 0.000 0.000 0.000		0.000 ombined ru 0. 0. 0. 0. 0. 0. 0.	218 232 247 261 264	icient		Ret	2 5 10 20 25	eriod	Q	0.06 0.08 0.11 0.15 0.17	s]
Residential Business Return Period Adjust in 2 5 10 20 25 50 100	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.218 0.232 0.247 0.261 0.264 0.276	coefficient uence	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0.000 ombined ru 0. 0. 0. 0. 0. 0. 0.	218 232 247 261 264 276 290				2 5 10 20 25 50	eriod	Q	0.06 0.08 0.11 0.15 0.17 0.21	s]
Return Period Adjust in 2 5 10 20 25 50 100 Return Period [yrs]	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Dolomitic Infl 0.218 0.232 0.247 0.261 0.264 0.276 0.290	Coefficient uence	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	10	0.000 0.000 0.00 0.00 0.00 0.00 0.00 0.00	218 232 247 261 264 276 290		550	100	2 5 10 20 25 50	eriod	Q	0.06 0.08 0.11 0.15 0.17 0.21	s]
Return Period Adjust in 2 5 10 20 25 50 100 Peturn Period [yrs] Point precipitation, Pt (*	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Cit Dolomitic Infl 0.218 0.232 0.247 0.261 0.264 0.276 0.290 dwg) [mm]	Coefficient uence	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	10 31.1	0.000 0.000 0.00	218 232 247 261 264 276 290	55	3.0	100	2 5 10 20 25 50	eriod	Q	0.06 0.08 0.11 0.15 0.17 0.21	s]
Residential Business Return Period Adjust in 2 5 10 20 25 50 100 leturn Period [yrs]	Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Cit Dolomitic Infl 0.218 0.232 0.247 0.261 0.264 0.276 0.290 dwg) [mm]	Coefficient uence	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	10	0.000 0.000 0.00 0.00 0.00 0.00 0.00 0.00	218 232 247 261 264 276 290	5.5 160	3.0	100	2 5 10 20 25 50	eriod	Q	0.06 0.08 0.11 0.15 0.17 0.21	s]



	b.		hment #4 -	Office are	a an	d Reside	ntial W	est		ulated b			ey De		hen		
Catchment Refe	erence	: Post	Developed	INP	LIT				Date	2	<u> </u>	11.08	3.2020)	-	-	H
				OUT											-		
Physical Charac	teristics:	(Inland ca	tchments)														
Size of catchment	7			0.01			[km ²]			e complet		if defin	ned w	aterc	ourse		L
ongest water co				0.1			[km]	-		ulation of		_			-		
Average slope, S		irse / overla	nd)	0.03			[m / ı	n]	H _{0.85}	_	403.7		[m]		-	-	-
Dolomitic percent Overland flow (0)		ource (1)		0			[%]		H _{0.10} ΔH	L	1400 3.7		[m]		+	-	-
Roughness coeffic				0.0			[.]		0.75		112.5		[m]		+		
lainfall region (w				sumi			[.]		Sav		.03289		[m /	m]			
Mean annual precipitation, MAP		750			[mm]		-										
Steep & imperme	able (0), f	lat & perme	able (1)	0	<u> </u>												
ime of Concentra	ation T [arel		Aros	J Diet	ribution Fa	octors		1						_	-	H
Overland Flow	auon, re Li	0.000		Rural		Urban	_	Lakes	+						+		
Vatercourse		0.057	α	0.0000	β	1.0000	φ	0.0000	Σ=	1							
		Tc taken as	s 0.25 (recor		inimu	ım)											
			Rui									Urbar					
Surface Slope			neability	0.		Vegetati			% 0.0		0 D		_	split	_	-	\vdash
leis & pans(<3%) lat areas (3-10%)		0.0 very p	ermeable	0.	_	Thick bush & Light bush &			0.0	-	ns & Par ustrial Ar		_	0.0	_	-	
filly (10-30%)			ermeable	0.		Grass lands			0.0		idential A			.0	1		
teep areas(>30%)			meable	0.	_	No vegetati			0.0	-	iness			0.0			
= 100		0 ∑ = 1	100	0	1	∑ = 100			0	Σ:	100		10	00			
															-	-	\vdash
awns & Parks		% Indu	strial Area	s %	Urb	an Resident	ial Ara	36	%	Busines	<u>.</u>		ſ	%	+	-	\vdash
awns & Parks andy, flat (<2%)			ndustry	s %		Houses (Re			0.0	City centr	-			% .0	1	-	\vdash
andy, steep (>7%)			industry	0.	_	Flats (Res 2			0.0	Suburban				0.0	1		
leavy soil, flat (<2%	6) (0.0								Streets				0.0			
neavy soil, steep (>7		0.0								Maximum	lood		_	.0			L
= 100	1	00 Σ = 1	100	0)	∑ = 100	-		0	Σ = 100		-	10	00	+	-	-
			Rura	l C.											+	-	\vdash
		1		Assigned	Runc	off									+	-	Н
Compone	ent	Classi	fication	Coeffi		,, M	Veighted	I C	C ₁						1		
		Vleis & pans(<3%)	0.0					Do	lomitic	effect	on Ru	ral su	ırface	slope		
Surface Slo	ne. C.	Flat areas (3-10%) Hilly (10-30%)		0.00			0.000					(facto				
Juliace 310	P⊂/ ∽ h						0.000				C _{1D}	,		0.	.000		_
		Steep areas(0.0										<u> </u>	<u></u>		
		Very permea	ble	0.0						R	eturn Po	eriod	Adju		rural r	unoff	
Permeabilit	y, C _d	Permeable Semi permea	blo	0.0		0.000		.000	<u> </u>	2			factor 0.000				
		Impermeable		0.0							5		-		.000		
		Thick bush &		0.0	00						10		-	0.	.000		
Vegetation	n C.	Light bush & farm lands		0.00			0.000				20				0.000		
regetatio.	., Ср	Grass lands			0.00						25			0.000			
1 1 1		No vegetatio	n	0.00					1		50 100				.000		
			Urbai	n. C2							100			0.	000	_	
6																_	\vdash
Compone	ent	CI:		Assigned	1 Runc	off ,	/ - ! - l- t		_								
		Classit	ilcauon	Assigned Coeffi		off V	Veighted	i C	C ₂								
		Sandy, flat (<2%)	Coeffi 0.0	icient 08	off W	Veighted	i C	C ₂								
Lawns	:	Sandy, flat (<2%) (>7%)	Coeffi 0.0 0.0	os 08 00	off W	Veighted	i C	C ₂								
Lawns	;	Sandy, flat (Sandy, steep Heavy soil, fl	<2%) 0 (>7%) at (<2%)	Coeffi 0.0 0.0 0.0	08 00 00	off W		I C	C ₂								
		Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, st	<2%) (>7%) at (<2%) teep (>7%)	Coeffi 0.0 0.0 0.0 0.0	08 00 00 00	off W	0.080	I C	C ₂								
Lawns Industrial a		Sandy, flat (Sandy, steep Heavy soil, fl	<2%) o (>7%) at (<2%) teep (>7%)	Coeffi 0.0 0.0 0.0	08 00 00 00 00	off W											
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, st Light industry	<2%) o (>7%) at (<2%) teep (>7%) ry	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	08 00 00 00 00 00 00	off W	0.080	0	.682								
	ireas	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, st Light industry heavy indust Houses (Res Flats (Res 2	<2%) o (>7%) at (<2%) teep (>7%) / rry 1)	Coeffi 0.C 0.C 0.C 0.C 0.C 0.C 0.C 0.C	08 00 00 00 00 00 00 00 00	off W	0.080	0									
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2	<2%) o (>7%) at (<2%) teep (>7%) / rry 1)	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	08 00 00 00 00 00 00 00 00 00	off W	0.080	0									
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, sl heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban	<2%) o (>7%) at (<2%) teep (>7%) / rry 1)	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	icient	off W	0.080	0.									
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, si heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2	<2%) b (>7%) at (<2%) teep (>7%) ry 1)	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	000 000 000 000 000 000 000 000 000 00	W.	0.080	0.									
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, sil heavy soil, sil Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets	<2%) b (>7%) at (<2%) teep (>7%) ry 1)	Coeffi 0.C 0.C 0.C 0.C 0.C 0.C 0.C 0.C	000 000 000 000 000 000 000 000 000 00	off w	0.080	0.									
Industrial a	ireas	Sandy, flat (Sandy, steep Heavy soil, sil heavy soil, sil Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets	<2%) b (>7%) at (<2%) teep (>7%) ry 1)	Coeffi 0.C 0.C 0.C 0.C 0.C 0.C 0.C 0.C	000 000 000 000 000 000 000 000 000 00	W W	0.080	0.									
Industrial a Resident Busines	areas cial	Sandy, flat (Sandy, steep Heavy soil, sil heavy soil, sil Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets	<2%) b (>7%) at (<2%) teep (>7%) ry 1) +)	Coeffi 0.C 0.C 0.C 0.C 0.C 0.C 0.C 0.C	icient 08 00 00 00 00 00 00 0	V	0.080 0.000 0.000 0.940	0.	.682								
Industrial a Resident Busines	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, sl heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	icient 08 00 00 00 00 00 00 0	V	0.080 0.000 0.000 0.940	0.	.682		Ret	urn Pe	eriod	Q	er [m³,	/s]	
Industrial a Resident Busines	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.0	icient 08 00 00 00 00 00 00 0	V	0.080 0.000 0.000 0.940	0.	.682		Ret	urn Pe	eriod	Q	_T [m ³ /	(s]	
Industrial a Resident Busines	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, fl heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.0	000 000 000 000 000 000 000 000 000 00	V	0.080 0.000 0.000 0.940	0.	.682		Ret	urn Pe	eriod	Q	h [m³/		
Industrial a Resident Busines Return Period	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	08 08 000 000 000 000 000 000 000 000 0	V	0.080 0.000 0.000 0.940 ned run	off coeffici	.682		Ret	2 5	eriod	Q	0.19 0.27		
Industrial a Resident Busines Return Period	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icicient	V	0.080 0.000 0.000 0.940 ned run 0.6 0.6 0.6	off coeffici	.682		Ret	2 5 10	eriod	Q	0.19 0.27 0.37		
Resident Busines Return Period	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icicient	V	0.080 0.000 0.940 ned run 0.6 0.6 0.6 0.6	0 off coeffici 82 82 82 82 82	.682		Ret	2 5 10 20	eriod	Q	0.19 0.27 0.37 0.44		
Resident Busines Return Period 2 5 10 20 25	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, fi heavy soil, fi heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icient	V	0.080 0.000 0.940 0.66 0.66 0.66 0.66	0.000	.682		Ret	2 5 10 20 25	eriod	Q	0.19 0.27 0.37 0.44 0.51		
Resident Busines Return Period	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, fi heavy soil, si Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo Rural Runoff olomitic Infl 0.000 0.000 0.000 0.000 0.000 0.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icient	V	0.080 0.000 0.940 ned run 0.6 0.6 0.6 0.6	0 off coeffici 82 82 82 82 82 82 82 82 82	.682		Ret	2 5 10 20	eriod	Q	0.19 0.27 0.37 0.44 0.51 0.60		
Resident Busines Return Period 2 5 10 20 25 50	areas ial s Adjusted	Sandy, flat (Sandy, steep Heavy soil, fi heavy soil, fi heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000	<2%) 0 (>7%) at (<2%) teep (>7%) / ry 1) +) cod	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icient	V	0.080 0.000 0.940 0.66 0.66 0.66 0.66 0.66	0 off coeffici 82 82 82 82 82 82 82 82 82	.682		Ret	2 5 10 20 25 50	eriod	Q	0.19 0.27 0.37 0.44 0.51		
Resident Busines Return Period 2 5 10 20 25 50 100 Leturn Period [yrs	areas ial Adjusted lincl D	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	<2%) b (>7%) at (<2%) teep (>7%) / / ry 1) ++) Coefficient uence	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	10 10 10 10 10 10 10 10	Combin	0.080 0.000 0.940 0.66 0.66 0.66 0.66 0.66	82 82 82 82 82 82 82 82 82 82 82 82	682	50	100	2 5 10 20 25 50	eriod	Q	0.19 0.27 0.37 0.44 0.51 0.60		
Resident Busines Return Period 2 5 10 20 25 50 100 Return Period [yrs	Adjusted incl D	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	<2%) b (>7%) at (<2%) teep (>7%) / / ry 1) +) Coefficient uence 2 15.8	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	icient (108	Combi	0.080 0.000 0.940 0.66 0.66 0.66 0.60 0.63 0.63	82 82 82 82 82 82 82 82 82 82 84 82 84 84 85 86 86 86 86 86 86 86 86 86 86 86 86 86	.682 ent	9.0	100	2 5 10 20 25 50	eriod	Q	0.19 0.27 0.37 0.44 0.51 0.60		
Resident Busines Return Period 2 5 10 20 25 50	Adjusted incl D	Sandy, flat (Sandy, steep Heavy soil, sl Light industry heavy indust Houses (Res Flats (Res 2 City centre Suburban Streets Maximum Flo O.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	<2%) b (>7%) at (<2%) teep (>7%) / / ry 1) ++) Coefficient uence	Coeffi 0.0 0.0 0.0 0.0 0.0 0.0 0.0	10 10 10 10 10 10 10 10	Combi	0.080 0.000 0.940 0.66 0.66 0.66 0.66 0.66	82 82 82 82 82 82 82 82 82 82 82 82	.682	9.0	100	2 5 10 20 25 50	eriod	Q	0.19 0.27 0.37 0.44 0.51 0.60		





roject & Job N			hment #5	- Office are	ea and	Reside	ntial Ea	st	Calc	ulated by	:		ey De		hen	
atchment Refe	erence	: Pre-D	eveloped	TAIC	N.CT				Date	е	:	11.08	3.2020)		
				INP OUT												-
hysical Charac	teristics:	(Inland ca	tchments)	001												
ize of catchment	t, A			0.0	216		[km ²]		To b	e complete	d only	if defi	ned w	aterc	ourse	
ongest water cou	urse, L			0.3	25		[km]		Calc	ulation of S	av					
verage slope, S		ırse / overla	nd)		² 680		[m / ı	n]	H _{0.85}		109.1		[m]			
olomitic percenta		(1))		[%]		H _{0.10}		394.7		[m]			
verland flow (0)					1		[.]		ΔH 0.75		14.4 87.5		[m]			
Roughness coefficient, r (overland flow) Rainfall region (winter / summer)		0.4 Summer			[.]		S _{av}		07680		[m /	ml		-		
Mean annual precipitation, MAP		75			[mm]		Jav	0.0	07000		LIII /	,		_		
teep & imperme			able (1))											
ime of Concentra	ation, T _c [l					ibution Fa										
Verland Flow Vatercourse		0.375 0.000	α	Rural 1.0000	β	0.0000		0.0000	Σ =	1						
ratercourse		0.000	u	1.0000	р	0.0000	φ	0.0000	<u> </u>	1						-
			Ru	ral								Urbai	1			_
urface Slope		% Perm	neability		6 ١	/egetati	ion		%			<u> </u>		split		
leis & pans(<3%)	3	0.0 Very p	ermeable	30	1.0	Thick bush 8	& plantat	ion 1	0.0	Lawr	ns & Parl	ks	0	.0		
lat areas (3-10%)		0.0 Perme		20		ight bush 8			0.0		strial Ar			.0		
illy (10-30%)			ermeable	50	_	Grass lands	_		80.0		dential A	reas		.0		
teep areas(>30%)		_	meable		_	No vegetati	ion		0.0	Busir		-	_	.0		
= 100	1	.00 ∑ = 1	UU	10	00 2	Σ = 100			100	Σ=	100			0		_
		o, I= -			Urba				0/	In. ·	. 1					
awns & Parks			strial Area		_	Resident			% 0.0	Business City centre				% .0		
andy, flat (<2%) andy, steep (>7%)		3 -	industry		_	Houses (Re Flats (Res 2			0.0	Suburban	+	-		.0		-
eavy soil, flat (<2%).0 neavy	rausti y		<u> </u>	JU (INCO Z	,		J.J	Streets				.0		
eavy soil, steep (>7	.,	0.0			1					Maximum Fl	lood		_	.0		
= 100		0 ∑ = 1	00	()]	<u>></u> = 100			0	∑ = 100				0		
		1	Rura													
Compone	ent	Classif	ication	Assigned	d Runoi icient	'' N	/eighted	1 C	C ₁							-+
		Vleis & pans(<3%)	0.0						Dol	omitic	effect	on Ru	ral su	rface s	lope
	_		Flat areas (3-10%)		0.08								C facto		3	7,5
Surface Slop	pe, C _h	Hilly (10-30%)		0.16			0.065				C _{1D}				290	
		Steep areas(0.0							I					
		Very permeal	-	0.0						Do	eturn Pe	eriod	Αdjι		rural ru	noff
Permeabilit	tv, Ca	Permeable		0.08 0.16			0.096	0.	.290	I Re		10u			ctor	
	-,, -u	Semi permeal	ole				0.050					2			218	
		Impermeable		0.0							5				232	
			Thick bush & plantation Light bush & farm lands Grass lands No vegetation		00	_	-				10 20		-		247 261	
Vegetation	n, C _p				0.11 0.21 0.00		0.129				25				264	
											50		-		276	
											100			0.	290	
			Urba	n, C ₂												
Compone	ent	Classif	ication	Assigned Coeff	d Runot icient	ff v	/eighted	i C	C ₂							
		Sandy, flat (<2%)		00											
Lawns			Sandy, steep (>7%) Heavy soil, flat (<2%)		0.00 0.00		0.000									
Lawiis	•						0.000									
		heavy soil, st		0.00												
Industrial a	areas	Light industry		0.00			0.000					-				
		heavy indust		0.00					.000		-	-				
Resident	tial	Houses (Res Flats (Res 2 -		0.00 0.00			0.000				+					-
		City centre	,		00											
D !		Suburban		0.0			0.000									
Busines	5	Streets		0.0	00		0.000									
		Maximum Floo	od	0.	00											
Return Period		Rural Runoff Polomitic Infl		Urban Rui Coefficie	-	Combi	ned run	off coeffici	ent		Ret	urn Po	eriod	Q	_r [m³/	s]
2		0.218		0.000			0.2	18				2			0.07	
5		0.232		0.000		0.218 0.232					5			0.10		
10		0.247		0.000			0.2				10				0.13	
20		0.261		0.000			0.2					20			0.17	
		0.264		0.000			0.2					25			0.21	
25		0.276 0.290		0.000 0.000			0.2 0.2					50 100			0.26 0.33	
50		11.7711		0.000			0.2	.50		-		100			0.33	
		0.250														
50	s]	0.250	2	5	10		20	25		50	100					
50 100			2 20.2	5 27.2	10 33.		20	25 50.7	_		100 71.9					
eturn Period [yrsoint precipitation oint intensity Pi [n, P _t (*.dw [mm/hr]		20.2 53.83	27.2 72.49	33. 88.4	2 48 11	11.9 11.66	50.7 135.11	6 15	0.0 7 9.90 19	71.9 91.61					
50 100 eturn Period [yrsoint precipitation	n, P _t (*.dw [mm/hr]	g) [mm]	20.2	27.2	33.	2 48 11 0	1.9	50.7	6 15	0.0 7 9.90 19 00	71.9					



Catchment Referenc	:			- Office are	a and	d Residen	tial Ea	st		ulated by				enyssc	:hen	
	e :	Post Dev	eloped	73.1	1.17				Date		- :	11.0	8.202	0	-	
	_	+	+	INP OUT					-		-			+	-	
Physical Characterist	tics: (Inl	and catch	ments)		PUI									+	+	
Size of catchment, A	.ксэ. (ши	and cater	IIICIICS)	0.02	216		[km²]		To b	e complet	ed only	if defi	ned w	vatero	ourse	
ongest water course, I				0.02			[km]			lation of		ii ucii	licu vi	Vaccio	Durse	
Average slope, S (Wate		/ overland)		0.03			[m / ı	nl	H _{0.85}	_	1407		[m]	_		
Colomitic percentage [9		Overland)		0.00			[%]		H _{0.10}		1400		[m]	+	_	
Overland flow (0) or wa		e (1)	-	1			[.]		ΔΗ	-	7		[m]	+	+	
Roughness coefficient,				0.0			[.]		0.75		180		[m]	_		
Rainfall region (winter)	•			sum			[.]		Sav		03889		[m /	ml		
lean annual precipitati		'		75			[mm]		Jav		00005		L /	111		
Steep & impermeable (permeable	2 (1)	0			[j									
		<u> </u>	Ť													
Time of Concentration,	T _c [hrs]			Area	al Distr	ribution Fac	ctors	-								
Overland Flow	0.00	00		Rural	l	Jrban		Lakes								
Vatercourse	0.07	77	α	0.0000	β	1.0000	φ	0.0000	Σ = .	1						
	Tc t	aken as 0.	25 (reco	mmended m	ninimu	m)										
			Ru	ral								Urba				
Surface Slope	%	Permea	bility			Vegetatio	n		%				%	split		
leis & pans(<3%)	0.0	Very perm		0.		Thick bush &			0.0		ns & Par			0.0		
lat areas (3-10%)	0.0	Permeable		0.	_	Light bush &	farm lar		0.0		ustrial Ar			0.0		
filly (10-30%)	0.0	Semi perm		0.	_	Grass lands			0.0		idential A	Areas		0.0	4	
teep areas(>30%)	0.0	Impermea	ole	0.		No vegetation	n		0.0		iness		_	0.0		
= 100	0	∑ = 100	_	С)	Σ = 100			0	Σ:	100		1	100	-	
															+	
		Te		_ 1 -	Urb		-1.4		0/	ln. ·	_	1		0/	4	
awns & Parks	% 100.0		ial Area	-	-	Residenti			%	Busines	-		_	%	1	
andy, flat (<2%)	100.0	Light indus	-	0.	_	Houses (Res	-		0.0	City centre	2	-		0.0	4	
landy, steep (>7%) Heavy soil, flat (<2%)	0.0	heavy ind	JSUTY	0.	.0	Flats (Res 2	+)		0.0	Suburban Streets	-	-		0.0	4	
eavy soil, flat (<2%) eavy soil, steep (>7%)	0.0	+	_							Maximum I	lood			0.0	1	
= 100	100	Σ = 100	+	C)	Σ = 100			0	$\Sigma = 100$	Jour	+-	_	100	_	
_ 100	100					100			1	Z = 100			1	.50		
			Rura	l C										_		
				Assigned	l Runc	off								+	_	
Component		Classificat	tion	Coeffi		,,, M	eighted	IC	C ₁					_		
	Vleis	8 pans(<3%	6)	0.0						Do	lomitic	effect	on Ru	ural sı	urface s	lope
	Flat	areas (3-10%		0.0			0.5						C fact			
Surface Slope, C		(10-30%)		0.0	00		0.000				C_{1D}				.000	
		ep areas(>30	%)	0.0							15					
		permeable	\neg	0.0								aut - 1	Adi	usted	rural ru	ınoff
Downson b War C		neable		0.0			0.000		000		eturn Po	eriod	-5.		ctor	
Permeability, C _d		i permeable		0.0			0.000	0.	500		2				.000	
	Impe	ermeable		0.0							5			0.	.000	
-	Thick	k bush & plar	tation	0.0							10				.000	
Vegetation, C _p		t bush & farn	ı lands	0.0			0.000				20				.000	
- againston, up		ss lands		0.0			5.000				25				.000	
	No v	regetation		0.0	00						50				.000	
											100			0.	.000	
			Urba	<u>, - </u>												
<u> </u>		Classificat	tion	Assigned		off w	eighted	ıc	C₂							
(nmnonent				Coeffi		**	داجا الحال	. ~	-2							
Component		dy, flat (<2%	ه) (0.0												
Component					20								_			
Component	Sand	dy, steep (>		0.0			0.080							-	-	-
<u>·</u>	Sand Heav	dy, steep (>? vy soil, flat (·	<2%)	0.0	00		0.080									
<u> </u>	Sand Heav heav	dy, steep (>: vy soil, flat (· vy soil, steep	<2%)	0.0	00 00		0.080									
<u> </u>	Sand Heav heav Light	dy, steep (>? vy soil, flat (· vy soil, steep t industry	<2%)	0.0 0.0 0.0	00 00 00		0.080									
Lawns	Sand Heav heav Light heav	dy, steep (> vy soil, flat (· vy soil, steep t industry vy industry	<2%)	0.0 0.0 0.0	00 00 00 00				424							
Lawns	Sand Heav heav Light heav Hous	dy, steep (>) vy soil, flat (· vy soil, steep t industry vy industry ses (Res 1)	<2%)	0.0 0.0 0.0 0.0	00 00 00 00 00			o.	424							
Lawns Industrial areas	Sanc Heav heav Light heav Hous	dy, steep (>) vy soil, flat (-) vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +)	<2%)	0.0 0.0 0.0 0.0 0.0	00 00 00 00 00 00		0.000	0.	424							
Lawns Industrial areas	Sanc Heav heav Light heav Hous Flats	dy, steep (>) vy soil, flat (vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre	<2%)	0.0 0.0 0.0 0.0 0.0 0.0	00 00 00 00 00 00 00		0.000	0.	424							
Lawns Industrial areas	Sand Heav Light heav Hous Flats City Subu	dy, steep (>: vy soil, flat (- vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban	<2%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0	00 00 00 00 00 00 00 00		0.000	0.	424							
Lawns Industrial areas Residential	Sanc Heav Light heav Hous Flats City Subu Stree	dy, steep (>: vy soil, flat (- vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban ets	<2%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0	00 00 00 00 00 00 00 00 00 90		0.000	o.	424							
Lawns Industrial areas Residential	Sanc Heav Light heav Hous Flats City Subu Stree	dy, steep (>: vy soil, flat (- vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban	<2%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0	00 00 00 00 00 00 00 00 00 90		0.000	O.	424							
Lawns Industrial areas Residential	Sanc Heav Light heav Hous Flats City Subu Stree	dy, steep (>: vy soil, flat (- vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban ets	<2%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0	00 00 00 00 00 00 00 00 00 90		0.000	0.	424							
Industrial areas Residential Business	Sanc Heav heav Light heav Hous Flats City Sub. Stree Maxi	dy, steep (>) vy soil, flat (-) vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban ets imum Flood	<2%) (>7%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0	00 00 00 00 00 00 00 00 90 00		0.000	0.	424							
Industrial areas Residential Business Return Period Adjus	Sance Heave Heave Light heave House Flats City Subb. Stree Maxie	dy, steep (>: vy soil, flat (: vy soil, steep ti industry vy industry vy industry sess (Res 1) s (Res 2 +) centre urban ets imum Flood	<2%) (>7%) (>7%)	0.0 0.0 0.0 0.0 0.0 0.0 1.0 Urban Rui	00 00 00 00 00 00 00 00 00 00 00	Combin	0.000	O.			Ret	urn P	eriod	•	}, [m³/	[s]
Industrial areas Residential Business Return Period Adjus	Sance Heave Heave Light heave House Flats City Subb. Stree Maxie	dy, steep (>) vy soil, flat (-) vy soil, steep t industry vy industry ses (Res 1) s (Res 2 +) centre urban ets imum Flood	<2%) (>7%) (>7%)	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0	00 00 00 00 00 00 00 00 00 00 00	Combin	0.000				Ret	urn P	eriod	Q	_T [m³/	's]
Lawns Industrial areas Residential Business Return Period Adjus	Sanc Heav heav Light heav Hous Fiats City Subu Stree Maxi	dy, steep (>: vy soil, flat (: vy soil, steep t industry vy industry vy industry ses (Res 1) s (Res 2+) centre urban ets imum Flood	<2%) (>7%) (>7%)	0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 Urban Rur Coefficie	00 00 00 00 00 00 00 00 00 00 00 00	Combin	0.000 0.000 0.940	off coeffici			Ret		eriod	Q		's]
Lawns Industrial areas Residential Business Return Period Adjus	Sance Heave heave Light heave House Flats City Subb Stree Maxi ted Rural ncl Dolom	dy, steep (>: vy soil, flat (: vy soil, steep t industry vy soil, steep t industry vy industry vy industry vy ses (Res 1) s (Res 2 +) centre urban ets imum Flood	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 0.7 0.7 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	00 00 00 00 00 00 00 00 90 00 00	Combin	0.000 0.000 0.940 ed run	off coeffici			Ret	2	eriod	Q	0.16	's]
Lawns Industrial areas Residential Business Return Period 2 5	Sance Heave heave Light heave House Flats City Subb. Stree Maxie ted Rural ncl Dolom 0	dy, steep (>: vy soil, flat (: vy soil, steep t i industry vy industry vy industry vy industry vy ses (Res 1) s (Res 2 +) centre urban ets imum Flood I Runoff Coo itic Influen 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 1.6 Urban Rui Coefficie	000 000 000 000 000 000 000 000 000	Combin	0.000 0.000 0.940 ed run	off coeffici			Ret	2 5	eriod	l Q	0.16 0.22	's]
Lawns Industrial areas Residential Business Return Period 2 5 10	Sancheave Heave y, steep (>: vy soil, flat (: vy soil, steep t industry vy soil, steep t industry vy soil, steep t industry ses (Res 1) s (Res 2 +) centre urban ets imum Flood I Runoff Coe iitic Influen 0.000 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 1.6 Urban Rui Coefficie	000 000 000 000 000 000 000 000 000 00	Combin	0.000 0.000 0.940 ed run 0.4 0.4 0.4	off coeffici 24 24 24 24			Ret	2 5 10	eriod	Q	0.16 0.22 0.31	's]	
Lawns Industrial areas Residential Business Return Period 2 5 10 20	Sancheav Heav Lightheav House Flats City Subc Stree Maxi ted Rural ncl Dolom 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, flat (: vy soil, steep t industry vy industry ses (Res 1) S (Res 2 +) centre urban ets imum Flood B Runoff Coo ditic Influen 0.000 0.000 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.7 1.6 1.6 Urban Rui Coefficie	000 000 000 000 000 000 000 000 000 00	Combin	0.000 0.000 0.940 ed run 0.4 0.4 0.4	24 24 24 24 24			Ret	2 5 10 20	eriod	Q	0.16 0.22 0.31 0.37	's]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25	Sancheav heav heav Lightheav House Flats City Subu Stree Maxi ted Rural ncl Dolom 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, flat (: vy soil, steep t industry vy industry vy industry ses (Res 1) 5 (Res 2 +) centre urban ets imum Flood 1 Runoff Coo nitic Influen 0.000 0.000 0.000 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.7 1.6 1.7 Urban Rui Coefficie 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00	Combin	0.000 0.940 0.940 0.44 0.4 0.4 0.4 0.4	24 24 24 24 24 24			Ret	2 5 10 20 25	eriod	Q	0.16 0.22 0.31 0.37 0.42	[s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50	Sance Heave heave Light heave House Flats City Subb. Stree Maxi tted Rural ncl Dolom 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, steep t industry vy soil, steep t industry vy industry vy industry vy industry vy ses (Res 1) s (Res 2 +) centre urban ets imum Flood 1 Runoff Coo ditic Influen 0.000 0.000 0.000 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 1.6 Urban Rur Coefficie 0.424 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00	Combin	0.000 0.940 0.940 0.4 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24			Ret	2 5 10 20 25 50		Q	0.16 0.22 0.31 0.37 0.42 0.50	[s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25	Sance Heave heave Light heave House Flats City Subb. Stree Maxi tted Rural ncl Dolom 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, flat (: vy soil, steep t industry vy industry vy industry ses (Res 1) 5 (Res 2 +) centre urban ets imum Flood 1 Runoff Coo nitic Influen 0.000 0.000 0.000 0.000 0.000	<2%) (>7%) (>7%)	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.7 1.6 1.7 Urban Rui Coefficie 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00	Combin	0.000 0.940 0.940 0.44 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24			Ret	2 5 10 20 25		Q	0.16 0.22 0.31 0.37 0.42	[s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100	Sance Heave heave Light heave House Flats City Subb. Stree Maxi tted Rural ncl Dolom 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, steep t industry vy soil, steep t industry vy industry vy industry vy industry vy ses (Res 1) s (Res 2 +) centre urban ets imum Flood 1 Runoff Coo ditic Influen 0.000 0.000 0.000 0.000 0.000	<2%) p(>7%) efficient	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.7 1.6 1.6 Urban Rur Coefficie 0.424 0.424 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00		0.000 0.000 0.940 0.44 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24	ent			2 5 10 20 25 50		Q	0.16 0.22 0.31 0.37 0.42 0.50	[s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 leturn Period [yrs]	Sance Heave heave Light heave House Flats City Subb. Stree Maxie ted Rural ncl Dolom 0 0 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, steep t industry vy soil, steep t industry vy soil, steep t industry vy industry vy industry vy industry vy industry vy industry vi industry vi industry ses (Res 1) s (Res 2 +) centre urban ets imum Flood I Runoff Coo intic Influen 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	<2%) p(>7%) p(>7%) perfficient ince	0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 1.6 Urban Rui Coefficie 0.424 0.424 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00	0 2	0.000 0.000 0.940 0.940 0.4 0.4 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24 24	ent	50	100	2 5 10 20 25 50		Q	0.16 0.22 0.31 0.37 0.42 0.50	[s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 Return Period [yrs] Foint precipitation, Pt (3)	Sancheav Heav heav Light heav Hous Flats City Subb Stree Maxi ted Rural ncl Dolom 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, steep tiny soil,	22 15.8	0.6 0.6 0.6 0.6 0.6 0.6 0.7 0.6 0.7 1.6 0.7 0.8 0.8 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9	000 000 000 000 000 000 000 000 000 00	0 2	0.000 0.000 0.940 0.940 0.4 0.4 0.4 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24 24 24 24	ent	9.0	100	2 5 10 20 25 50		Q	0.16 0.22 0.31 0.37 0.42 0.50	·s]
Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 leturn Period [yrs]	Sancheav Heav heav Light heav Hous Flats City Subb Stree Maxi ted Rural ncl Dolom 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	dy, steep (>: vy soil, flat (: vy soil, steep tiny soil,	<2%) p(>7%) p(>7%) perfficient ince	0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.6 1.6 Urban Rui Coefficie 0.424 0.424 0.424 0.424 0.424 0.424 0.424	000 000 000 000 000 000 000 000 000 00	0 2 .1 3 .40 14	0.000 0.000 0.940 0.940 0.4 0.4 0.4 0.4 0.4 0.4	24 24 24 24 24 24 24 24 24	49 190	9.0	100	2 5 10 20 25 50		Q	0.16 0.22 0.31 0.37 0.42 0.50	·'s]



Annexure F-6

Storm Water Run-off Calculations Catchment #6



Project & Job No.	- 1:			Sports Fi	eld an	d Paved	Area			ulated b	-			enyssc	hen	
Catchment Reference	e :	Pre-Deve	loped						Date		:	11.0	8.202	0		
				INF							_	-				
hydiaal Characterisi	ica: (Tak	and catch	monto)	001	PUT											
Physical Characteris	ics: (IIII	anu Catch	ments)	0.01	EAE		[km²]		To b	e comple	tod only	if dofi	nod u	otoro	OURCO	
Size of catchment, A ongest water course,					1545 14		[km]			lation of		ii deii	nea v	vaterc	ourse	
-		(overland)			7048			m1			1412.7		[m]			
Average slope, S (Wate		overland)	-			_	[m / ı	nj	H _{0.851}			-	[m]	-		
Dolomitic percentage [^c Overland flow (0) or wa		. (1)			0 0		[%]		H _{0.101}	-	1405.3		[m]	-	-	
Roughness coefficient,			-		.4		[.]		0.75l		7.4 105		[m]	-		
Rainfall region (winter ,	•	-		Sum			[.]		Sav		0.07048		[m /	ml		
Mean annual precipitati		,	-		50		[mm]		Jav	_	7.07040		Liii /	1111		
Steep & impermeable (permeable	(1)		0		Limin									
Time of Concentration,	T _c [hrs]			Area	al Distr	ibution Fa	ctors									
Overland Flow	0.29	12		Rural	l	Jrban		Lakes								
Vatercourse	0.00	0	α	1.0000	β	0.0000	φ	0.0000	Σ = .	ı						
			Ru									Urba	n			
Surface Slope	%	Permea	bility			Vegetati	on		%				_	split		
/leis & pans(<3%)	40.0	Very perm			_	Thick bush 8			0.0		wns & Pa			0.0		
lat areas (3-10%)	60.0	Permeable				ight bush 8			0.0		dustrial A			0.0		
Hilly (10-30%)	0.0	Semi perm			_	Grass lands	_		0.0		sidential	Areas		0.0		
Steep areas(>30%)	100	Impermeat	эе		_	No vegetati	υn	_	0.0		siness	+		0.0	-	-
= 100	100	∑ = 100	-	10	00	Σ = 100			100	Σ	= 100	+	-	0	-	
					Urba	an .							1			-
awns & Parks	%	Industri	al Arac	e n		an Resident	ial A	36	%	Busines				%		-
andy, flat (<2%)	0.0	Light indus		-	_	K esiaent Houses (Re			0.0	City cent	-	+	_	%).0		-
andy, flat (<270) andy, steep (>7%)	0.0	heavy indu	-			Flats (Res 2			0.0	Suburban		+		0.0		
leavy soil, flat (<2%)	0.0	cuvy mac	.50. /		<u> </u>	(1103 2	· ,			Streets				0.0		
neavy soil, steep (>7%)	0.0				- 1					Maximum	Flood			0.0		
<u> </u>	0	Σ = 100		(0]	Σ = 100			0	<u>Σ</u> = 100	_			0		
			Rura	I, C ₁												
Component		Classificat	ion	Assigne	d Runo	ff v	eighted	10	C ₁							
Component		Classificat	.1011		icient	•	eignie		C1							
		& pans(<3%			03					D	olomitic				ırface s	lope
Surface Slope, C	Flat	areas (3-10%	6)		08		0.060						C fact			
Surface Slope, o	Hilly	(10-30%)			16		0.000				C _{1D}			0.	285	
	Stee	p areas(>30	%)	0.	00											
		permeable			00					L .	Return P	eriod	Adjı	usted	rural ru	noff
Permeability, C _d		neable			08		0.096	0.	.285			Cilou			ctor	
, , , ,		permeable			16						2	-			214	
		ermeable			00						5				228	
		bush & plan bush & farm		0.	00						10 20				242 257	-
Vegetation, C _p		s lands	i iai ius	0.			0.129				25				259	
		egetation			00						50				271	
	140 V	egetation		0.							100)			285	
			Urba	n Co						i	100	+			203	
				Assigne	d Duno	ff										
Component		Classificat	ion	-	icient	'' W	eighted	I C	C ₂							
	Sand	ly, flat (<2%)		00											
_		ly, nat (<2 /0 ly, steep (>7			00		0.000									
Lawns		/y soil, flat (<			00		0.000									
		y soil, steep			00											
Industrial and -		industry			00		0.000									
Industrial areas	heav	y industry		0.	00		0.000		000							
Residential	Hous	ses (Res 1)			00		0.000	0	.000							
residential	Flats	(Res 2 +)			00		0.000									
		centre			00											
Business		ırban			00		0.000									
	Stree				00							-				
	Maxi	mum Flood		0.	00							-				
					\vdash											
		Runoff Coe itic Influen		Urban Ru Coefficie		Combi	ned run	off coeffici	ent		Ret	urn P	eriod	Q	r [m³/	s]
2	0	.214		0.000			0.2	14				2			0.05	
5		.228		0.000			0.2					5			0.08	
10		.242		0.000			0.2					10			0.11	
20	0	.257		0.000			0.2	57				20			0.14	
25	0	.259		0.000			0.2	59				25			0.16	
50		.271		0.000			0.2					50			0.20	
100	0	.285		0.000			0.2	85				100			0.26	
Return Period [yrs]			2	5	10		20	25	_	0	100					
	.dwa) [m		16.1	22.8	30.		8.1	42.6		l.1	62.4					
Point precipitation, Pt (12	78.08	104.	44 13	0.47	145.88	174	1.98	213.68					
oint intensity Pi [mm/l			55.13						_				_	_	-	
	ır]		100 55.1	100 78.1	100 104	0	100 30.5	100 145.9	1	00	100 213.7			<u> </u>		



Project & Job No.	:	Catchment		rts Field	and Pa	ved A	rea			ulate	l by	:			enyssc	hen		Ι
Catchment Reference	e :	Post Develop	ped						Date	•		:	11.08	3.202	٥	\perp		Ĺ
				INPUT											1	_	_	Ļ
				OUTPU	T				-						-	-	-	+
Physical Characterist	ics: (Inla	na catchme	nts)		_	<u> </u>	. 2-								<u> </u>		+	+
Size of catchment, A				0.0154	5		km ²]						ır defii	ned w	atero	course	+	+
Longest water course, l				0.14			km]	. 1		ulation				F., 3	+	+	+	+
Average slope, S (Wate		overland)		0.0333			m / r	nj	H _{0.85}		-	08.5	_	[m]	+	-	+	+
Dolomitic percentage [9		(1)		0			%]		H _{0.10}	L		105		[m]	-		-	Ļ
Overland flow (0) or wa		• • • • • • • • • • • • • • • • • • • •		1			.]		ΔΗ			.5		[m]	+	+	+	+
Roughness coefficient, i	•			0.02			.]		0.75			05		[m]		+	-	+
Rainfall region (winter /				summe	r		.]		Sav		0.0.	3333		[m /	mj	-	-	+
Mean annual precipitation Steep & impermeable (permeable (1))	750 0			mm]											ļ
Time of Concentration,	T _c [hrs]			Areal D	Distributio	on Facto	ors											t
Overland Flow	0.000)	Rural		Urban	ı		akes										
Vatercourse	0.054		α 0.00			000	φ	0.0000	Σ =	1								L
	Tc ta	ken as 0.25 (ded mini	mum)													L
			Rural										Urbar					L
Surface Slope	%	Permeabilit	_	%		etation	_		%					_	split			L
/leis & pans(<3%)	0.0	Very permeabl	e	0.0		bush & pl			0.0			& Parl		_	0.0	4	-	H
Flat areas (3-10%)	0.0	Permeable		0.0		oush & fa	arm lar		0.0			trial Are			0.0	4	+	+
Hilly (10-30%)	0.0	Semi permeabl	e	0.0	Grass				0.0	-		ential A	reas	_	0.0	-	+	+
Steep areas(>30%)	0.0	Impermeable		0.0		getation			0.0		Busine		-	_	0.0	4	+	+
∑ = 100	0	∑ = 100		0	∑ = 1	100			0		Σ = .	100		1	100	+	+	+
					lrhar											+	+	+
Duma Q Daul	0/	Todayata'- '	A was =		Urban I Book	do+!!		20	0/-	D			1		0/:	4—	+	+
awns & Parks Sandy, flat (<2%)	% 100.0	Industrial A Light industry	areas	% 0.0		dential			% 0.0	Busin				_	% 0.0	1-	+	+
.,	0.0		,	0.0	_	s (Res 1) (Res 2 +)	-		0.0	City co					0.0	1	+	+
Sandy, steep (>7%) Heavy soil, flat (<2%)	0.0	heavy industry	′	0.0	riats (res 2 +)	,		0.0	Subur					0.0	1	+	+
neavy soil, flat (<2%)	0.0										s um Flo	od		_	0.00	1	+	+
$\overline{\Sigma} = 100$	100	Σ = 100		0	Σ = 1	100		_	0	Σ = 1		Ju		_	100.0 100	4	+	+
_ 100	100	2 100			Z = 1				Ť					1	1	+	+	+
			Rural, C ₁							t					+	+	+	+
	1		Λc	signed R	unoff			_		1					+	+	+	+
Component		Classification		Coefficie		Wei	ghted	C	C ₁							_	+	†
	Vleis 8	& pans(<3%)		0.00	-					1	Dolo	mitic e	effect	on Rı	ural sı	urface	slope	1
	Flat a	reas (3-10%)		0.00										C fact				
Surface Slope, C		10-30%)		0.00		0	0.000					C _{1D}				.000		Г
		areas(>30%)		0.00								-10						۲
		permeable		0.00							_			Adi	usted	rural r	runoff	1
_	Perm			0.00							Ret	urn Pe	eriod	Auji		actor	J. 1011	\vdash
Permeability, C _d		permeable		0.00		0	0.000	0	.000			2				.000		۲
		meable		0.00								5				.000		Г
	<u>-</u> -	bush & plantation	on	0.00								10				.000		Г
V		bush & farm land		0.00								20				.000		Г
Vegetation, C _p		lands		0.00		0	0.000					25				.000		Г
regetation, op		getation		0.00								50				.000		Г
	No ve											100			0.	.000		
	No ve																	Т
	No ve		Urban, C₂														+	T
		•	Λc	signed R	unoff		ali e	6							+			+
Component			Ass	signed R		Wei	ghted	С	C ₂								-	
		•	Ass	-		Wei	ghted	С	C ₂									+
Component	Sandy	Classification	As	Coefficie			_	С	C ₂									F
	Sandy Sandy	Classification	Ass	Coefficie 0.08			ghted	С	C ₂									-
Component	Sandy Sandy Heavy	Classification /, flat (<2%) /, steep (>7%)	Ass	Coefficie 0.08 0.00			_	C	C ₂									
Component	Sandy Sandy Heavy heavy	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2%	Ass	0.08 0.00 0.00		0	0.080	С	C ₂									
Component	Sandy Sandy Heavy heavy Light	Classification y, flat (<2%) y, steep (>7%) y soil, flat (<2% y soil, steep (>7	Ass	0.08 0.00 0.00 0.00		0	_											
Component Lawns Industrial areas	Sandy Sandy Heavy heavy Light heavy	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2% / soil, steep (>7 industry	Ass	Coefficie		0	0.080		.356									
Component	Sandy Sandy Heavy heavy Light heavy	Classification (, flat (<2%) (, steep (>7%) (y soil, flat (<2% (y soil, steep (>7 industry () industry	Ass	Coefficie		0	0.080											
Component Lawns Industrial areas	Sandy Sandy Heavy Light heavy House Flats	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2%) y soil, steep (>7 industry industry es (Res 1) (Res 2 +) entre	Ass	Coefficie		0	0.080											
Component Lawns Industrial areas Residential	Sandy Sandy Heavy Light heavy House Flats City o	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2% / soil, steep (>7 industry r industry ses (Res 1) (Res 2 +) entre	Ass	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00		0 0	0.080											
Component Lawns Industrial areas	Sandy Sandy Heavy Light heavy House Flats City of Subur	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 7 soil, steep (>7 industry 9 industry 10	Ass	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0 0	0.080											
Component Lawns Industrial areas Residential	Sandy Sandy Heavy Light heavy House Flats City of Subur	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2% / soil, steep (>7 industry r industry ses (Res 1) (Res 2 +) entre	Ass	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00		0 0	0.080											
Component Lawns Industrial areas Residential	Sandy Sandy Heavy Light heavy House Flats City of Subur	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 7 soil, steep (>7 industry 9 industry 10	Ass	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0 0	0.080											
Component Lawns Industrial areas Residential	Sandy Sandy Heavy Light heavy House Flats City of Subur	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 7 soil, steep (>7 industry 9 industry 10	Ass	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0		0 0	0.080											
Component Lawns Industrial areas Residential Business Adjus	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 7 soil, steep (>7 industry 9 industry 10	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0	ent	0 0 0 1	0.080		.356			Retr	urn Pe	eriod	Q	Pr [m³	/s]	
Component Lawns Industrial areas Residential Business Return Period Adjus	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2% y soil, steep (>7 industry y industry es (Res 1) (Res 2 +) rentre ban ts numFlood Runoff Coeffic tic Influence	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	ent	0 0 0 1	0.080 0.000 0.000 0.000	O O	.356			Retu		eriod	Q			
Component Lawns Industrial areas Residential Business Return Period Adjus	Sandy Sandy Heavy Light heavy House Flats City o Subur Stree Maxin	Classification (, flat (<2%)	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0	ent	0 0 0 1	0.000 0.000 0.000 0.000	Off coeffici	.356			Retu	2	eriod	Q	0.10)	
Component Lawns Industrial areas Residential Business Return Period Adjus	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2%) y soil, steep (>7 industry y industry es (Res 1) (Res 2 +) entre ban ts numFlood Runoff Coeffic tic Influence 000 000	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0	ent	0 0 0 1	0.3 0.3	off coeffici	.356			Reti	2 5	eriod	Q	0.10 0.14) 1	
Component Lawns Industrial areas Residential Business Return Period Adjus	Sandy Sandy Heavy Light heavy House Flats City c Subur Stree Maxin 1.00 0.00	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2%) / soil, steep (>7 industry r industry r industry ses (Res 1) (Res 2 +) rentre renum Flood Runoff Coeffic tic Influence 000 000 000 000	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0	ent	0 0 0 1	0.3 0.3 0.3	off coeffici	.356			Retr	2 5 10	eriod	Q	0.10 0.14 0.18) 	
Component Lawns Industrial areas Residential Business Return Period Adjus is 2 5 10 20	Sandy Sandy Heavy Heavy House Flats City of Subur Stree Maxin 0.0 0.0	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 7 soil, steep (>7 industry 1 indus	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	ent	0 0 0 1	0.000 0.000 0.000 0.000 0.3 0.3 0.3 0.3	0 off coeffici	.356			Retu	2 5 10 20	eriod	Q	0.10 0.14 0.18 0.22) 	
Component Lawns Industrial areas Residential Business Return Period Adjus i 2 5 10 20 25	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin 0.0 0.0 0.0	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 9 soil, steep (>7 industry 10 industry 11 industry 12 industry 13 industry 15 industry 16 industry 17 industry 18 industry 18 industry 19 industry 10 industry 1	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	ent	0 0 0 1	0.000 0.000 0.000 0.000 0.300 0.3 0.3 0.	0,000	.356			Retr	2 5 10 20 25	eriod	Q	0.10 0.14 0.18 0.22 0.25) 1 3 2	
Component Lawns Industrial areas Residential Business Return Period Adjus 1 2 5 10 20 25 50	Sandy Sandy Heavy Light heavy House Flats City of Suburu Stree Maxin	Classification 7, flat (<2%) 7, steep (>7%) 8 y soil, flat (<2%) 9 y soil, flat (<2%) 10 y soil, flat (<2%) 11 y soil, steep (>7 industry 12 industry 13 industry 14 industry 15 industry 16 industry 17 industry 18 industry 18 industry 19 industry 10 industry	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	ent	0 0 0 1	0.000 0.000 0.000 0.3 0.3 0.3 0.3 0.3	0.000000000000000000000000000000000000	.356			Reti	2 5 10 20 25 50	eriod	Q	0.10 0.14 0.18 0.22 0.25 0.30) 1 3 2 5	
Component Lawns Industrial areas Residential Business Return Period Adjus i 2 5 10 20 25	Sandy Sandy Heavy Light heavy House Flats City of Suburu Stree Maxin	Classification 7, flat (<2%) 7, steep (>7%) 9 soil, flat (<2%) 9 soil, steep (>7 industry 10 industry 11 industry 12 industry 13 industry 15 industry 16 industry 17 industry 18 industry 18 industry 19 industry 10 industry 1	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	ent	0 0 0 1	0.000 0.000 0.000 0.000 0.300 0.3 0.3 0.	0.000000000000000000000000000000000000	.356			Retr	2 5 10 20 25	eriod	Q	0.10 0.14 0.18 0.22 0.25) 1 3 2 5	
Component Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100	Sandy Sandy Heavy Light heavy House Flats City of Suburu Stree Maxin	Classification /, flat (<2%) /, steep (>7%) y soil, flat (<2%) y soil, steep (>7 industry y industry es (Res 1) (Res 2 +) entre ban ts numFlood Runoff Coeffic tic Influence 000 000 000 000 000 000 000	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.0	f Co	0 0 0 1 1 mmbinee	0.3000 0.3000 0.3000 0.3000 0.3000 0.3000 0.3000 0.3000	00 00 00 00 00 00 00 00 00 00 00 00 00	.356	50	1		2 5 10 20 25 50	eriod	Q	0.10 0.14 0.18 0.22 0.25 0.30) 1 3 2 5	
Component Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50 100 Return Period [yrs]	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin 0. 0. 0. 0. 0. 0. 0.	Classification 7, flat (<2%) 7, steep (>7%) 8 y soil, flat (<2% 7 soil, steep (>7 industry 8 industry 9 industry 10	As:	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	f Co	0 0 0 1 1 Dombined	0.000 0.000 0.000 0.300 0.300 0.300 0.300 0.300	00 off coefficients	.356 ent	50		00	2 5 10 20 25 50	eriod	Q	0.10 0.14 0.18 0.22 0.25 0.30) 1 3 2 5	
Component Lawns Industrial areas Residential Business Return Period Adjus is is is is is is is	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	Classification 7, flat (<2%) 7, steep (>7%) 8 y soil, flat (<2% 7 soil, steep (>7 7 industry 8 industry 9 industry 10 industry	As: As: Urb. Co.	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	f Co	0 0 0 1 1 1 Dombines	0.3000 0.3000 0.3000 0.3000 0.3003 0.3003 0.3003	00 566 566 566 566 566 566 566 566 564 41.6	.356 ent	9.0	6	000	2 5 10 20 25 50	eriod	Q	0.10 0.14 0.18 0.22 0.25 0.30) 1 3 2 5	
Component Lawns Industrial areas Residential Business Return Period 2 5 10 20 25 50	Sandy Sandy Heavy Light heavy House Flats City of Subur Stree Maxin 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	Classification 7, flat (<2%) 7, steep (>7%) 8 y soil, flat (<2% 7 soil, steep (>7 industry 8 industry 9 industry 10	As: As: Urbacco 5 5 8 22 20 88.	Coefficie 0.08 0.00 0.00 0.00 0.00 0.00 0.00 0.	f Co	0 0 0 1 1 Dombined	0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	00 off coefficients	.356		6: 24	00	2 5 10 20 25 50	eriod	Q	0.10 0.14 0.18 0.22 0.25 0.30) 1 3 2 5	



Annexure F-7

Storm Water Run-off Calculations 'Total Catchment'



Project & Job No.	:	Total Site					Calc	ulated b	y :	Brad	ley Der	nysscher	1
Catchment Reference	:	Pre-Developed					Date		:		8.2020		
			INPU	Т									
			OUTPL	UT									
Physical Characteristi	cs: (Inla	nd catchments	5)										
Size of catchment, A			0.199	86	[ki	m ²]	To b	e comple	ted only	y if defi	ined wa	atercour	se
ongest water course, L			0.6		[ki	m]	Calc	ulation of	S_{av}				
Average slope, S (Water	course /	overland)	0.069	11	[m	n / m]	H _{0.85}	L	1422		[m]		
Oolomitic percentage [%	1		0		[%	6]	H _{0.10}		1390.9		[m]		
Overland flow (0) or wat		(1)	0		[.]		ΔΗ	_	31.1		[m]		
Roughness coefficient, r		• • • • • • • • • • • • • • • • • • • •	0.4		[.]		0.75	L	450		[m]		
Rainfall region (winter /	•		Summ	er	[.]		Sav		.06911		[m / r	m1	
Mean annual precipitatio			750			nm]	Jav				[, .	,	
Steep & impermeable (0		nermeable (1)	0		L								
seep a impermediae (d), naca j	Jerniedbie (1)	Ĭ		_								
Time of Concentration, T	- [hre]		Δreal	Distribut	ion Factor	's							
Overland Flow	0.579	a	Rural	Urba		Lake	2						
Watercourse	0.000		1.0000				<u>0000</u> Σ =	1		_			
vatercourse	0.000	, u	1.0000	p 0.0	0000	γ 0.0	<u> </u>	<u> </u>					
		D	ural					1 -		Urba	n		
Suufa aa Clama	%		wrai %	lv		_	%	-		Urba	_	and the	
Surface Slope		Permeability		_	etation			<u> </u>			% s		
/leis & pans(<3%)	30.0	Very permeable	30.0	_	bush & plai		10.0		wns & Pa		0.		
Flat areas (3-10%)	70.0	Permeable	20.0		bush & farr	ıı ıanas	60.0		dustrial A		0.	_	
Hilly (10-30%)	0.0	Semi permeable	50.0		s lands	-	30.0		sidential	Areas	0.	_	-
Steep areas(>30%)	0.0	Impermeable	0.0	_	egetation	_	0.0		siness	_	0.	_	
= 100	100	<u>Σ</u> = 100	100	Σ =	100		100	Σ	= 100	-	0	J	
				15.2									
				Urban			1 -						
awns & Parks	%	Industrial Are			idential /	Areas	%	Busines	-		9/	_	
Sandy, flat (<2%)	0.0	Light industry	0.0		es (Res 1)		0.0	City centr			0.		
Sandy, steep (>7%)	0.0	heavy industry	0.0	Flats	(Res 2 +)		0.0	Suburban			0.	_	
leavy soil, flat (<2%)	0.0	4						Streets			0.	_	
neavy soil, steep (>7%)	0.0			ļ				Maximum	_		0.	_	
= 100	0	∑ = 100	0	Σ =	100		0	$\Sigma = 100$			C)	
		Rui	ral, C ₁										
Component		Classification	Assigned I	Runoff	Woigh	nted C	C ₁						
Component		Classification	Coeffici	ent	weigi	iteu C	G						
	Vleis 8	& pans(<3%)	0.03					D	olomitic	effect	on Rur	al surfa	ce slope
	Flat a	reas (3-10%)	0.08	3							C facto	r	
Surface Slope, C _h		(10-30%)	0.16	;	0.0	065			C ₁₀			0.290)
		areas(>30%)	0.00		_			<u> </u>	O.L.			0.20	
			0.00								Adiu	ctod rur	al runoff
	Perm	permeable	0.00		_			F	Return F	Period	Aujus	facto	
Permeability, C _d			0.06		0.0)96	0.290	\vdash	2			0.218	
		permeable	0.10		_			\vdash	5	-	-	0.210	
		rmeable									-		
		bush & plantation	0.00		_				10		_	0.247	
Vegetation, C _p	3 .	bush & farm lands	0.11		0.1	129			20		_	0.261	
		alands	0.21		_				25		-	0.264	
	No ve	egetation	0.00			_			50	_	_	0.276	
									100	0	Щ,	0.290)
		Urb	an, C ₂										
Component		Classification	Assigned I	Runoff	Woigh	nted C	٠.						
Component		Classification	Coeffici	ent	weigi	iteu C	C ₂						
	Sand	y, flat (<2%)	0.00										
Laure		y, steep (>7%)	0.00)	0.0	000							
Lawns		y soil, flat (<2%)	0.00		0.0	000							
		y soil, steep (>7%)	0.00										
		industry	0.00			200							
Industrial areas		y industry	0.00		0.0	000							
		es (Res 1)	0.00			200	0.000						
Residential		(Res 2 +)	0.00		0.0	000							
		centre	0.00										
	Subui		0.00										
Business	Stree		0.00		0.0	000				+			
		mum Flood	0.00							_			
	I IGAII		0.00						-	_			
		سلسلس											
		Runoff Coefficient			Combined	runoff ~	efficient		Ref	turn P	eriod	0- [n³/s]
in	ci Dolomi	itic Influence	Coefficient	• `								Æ1 [1	, 5]
2	0	218	0.000			0.218				2		0	46
5		232	0.000			0.216				5			40 71
10		247	0.000			0.232				10			71 97
20		261	0.000			0.247				20			28
25		264	0.000			0.264				25			53 96
50		276	0.000			0.276				50			86 42
100	0.	290	0.000			0.290		-		100		2.	43
			$+$ \downarrow $+$	12				-	100	_			
1-t D- : 15 3		2	5	10	20		25	50	100	_			
Return Period [yrs]													
oint precipitation, Pt (*.		m] 22.1	32.0	41.1	51.3	_		0.5	87.4				
oint precipitation, Pt (*. oint intensity Pi [mm/hr		m] 22.1 38.18	55.28	71.00	88.62	10	4.69 12	1.79	150.99				
		m] 22.1				10	4.69 12						



Project & Job N	No.	: Steyr	n City - River	view EXT 84				Calc	ulated	l by	:	Bradley	/ Der	nyssch	ien	
Catchment Ref	erence	: Post	Developed	TAIDLE				Date	3		:	11.08.2	2020			
				INPU OUTPI									-			
Physical Charac	cteristics:	(Inland ca	tchments)	0011	J.											
Size of catchmen	nt, A			0.199	86	[km	1 ²]					if define	d wa	aterco	urse	
Longest water co	•			0.62		[km	-		ulation				_			
Average slope, S		rse / overla	nd)	0.045	2		/ m]	H _{0.85}			16		m]			
Dolomitic percent Overland flow (0)		0.000 (1)		0		[%]]	H _{0.10} ΔH	L		95 !1		m]			
Roughness coeffi	•			0.02		[.]		0.75			55		m] m]			
Rainfall region (w				summ		[.]		Sav			1 516		m / ı	m]		
Mean annual pre		-		750		[mı	n]							_		
Steep & imperme	eable (0), fl	at & perme	able (1)	0												
Time of Concentr	ration, T _c [h					ion Factors										
Overland Flow		0.000		Rural	Urba		Lakes			-						
Watercourse		0.151	α 0.25 (reco	0.0000 mmended mir		0000 φ	0.0	<u>0000</u> Σ =								
		i c taken as	Ru		iiiiiuiii)				1 1			Urban				
Surface Slope	(% Pern	neability	%	Veg	etation		%					% s	plit		
Vleis & pans(<3%)			ermeable	0.0	Thick	bush & plant	ation	0.0			& Park		50	_		
Flat areas (3-10%)).0 Perme		0.0		bush & farm	lands	0.0	4		rial Are		0.			
Hilly (10-30%)			permeable	0.0	_	ands		0.0	1		ential A	reas	0. 50			
Steep areas(>30%) $\Sigma = 100$		$ \begin{array}{c c} \hline 0.0 & \text{Imperior} \\ \hline 0 & \hline \end{array} $	meable 100	0.0	Σ =	egetation 100	+	0.0		Busine $\Sigma = 1$		+	10			
<u> </u>		2-	. 50	J		100							10	,,,		
Lawns & Parks		% Indu	strial Area	s %	Urban Res	idential A	reas	%	Busir	ness			9	6		
Sandy, flat (<2%)			ndustry	0.0	_	es (Res 1)	. cas	0.0	City ce				0.			
Sandy, steep (>7%)		J .	industry	0.0		(Res 2 +)		0.0	Suburt				100	_		
Heavy soil, flat (<2%		0.0							Streets	S			0.			
heavy soil, steep (>		0.0			<u> </u>	100			_	um Floo	bd		0.		 	
∑ = 100	1	00 ∑ = 1	100	0	Σ =	100		0	∑ = 1	00			10)0		
			Rura	l C.					1							
		1		Assigned I	Runoff			T	1							
Compone	ent	Classif	fication	Coeffici		Weight	ted C	C ₁								
		Vleis & pans(<3%)	0.00						Dolor	mitic e	effect or	n Rur	ral sur	face s	lope
Surface Slo	ne C	Flat areas (3	-	0.00		0.00	10			<u> </u>			facto	r		
Suitace 510	νρ ε , c _h	Hilly (10-30%		0.00		0.00	JU			<u> </u>	C_{1D}			0.0	000	
		Steep areas(_	0.00												
		Very permeal	ble	0.00		-				Reti	urn Pe	eriod	Adju		ural ru	ınoff
Permeabilit	ty, C _d	Permeable Semi permeal	hle	0.00		0.00	00	0.000		 	2			fac	tor 000	
		Impermeable		0.00							5				000	
		Thick bush &		0.00							10				000	
Vegetatio	n. C-	Light bush &		0.00		0.00	00				20				000	
regetatio	, Ср	Grass lands		0.00		0.00					25			0.0		
		No vegetatio	n	0.00					4		100				000	
			Urba	n Ca					1		100	-		0.0	000	
Comme	ont	Class'		Assigned F	Runoff	\\\c:=!-	tod C									
Compone	eni		fication	Coeffici	ent	Weight	leu C	C ₂								
		Sandy, flat (0.08		_										
Lawns	s	Sandy, steep		0.00		0.08	30			<u> </u>			_			
		Heavy soil, fl heavy soil, st		0.00											\vdash	
		Light industry		0.00												
Industrial a	areas	heavy indust		0.00		0.00	JU	0.465								
Residen	tial	Houses (Res	1)	0.00		0.00	00	0.465								
		Flats (Res 2	+)	0.00		0.00										
		City centre		0.00		-										
Busines	ss	Suburban Streets		0.85 0.00		0.85	50		\vdash							
		Maximum Flo	od	1.00												
Return Period		Rural Runoff		Urban Runo		Combined r	unoff co	efficient			Reti	ırn Per	iod	O-	[m³/	s1
	incl D	olomitic Infl	uence	Coefficient	· `									Æ	/	
2		0.000		0.465			0.465					2			1.63	
5		0.000		0.465).465			—		5			2.28	
10		0.000 0.000		0.465 0.465).465).465					10 20			3.11 3.71	
10 20		0.000		0.465).465).465					25			4.30	
20		0.000		0.100).465					50			5.06	
		0.000 0.000		0.465												
20 25				0.465 0.465		(0.465					100			6.32	
20 25 50 100		0.000		0.465).465					100			6.32	
20 25 50 100 Return Period [yr		0.000	2	0.465 5	10	20).465 2		50	10		100			6.32	
20 25 50 100 Return Period [yr	n, P _t (*.dw	0.000	15.8	0.465 5 22.1	30.1	20 35.9	2 41	1.6 4	9.0	61	.2	100			6.32	
20 25 50 100 Return Period [yr Point precipitation Point intensity Pi	n, P _t (*.dw [mm/hr]	0.000	15.8 63.20	0.465 5 22.1 88.40	30.1 120.40	20 35.9 143.60	2 41 166	1.6 40 6.40 19	9.0 6.00	61 244	1.2 1.80	100			6.32	
20 25 50 100 Return Period [yr	n, P _t (*.dw [mm/hr]]	0.000 0.000 g) [mm]	15.8	0.465 5 22.1	30.1	20 35.9	2 41 166	1.6 49 6.40 19 00 1	9.0	61 244 10	1.2 1.80	100			6.32	



Annexure G1 Area #1 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 15.1 min 0.3 hr

RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.4 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 100.6 mm/h

Rational C 0.98 Peak Rainfall Intensity Triangular Hyetograph

201.3 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol $352 \text{ m}^3 = \text{C x P x A}$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.1 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 112.0 Invert LvI 1.30 Invert LvI 1.50 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	380	0
0.25	0.25	400	98
0.50	0.50	425	201
0.75	0.75	450	310
1.00	1.00	475	426
1.20	1.20	500	523
1.40	1.40	525	626
1.60	1.60	550	733

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

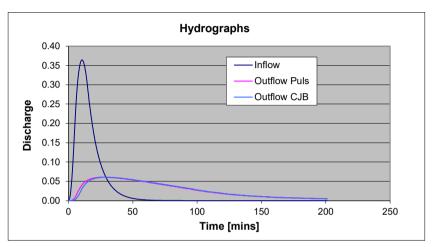
 Vol
 0 m³

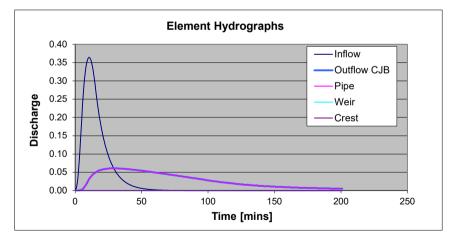
 Area
 380 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 15.1 min 0.3 hr
RI 25 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.4 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 163.1 mm/h

Rational C 0.98 Peak Rainfall Intensity Triangular Hyetograph

326.2 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 571 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.1 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 112.0 Invert LvI 1.30 Invert LvI 1.50 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	380	0
0.25	0.25	400	98
0.50	0.50	425	201
0.75	0.75	450	310
1.00	1.00	475	426
1.20	1.20	500	523
1.40	1.40	525	626
1.60	1.60	550	733

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

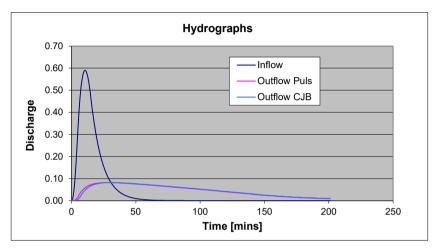
 Vol
 0 m³

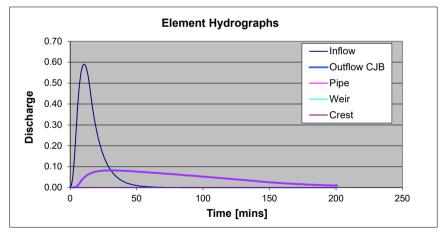
 Area
 380 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 15.1 min 0.3 hr
RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.4 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 200.8 mm/h

Rational C 0.98 Peak Rainfall Intensity Triangular Hyetograph

401.6 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 703 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.1 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 112.0 Invert LvI 1.30 Invert LvI 1.50 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	380	0
0.25	0.25	400	98
0.50	0.50	425	201
0.75	0.75	450	310
1.00	1.00	475	426
1.20	1.20	500	523
1.40	1.40	525	626
1.60	1.60	550	733

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

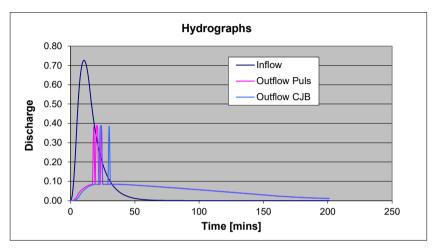
 Vol
 0 m³

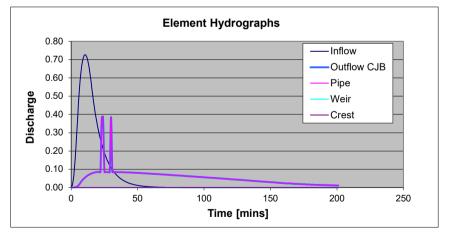
 Area
 380 m²

 Discharge
 0.00 m³/s

Results Summary Peaks









Annexure G2 Area #2 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 18.3 min 0.3 hr

RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 7.1 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 91.8 mm/h

Rational C 0.40 Peak Rainfall Intensity Triangular Hyetograph

183.6 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 795 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.250	0.45 m	Crest LvI	0.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 0.70 Invert LvI 0.90 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	1000	0
0.10	0.10	1000	100
0.20	0.20	2000	250
0.30	0.30	3000	500
0.40	0.40	4000	850
0.50	0.50	5000	1300
0.60	0.60	6000	1850
1.00	1.00	7000	4450

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

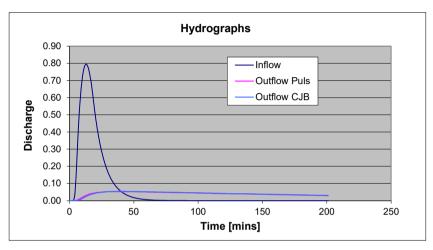
 Vol
 0 m³

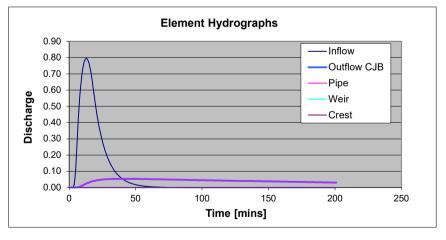
 Area
 1000 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

 Region

 MAP
 750 mm/year
 Storm Td
 18.3 min
 0.3 hr

 RI
 25 year
 = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 7.1 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 148.8 mm/h

Rational C 0.40 Peak Rainfall Intensity Triangular Hyetograph

297.6 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 1288 m^3 = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.250	0.45 m	Crest LvI	0.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 0.70 Invert LvI 0.90 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	1000	0
0.10	0.10	1000	100
0.20	0.20	2000	250
0.30	0.30	3000	500
0.40	0.40	4000	850
0.50	0.50	5000	1300
0.60	0.60	6000	1850
1.00	1.00	7000	4450

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

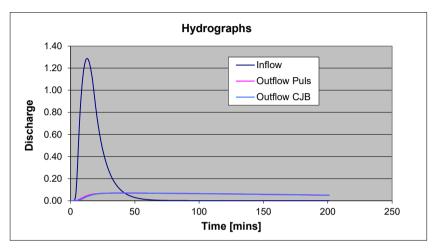
 Vol
 0 m³

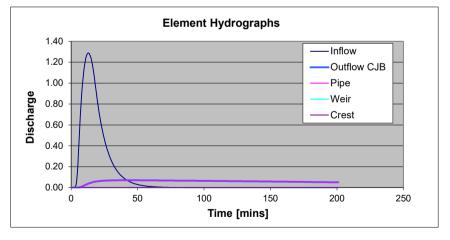
 Area
 1000 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 18.3 min 0.3 hr
RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 7.1 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 183.2 mm/h

Rational C 0.40 Peak Rainfall Intensity Triangular Hyetograph

366.4 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 1586 m^3 = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.250	0.45 m	Crest Lvl	0.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 0.70 Invert LvI 0.90 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	1000	0
0.10	0.10	1000	100
0.20	0.20	2000	250
0.30	0.30	3000	500
0.40	0.40	4000	850
0.50	0.50	5000	1300
0.60	0.60	6000	1850
1.00	1.00	7000	4450

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

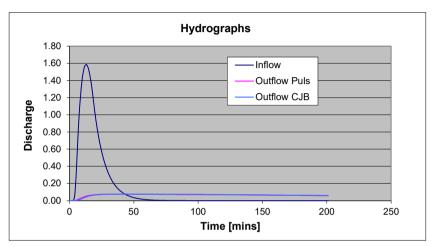
 Vol
 0 m³

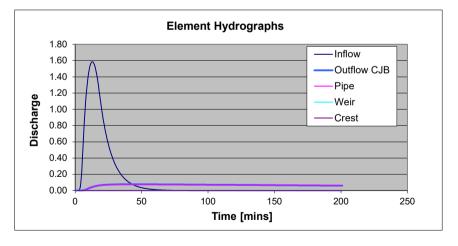
 Area
 1000 m²

 Discharge
 0.00 m³/s

Results Summary Peaks









Annexure G3 Area #3 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 17.0 min 0.3 hr

RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 6.0 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 95.0 mm/h

Rational C 0.60 Peak Rainfall Intensity Triangular Hyetograph

190.1 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 975 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest LvI	1.7 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ 1.40 for Q = Cd x L x $h^{1.5}$ Cd Cd 350.0 Width 2.5 Width Invert LvI 1.80 Invert LvI 2.00 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	280	0
0.25	0.25	400	85
0.50	0.50	520	200
0.75	0.75	640	345
1.00	1.00	760	520
1.25	1.25	880	725
1.50	1.50	1000	960
2.10	2.10	1650	1755

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

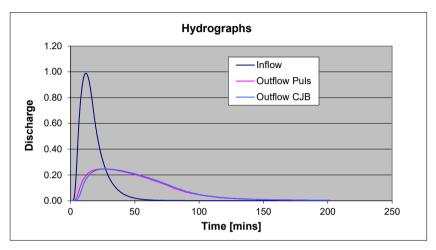
 Vol
 0 m³

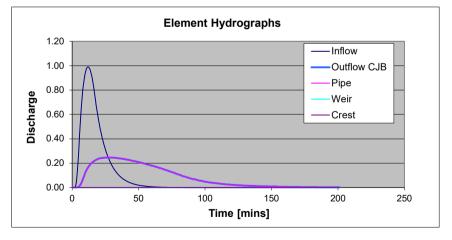
 Area
 280 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 17.0 min 0.3 hr
RI 25 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 6.0 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 154.0 mm/h
Rational C 0.60 Peak Rainfall Intensity Triangular Hyetogr

Rational C 0.60 Peak Rainfall Intensity Triangular Hyetograph 308.1 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 1581 $m^3 = C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest Lvl	1.7 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 1.80 Invert LvI 2.00 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	280	0
0.25	0.25	400	85
0.50	0.50	520	200
0.75	0.75	640	345
1.00	1.00	760	520
1.25	1.25	880	725
1.50	1.50	1000	960
2.10	2.10	1650	1755

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

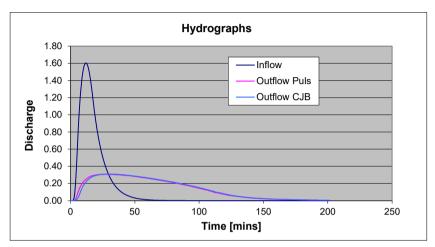
 Vol
 0 m³

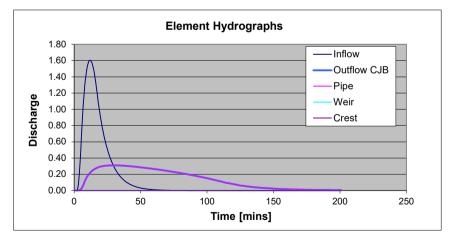
 Area
 280 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 17.0 min 0.3 hr

RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 6.0 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 189.6 mm/h
Rational C 0.60 Peak Rainfall Intensity Triangular Hyetograph

379.3 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 1946 m^3 = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest LvI	1.7 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ 1.40 for Q = Cd x L x $h^{1.5}$ Cd Cd 350.0 Width 2.5 Width Invert LvI 1.80 Invert LvI 2.00 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	280	0
0.25	0.25	400	85
0.50	0.50	520	200
0.75	0.75	640	345
1.00	1.00	760	520
1.25	1.25	880	725
1.50	1.50	1000	960
2.10	2.10	1650	1755

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

 Vol
 0 m³

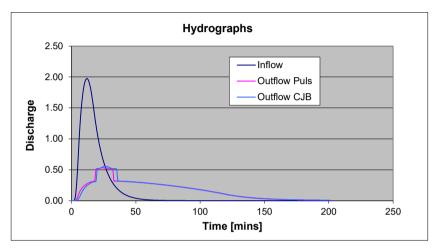
 Area
 280 m²

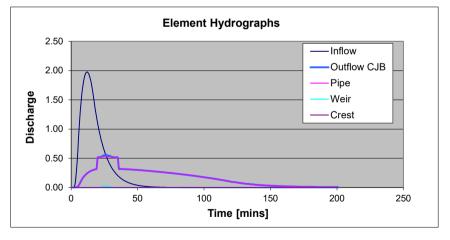
 Discharge
 0.00 m³/s

Results Summary Peaks

Q_{in}	1.975 m³/s		
Q _{out} CJB	$0.556 \text{ m}^3/\text{s}$	Q_{pipe}	$0.527 \text{ m}^3/\text{s}$
Q _{out} Puls	$0.532 \text{ m}^3/\text{s}$	Q_{weir}	$0.029 \text{ m}^3/\text{s}$
Stage	1.841 m	Q_{crest}	$0.000 \text{ m}^3/\text{s}$
Stored Vol	1407 m ³		









Annexure G4 Area #4 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 16.6 min 0.3 hr

RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.6 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 96.3 mm/h

Rational C 0.68 Peak Rainfall Intensity Triangular Hyetograph

192.6 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 292 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.180	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 175.0 Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	190	0
0.20	0.20	200	39
0.40	0.40	225	82
0.60	0.60	250	129
0.90	0.90	275	208
1.20	1.20	300	294
1.50	1.50	325	388
1.80	1.80	350	489

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

 Vol
 0 m³

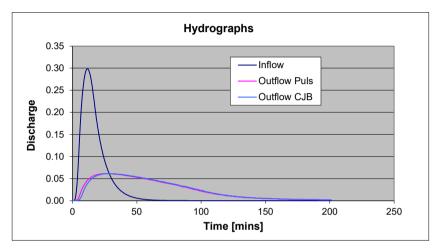
 Area
 190 m²

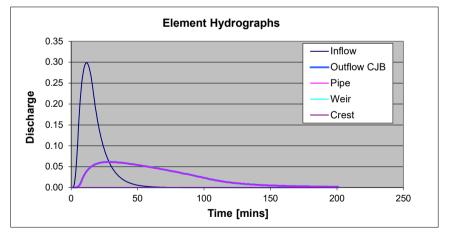
 Discharge
 0.00 m³/s

Results Summary Peaks

Q_{in}	0.298 m ³ /s		
Q _{out} CJB	$0.061 \text{ m}^3/\text{s}$	Q_{pipe}	0.061 m ³ /s
Q _{out} Puls	$0.061 \text{ m}^3/\text{s}$	Q_{weir}	$0.000 \text{ m}^3/\text{s}$
Stage	0.921 m	Q_{crest}	$0.000 \text{ m}^3/\text{s}$
Stored Vol	213 m ³		







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

 Region

 MAP
 750 mm/year
 Storm Td
 16.6 min
 0.3 hr

 RI
 25 year
 = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.6 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 156.0 mm/h

Rational C 0.68 Peak Rainfall Intensity Triangular Hyetograph

312.1 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 472 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.180	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ Cd Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 175.0 Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	190	0
0.20	0.20	200	39
0.40	0.40	225	82
0.60	0.60	250	129
0.90	0.90	275	208
1.20	1.20	300	294
1.50	1.50	325	388
1.80	1.80	350	489

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

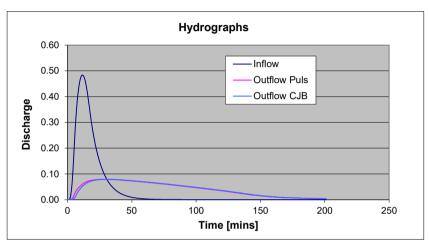
 Vol
 0 m³

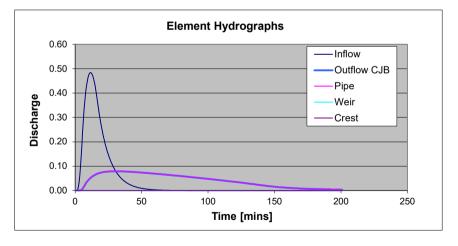
 Area
 190 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 16.6 min 0.3 hr
RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.6 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 192.1 mm/h
Rational C 0.68 Peak Rainfall Intensity Triangular Hyetograph

384.2 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 582 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.180	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 175.0 Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	190	0
0.20	0.20	200	39
0.40	0.40	225	82
0.60	0.60	250	129
0.90	0.90	275	208
1.20	1.20	300	294
1.50	1.50	325	388
1.80	1.80	350	489

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

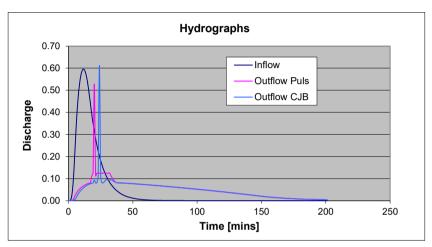
 Vol
 0 m³

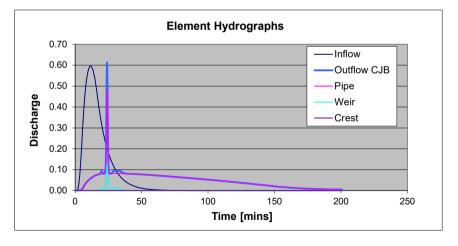
 Area
 190 m²

 Discharge
 0.00 m³/s

Results Summary Peaks









Annexure G5 Area #5 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 18.1 min 0.3 hr
RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 2.2 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 92.3 mm/h

Rational C 0.43 Peak Rainfall Intensity Triangular Hyetograph

Storm

Time to peak 0.3 ratio Runoff Vol 259 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

184.6 mm/h

At time

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ Cd Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	165	0
0.20	0.20	170	34
0.40	0.40	183	69
0.60	0.60	200	107
0.90	0.90	218	170
1.20	1.20	235	238
1.50	1.50	253	311
1.80	1.80	270	389

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

 Vol
 0 m³

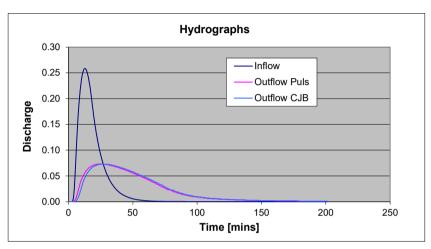
 Area
 165 m²

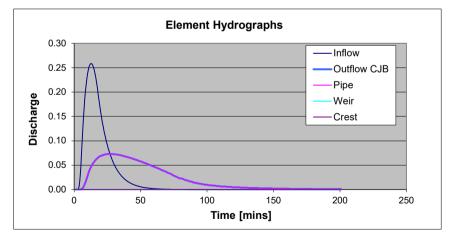
 Discharge
 0.00 m³/s

5 mins

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 18.1 min 0.3 hr

RI 25 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 2.2 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 149.6 mm/h

Rational C 0.43 Peak Rainfall Intensity Triangular Hyetograph

299.2 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 419 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume	
0.00	0.00	165	0	
0.20	0.20	170	34	
0.40	0.40	183	69	
0.60	0.60	200	107	
0.90	0.90	218	170	
1.20	1.20	235	238	
1.50	1.50	253	311	
1.80	1.80	270	389	

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

 Vol
 0 m³

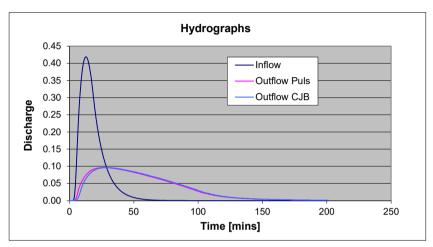
 Area
 165 m²

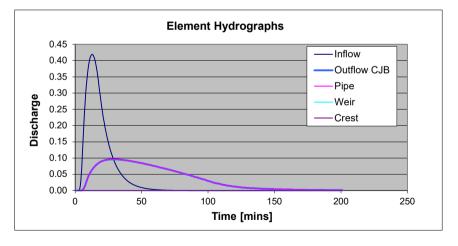
 Discharge
 0.00 m³/s

Results Summary Peaks

Q_{in}	$0.419 \text{ m}^3/\text{s}$		
Q _{out} CJB	$0.096 \text{ m}^3/\text{s}$	Q_{pipe}	$0.096 \text{ m}^3/\text{s}$
Q _{out} Puls	$0.096 \text{ m}^3/\text{s}$	Q_{weir}	$0.000 \text{ m}^3/\text{s}$
Stage	1.418 m	Q_{crest}	$0.000 \text{ m}^3/\text{s}$
Stored Vol	290 m ³		







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 18.1 min 0.3 hr
RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 2.2 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 184.2 mm/h

Rational C 0.43 Peak Rainfall Intensity Triangular Hyetograph

368.4 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 516 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.200	0.45 m	Crest LvI	1.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ 350.0 Width 2.5 Width Invert LvI 1.50 Invert LvI 1.70 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	165	0
0.20	0.20	170	34
0.40	0.40	183	69
0.60	0.60	200	107
0.90	0.90	218	170
1.20	1.20	235	238
1.50	1.50	253	311
1.80	1.80	270	389

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

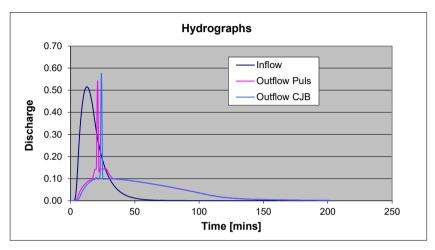
 Vol
 0 m³

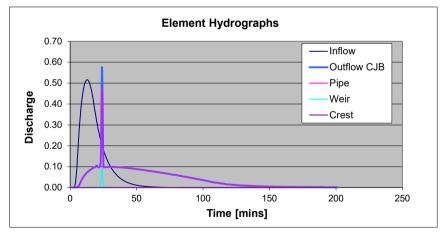
 Area
 165 m²

 Discharge
 0.00 m³/s

Results Summary Peaks









Annexure G6 Area #6 Pond Sizing and Hydrograph

Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed

Region

MAP 750 mm/year Storm Td 18.0 min 0.3 hr

RI 5 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.3 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 92.6 mm/h

Rational C 0.45 Peak Rainfall Intensity Triangular Hyetograph

185.3 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 165 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest LvI	0.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

Cd 1.60 for Q = Cd x L x $h^{1.5}$ Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 160.0 Invert LvI 0.60 Invert LvI 0.80 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	530	0
0.10	0.10	750	64
0.30	0.30	570	196
0.50	0.50	600	313
0.60	0.60	620	374
0.70	0.70	640	437
0.80	0.80	660	502
0.90	0.90	680	569

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

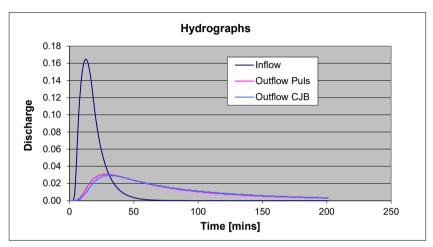
 Vol
 0 m³

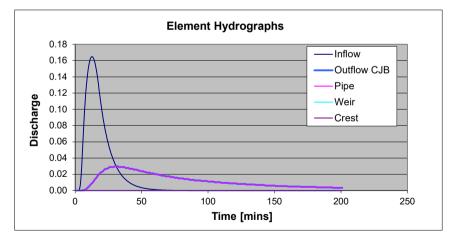
 Area
 530 m²

 Discharge
 0.00 m³/s

Results Summary Peaks







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 18.0 min 0.3 hr RI 25 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Op ten Noord & Stephenson Inland Area 1.3 ha

Conc time Tc 15 min 150.1 mm/h

Peak Rainfall Intensity Triangular Hyetograph Rational C 0.45

300.3 mm/h At time 5 mins Storm

Time to peak 0.3 ratio

267 m³ $= C \times P \times A$ Runoff Vol

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest LvI	0.5 m	$C_{d(sub)}$	0.62
Invert Lvl	0	0 m			C_h	0.85

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ Cd Cd 1.40 for Q = Cd x L x $h^{1.5}$ Width 2.5 Width 160.0 Invert LvI 0.60 Invert LvI 0.80 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume	
0.00	0.00	530	0	
0.10	0.10	750	64	
0.30	0.30	570	196	
0.50	0.50	600	313	
0.60	0.60	620	374	
0.70	0.70	640	437	
0.80	0.80	660	502	
0.90	0.90	680	569	

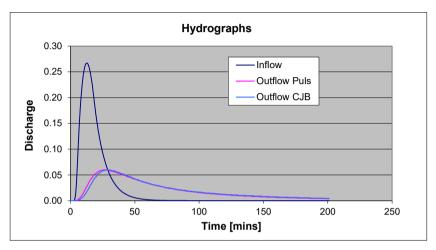
Initial Conditions

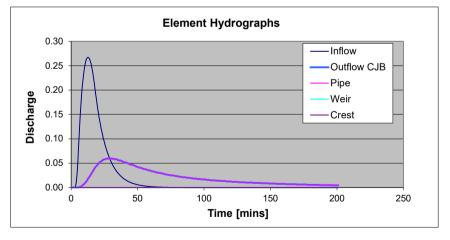
Stage 0.00 m Depth 0.00 m Vol 0 m^3 Area 530 m² $0.00 \text{ m}^3/\text{s}$ Discharge

Results Summary Peaks

 $0.267 \text{ m}^3/\text{s}$ Q_{in} $0.059 \text{ m}^3/\text{s}$ $0.059 \text{ m}^3/\text{s}$ $Q_{out}\,CJB$ Q_{pipe} Q_{out} Puls $0.059 \text{ m}^3/\text{s}$ $0.000 \text{ m}^3/\text{s}$ $0.000 \text{ m}^3/\text{s}$ $\mathsf{Q}_{\mathsf{crest}}$ Stage 0.309 m 200 m³ Stored Vol







Engineer Bradley Denysschen

Summary of Results No data input on this sheet

Input Computed Region

MAP 750 mm/year Storm Td 18.0 min 0.3 hr
RI 50 year = concentration time plus time to start runoff

Catchment Average Rainfall Intensity

Area 1.3 ha Op ten Noord & Stephenson Inland

Conc time Tc 15 min 184.8 mm/h

Rational C 0.45 Peak Rainfall Intensity Triangular Hyetograph

369.7 mm/h At time 5 mins

Storm

Time to peak 0.3 ratio Runoff Vol 329 m³ = $C \times P \times A$

Time step 1 min

Reservoir and Outlet Data

Pipe	U/S	D/S	Tower			
No off	1	1 No	Crest Len	4 m	$C_{d(unsub)}$	0.75
Dia	0.350	0.45 m	Crest LvI	0.5 m	$C_{d(sub)}$	0.62
Invert LvI	0	0 m			C_h	0.85

Spillway Crest

1.60 for Q = Cd x L x $h^{1.5}$ 1.40 for Q = Cd x L x $h^{1.5}$ Cd Cd 160.0 Width 2.5 Width Invert LvI 0.60 Invert LvI 0.80 Free board 0.20 Free board 0.10

Reservoir Data

Stage	Depth	Area	Volume
0.00	0.00	530	0
0.10	0.10	750	64
0.30	0.30	570	196
0.50	0.50	600	313
0.60	0.60	620	374
0.70	0.70	640	437
0.80	0.80	660	502
0.90	0.90	680	569

Initial Conditions

 Stage
 0.00 m

 Depth
 0.00 m

 Vol
 0 m³

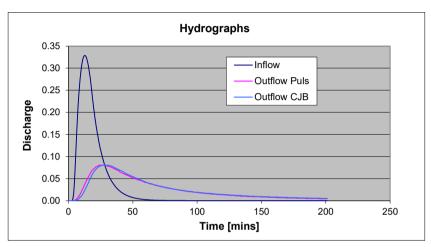
 Area
 530 m²

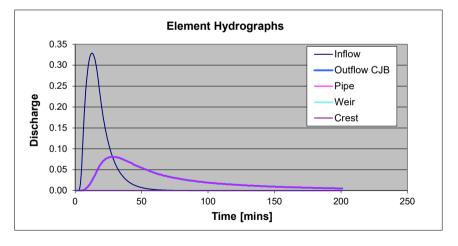
 Discharge
 0.00 m³/s

Results Summary Peaks

Q_{in}	$0.329 \text{ m}^3/\text{s}$		
Q _{out} CJB	$0.082 \text{ m}^3/\text{s}$	Q_{pipe}	$0.082 \text{ m}^3/\text{s}$
Q _{out} Puls	$0.080 \text{ m}^3/\text{s}$	Q_{weir}	$0.000 \text{ m}^3/\text{s}$
Stage	0.378 m	Q_{crest}	$0.000 \text{ m}^3/\text{s}$
Stored Vol	242 m ³		









Annexure H

Drawing 1574/84/320 – Proposed Bridge Crossing

