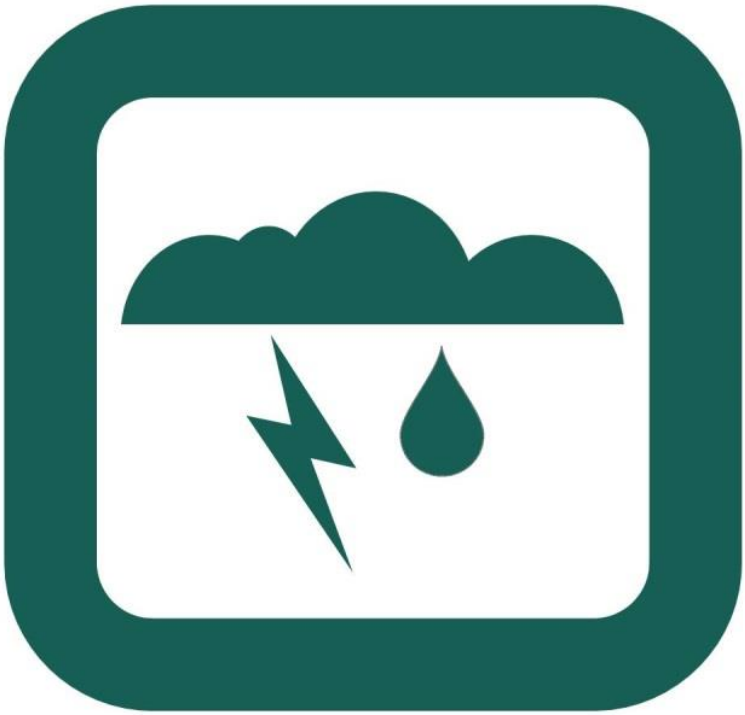
2024 Annual Rainfall Report

Monitoring and Modeling



Saskatoon Water
Utilities and Environment Division

City of Saskatoon

EXECUTIVE SUMMARY

The following report provides a summary of Saskatoon's 2024 rainfall season (April to September) and a comparison with historical rainfall. Highlights of the report include the following:

- In 2024, 337 mm of rainfall accumulated, which was more than the historical average of 263 mm and the 22nd highest seasonal rainfall total out of 125 years since 1900.
- On average, at least 1 mm of rainfall occurred on 25% of days in 2024.
- Based on the weighted average, 35mm was the largest amount of rainfall to accumulate in a single day.
- Saskatoon had a wet spring in 2024. The average rainfall between April and June since 1900 is 127 mm. Saskatoon received 213 mm which falls in the 95th percentile for this time period.
- Saskatoon had a normal summer in 2024. The average rainfall between July and September since 1900 is 136 mm. Saskatoon received 124 mm which falls in the 45th percentile for this time period.
- At one or more of the eleven rain gauges, a 2–5-year rain event occurred on June 12th, June 27-28th, and July 12th and a 5-25 year rain event occurred on August 23rd.

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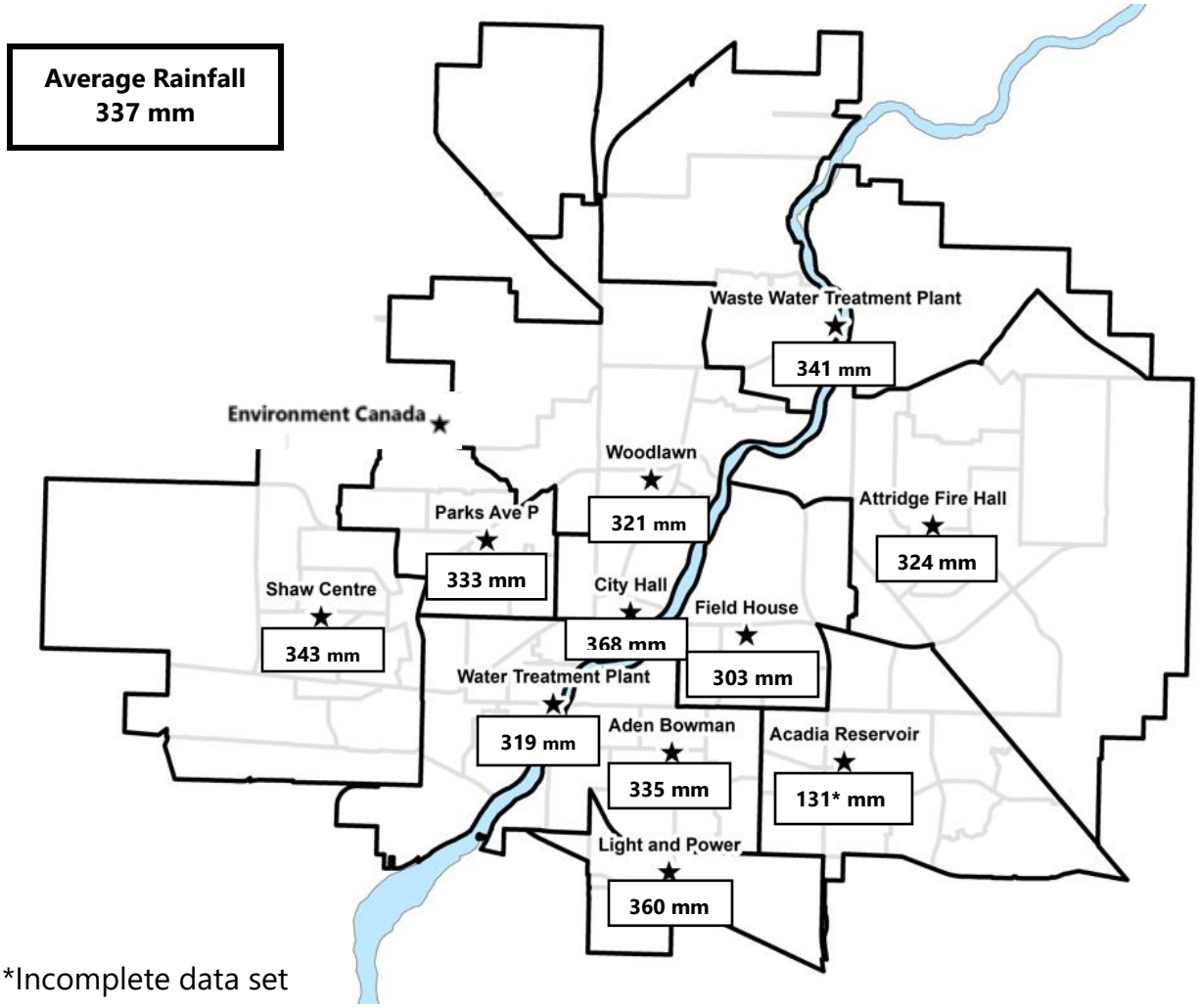
INTRODUCTION

The purpose of this report is to provide a summary of the 2024 rainfall season in Saskatoon and a comparison of this rainfall data with historical rainfall data. Within the scope of this report, a rainfall season is defined as the time period between April 1st and September 30th. Data between 1900 and 2011 was obtained from the Environment Canada rain gauge and in 2012 to 2022 data was obtained from eight City of Saskatoon rain gauges then in 2023 three more rain gauges were added for a total of eleven. The name, location, approximate area, and total seasonal rainfall of each rain gauge is shown below.



*Incomplete data set

Figure 1: Overview of rain gauges.

SUMMARY OF RAINFALL IN 2024

A daily weighted average for all City of Saskatoon rain gauges was calculated to determine the average daily rainfall for Saskatoon. The following graph depicts the average daily rainfall that occurred in Saskatoon throughout the 2024 rainfall season.

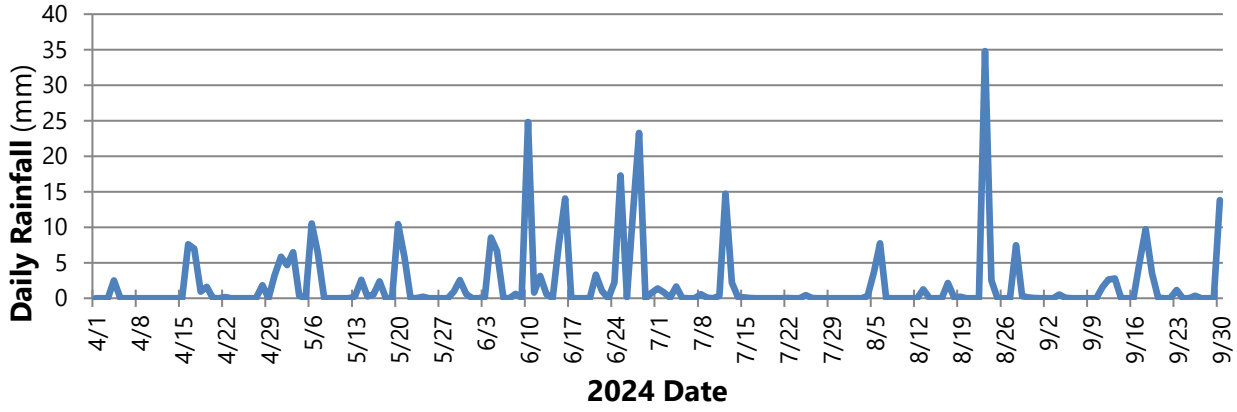


Figure 2: 2024 daily rainfall.

Based on the weighted average, the largest amount of rainfall occurred on August 23rd, 2024, with a total of 35 mm. This rainfall accounted for approximately 10% of the total rainfall that occurred in 2024.

Table 1 presents the percentage of days with total rainfall greater than or equal to 0.2 mm, 1 mm, 5 mm, 10 mm, and 25 mm at each rain gauge.

Table 1: Total daily rainfall percent occurrence.

Location	≥ 0.2 mm	≥ 1 mm	≥ 5 mm	≥ 10 mm	≥ 25 mm
Acadia Reservoir*	26%	20%	9%	4%	0%
Attridge Fire Hall	36%	26%	13%	5%	0%
Aden Bowman	35%	23%	14%	7%	1%
City Hall	37%	26%	14%	7%	2%
Light and Power	37%	26%	16%	6%	1%
Shaw Centre	38%	25%	11%	5%	1%
WWTP	36%	25%	13%	5%	1%
Woodlawn	40%	23%	13%	6%	1%
Field House	34%	25%	11%	5%	0%
Parks Ave P	37%	26%	13%	6%	1%
WTP	34%	25%	13%	5%	1%
Average	**36%**	**25%**	**13%**	**6%**	**1%**

*Incomplete data set

On average, least 1 mm of rainfall occurred on 25% of days in 2024.

SUMMARY OF RAINFALL IN 2024

The daily weighted average rainfall was added together to calculate the total seasonal rainfall. The total seasonal rainfall for 2024 was 337 mm. Figure 3 depicts the accumulation of rainfall throughout the 2024 season.

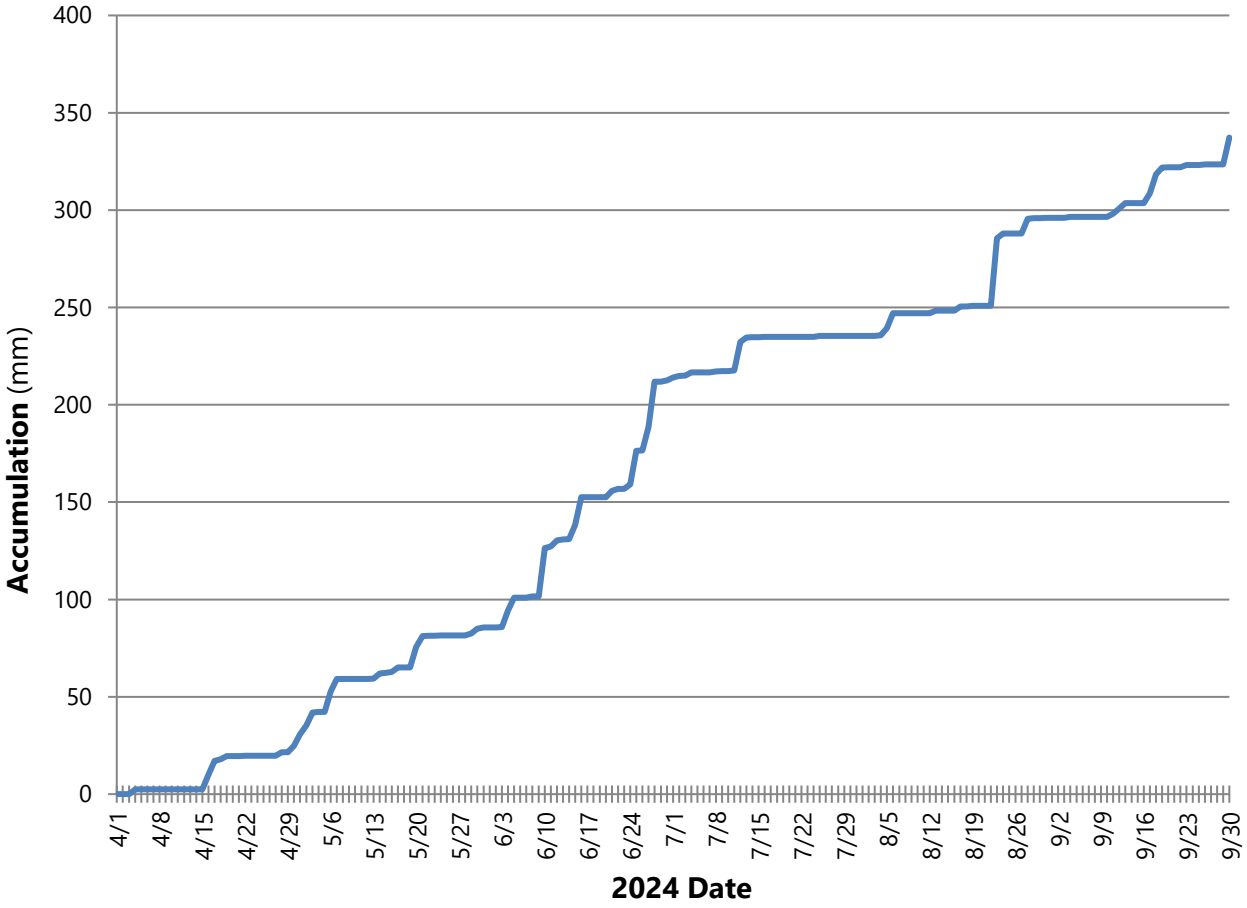


Figure 3: 2024 rainfall accumulation.

The 2024 rainfall season began with a wet spring (April to June) accumulating a total of 213 mm compared to the average spring accumulation of 127 mm. The 2024 spring rainfall total falls in the 95th percentile and was ranked the 7th highest spring rainfall total out of the 125 years since 1900. This was followed by a normal summer (July to September) which accumulated 124 mm compared to an average summer rainfall of 135 mm.

HISTORICAL COMPARISON

The average seasonal rainfall from 1900 to 2024 in Saskatoon is 263 mm which is depicted by the light blue line in Figure 4. The 2024 seasonal rainfall of 337 mm was above average and the 22nd highest rainfall out of 125 years since 1900.

The lowest seasonal rainfall occurred in 2001 with 131 mm and the highest seasonal rainfall occurred in 2010 with 569 mm. A table containing the seasonal rainfalls from 1900 to 2024 is shown in Appendix A.

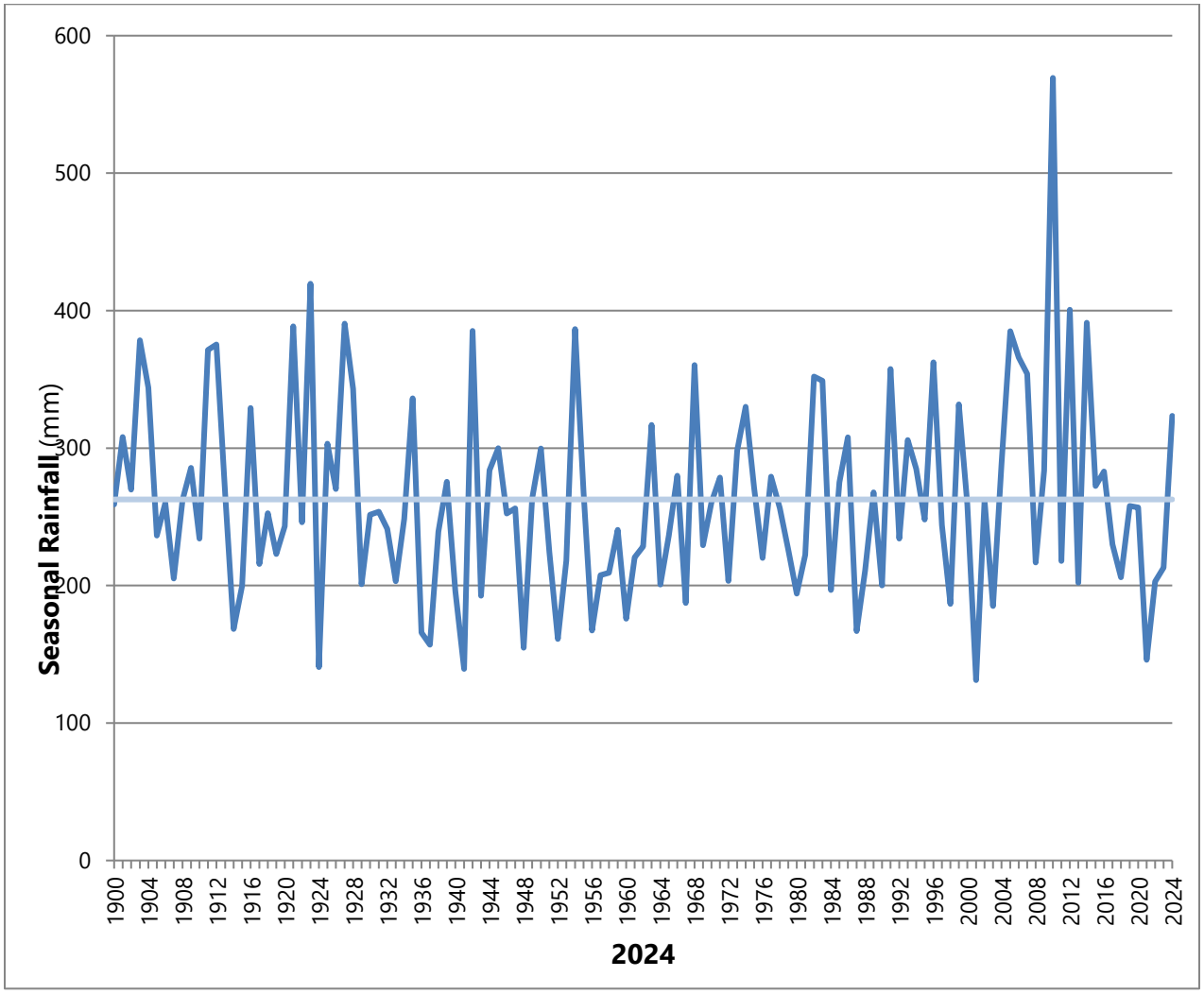


Figure 4: Seasonal rainfall (1900-2024).

HISTORICAL COMPARISON

The following graph provides a comparison of the maximum amount of rainfall to occur in a single day in each season. The average maximum rainfall in a single day in a season is 36 mm from the years 1900 to 2024 and is represented by the light blue line in Figure 5. During the 2024 rainfall season, the maximum rainfall to occur within a single day was 35 mm, which was on August 23rd.

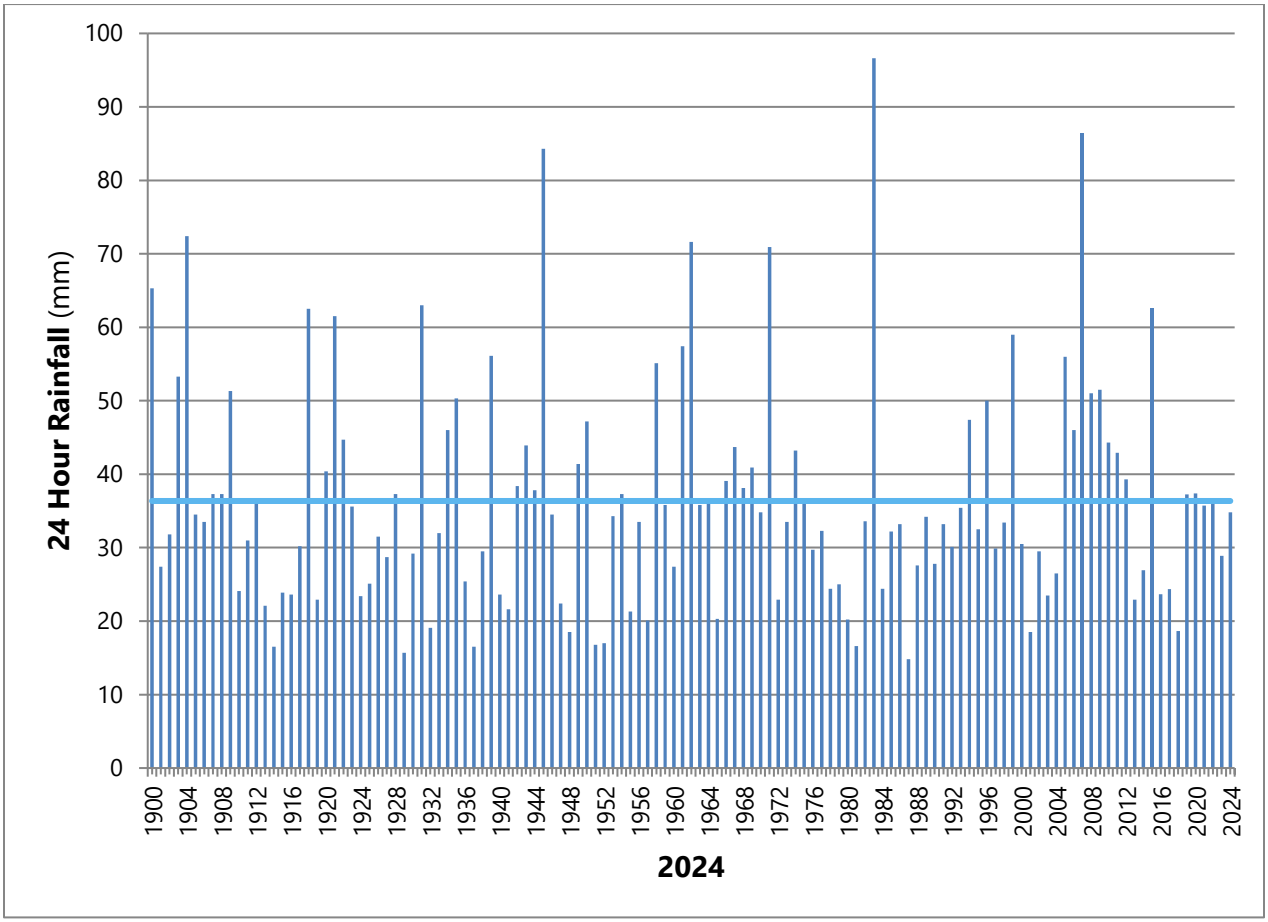


Figure 5: Maximum daily rainfall.

As can be seen in the graph above, the lowest maximum daily rainfall occurred on July 19th, 1987, with a total of 15 mm and the highest occurred on June 24th, 1983 with a total of 97 mm.

CLASSIFYING RAIN EVENTS

Rain events in Saskatoon are often localized. Therefore, a rain event may only occur at a few of the eleven rain gauges located throughout the city. In order to compare the severity of rain events, their return period must be determined. A return period provides an indication of the likelihood of an event. For example, a rain event with a return period of 2 years has a 50% chance of occurring in any given year. For comparison, a rain event with a return period of 100 years has a 1% chance of occurring in any given year. The following table provides a summary of the criteria used to determine the return period of each rain event.

Table 2: Criteria for determining return period of a rain event.

Time (minutes)	Intensity (mm/hr)			
	2-Year	5-Year	25-Year	100-Year
10	53	85	132	168
15	41	67	104	133
30	26.4	46.1	74	97
60	16.6	28.9	46.5	60
120	10.7	17.5	27.3	35
360	4.7	7.0	10.3	12.9
720	2.73	3.90	5.59	6.91
1440	1.56	2.18	3.07	3.76

For the purposes of this report, two different methods were utilized to determine the number of rain events with a return period of 2, 5, 25, or 100 years between 2012 and 2024. It should be noted that within this report, rain events with the same return period may include any of the durations as outlined in Table 2. The first method determined the average number of rain events for each return period by adding together the number of events in a season with the same return period at each of the city's rain gauges and dividing that number by the total number of rain gauges. The following table provides a summary of these values. A detailed table showing return periods recorded at each rain gauge is provided in Appendix B.

Table 3: Average frequency of rain events.

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Avg	2 – 5 Year	4	1	3	1	1	1	1	3	2	1	1	1	2	22
	5 – 25 Year	0	0	0	1	0	0	0	0	0	0	1	0	0	2
	25 – 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Years	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**4**	**1**	**3**	**2**	**1**	**1**	**1**	**3**	**2**	**1**	**2**	**1**	**2**	**24**

CLASSIFYING RAIN EVENTS

In Table 4, the rain events were tallied using the same method as Table 3, except only rain events with a duration of 1 hour or greater were counted.

Table 4: Average frequency of rain events greater than or equal to 1 hour duration.

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Avg	2 – 5 Year	3	1	2	1	0	1	0	1	2	1	0	1	1	14
	5 – 25 Year	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	25 – 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Years	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**3**	**1**	**2**	**2**	**0**	**1**	**0**	**1**	**2**	**1**	**0**	**1**	**1**	**15**

The second method determined the number of days per year that a major rain event occurred at one or more rain gauges. If the rain gauges throughout the City recorded varying return periods on a given day, the maximum return period was counted as the rain event for that day. The following table provides the number of days per year that a major rain event occurred at one or more rain gauges.

Table 5: Overall frequency of rain events.

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Overall	2 – 5 Year	8	5	6	3	3	2	3	5	2	2	0	4	3	46
	5 – 25 Year	0	1	1	0	0	1	0	2	0	1	1	0	1	8
	25 – 100 Year	0	0	0	1	0	0	0	0	0	0	1	0	0	2
	> 100 Years	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**8**	**6**	**7**	**4**	**3**	**3**	**3**	**7**	**2**	**3**	**2**	**4**	**4**	**56**

In Table 6, the days per year were tallied using the same method as Table 5, except only days with a rain event of 1 hour duration or greater were counted.

Table 6: Overall frequency of rain events greater than or equal to 1 hour duration.

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Overall	2 – 5 Year	6	4	3	1	2	1	2	2	2	1	0	3	3	30
	5 – 25 Year	0	0	0	0	0	1	0	0	0	1	0	0	1	3
	25 – 100 Year	0	0	0	1	0	0	0	0	0	0	1	0	0	2
	> 100 Years	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**6**	**4**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**3**	**4**	**35**

CONCLUSION

Overall, the 2024 rainfall accumulation was average compared to the historical seasonal average. In 2024, three rain events occurred with a maximum return period of 2 – 5 years and one rain event with return period of 5 – 25 years. Based on a weighted average, the most rainfall to occur within a single day was 35 mm, which was on August 23rd, 2024.

APPENDICES

Appendix A – Total Seasonal Rainfall (1900-2024)

APPENDIX A

Year	Rain (mm)	Rank	Year	Rain (mm)	Rank	Year	Rain (mm)	Rank
1900	259	59	1942	385	8	1984	197	107
1901	308	28	1943	193	110	1985	275	45
1902	270	49	1944	284	38	1986	308	29
1903	379	10	1945	300	32	1987	167	117
1904	344	20	1946	252	66	1988	211	94
1905	236	76	1947	256	63	1989	268	51
1906	260	57	1948	155	121	1990	200	105
1907	205	98	1949	263	53	1991	358	16
1908	262	54	1950	300	33	1992	234	78
1909	286	36	1951	224	84	1993	306	30
1910	234	79	1952	161	119	1994	285	37
1911	371	12	1953	218	89	1995	248	69
1912	375	11	1954	387	7	1996	362	14
1913	266	52	1955	268	50	1997	244	71
1914	168	115	1956	167	116	1998	187	112
1915	200	106	1957	208	96	1999	332	24
1916	329	26	1958	209	95	2000	259	58
1917	216	92	1959	241	74	2001	131	125
1918	253	65	1960	176	114	2002	262	55
1919	223	85	1961	221	87	2003	185	113
1920	243	72	1962	229	82	2004	288	35
1921	389	6	1963	317	27	2005	385	9
1922	246	70	1964	201	104	2006	366	13
1923	420	2	1965	236	77	2007	354	17
1924	141	123	1966	280	41	2008	217	91
1925	303	31	1967	187	111	2009	284	39
1926	270	48	1968	360	15	2010	569	1
1927	391	5	1969	229	81	2011	218	90
1928	343	21	1970	261	56	2012	401	3
1929	201	103	1971	279	43	2013	202	102
1930	252	67	1972	203	99	2014	391	4
1931	254	64	1973	298	34	2015	272	46
1932	241	73	1974	330	25	2016	283	40
1933	203	100	1975	271	47	2017	230	80
1934	249	68	1976	220	88	2018	206	97
1935	336	23	1977	279	42	2019	258	60
1936	166	118	1978	256	62	2020	257	61
1937	157	120	1979	226	83	2021	146	122
1938	239	75	1980	194	109	2022	203	101
1939	275	44	1981	222	86	2023	213	93
1940	196	108	1982	352	18	2024	337	22
1941	139	124	1983	349	19			

APPENDICES

Appendix B – Return Period of Rain Events by Rain Gauge

APPENDIX B

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Waste Water Treatment Plant	2 - 5 Year	4	0	3	1	1	1	1	3	1	1	1	1	2	20
	5 - 25 Year	0	0	0	1	0	0	0	1	0	0	1	0	0	3
	25 - 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**4**	**0**	**3**	**2**	**1**	**1**	**1**	**4**	**1**	**1**	**2**	**1**	**2**	**23**
Woodlawn	2 - 5 Year	5	1	3	2	1	1	0	4	2	0	2	1	2	24
	5 - 25 Year	0	1	0	1	0	0	0	0	0	0	0	0	1	3
	25 - 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**5**	**2**	**3**	**3**	**1**	**1**	**0**	**4**	**1**	**0**	**2**	**1**	**3**	**27**
Shaw Centre	2 - 5 Year	5	2	5	3	1	1	1	2	1	2	1	1	1	26
	5 - 25 Year	0	0	0	1	0	0	0	0	0	0	0	0	1	2
	25 - 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**5**	**2**	**5**	**4**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**28**
Nicholson Yards	2 - 5 Year	2	0	2	1	0									5
	5 - 25 Year	0	0	1	1	0									2
	25 - 100 Year	0	0	0	0	0									0
	> 100 Year	0	0	0	0	0									0
	Total	**2**	**0**	**3**	**2**	**0**									**7**
Light and Power	2 - 5 Year	2	2	3	0	1	0	1	4		2	0	0	3	18
	5 - 25 Year	0	0	0	0	0	1	0	0		0	1	0	0	2
	25 - 100 Year	0	0	0	1	0	0	0	0		0	1	0	0	2
	> 100 Year	0	0	0	0	0	0	0	0		0	0	0	0	0
	Total	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**4**		**2**	**2**	**0**	**3**	**22**
City Hall	2 - 5 Year	5	3	4	1	1	1	2	2	2	1	1	2	1	26
	5 - 25 Year	0	0	0	0	0	0	0	1	0	0	1	0	1	3
	25 - 100 Year	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	> 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**5**	**3**	**4**	**2**	**1**	**1**	**2**	**3**	**2**	**1**	**2**	**2**	**2**	**30**
Attridge Fire Hall	2 - 5 Year	1	1	1	1	0	0	0	2		0	2	1	3	12
	5 - 25 Year	0	0	0	1	0	0	0	0		0	0	0	0	1
	25 - 100 Year	0	0	0	0	0	0	0	0		0	0	0	0	0
	> 100 Year	0	0	0	0	0	0	0	0		0	0	0	0	0
	Total	**1**	**1**	**1**	**2**	**0**	**0**	**0**	**2**		**0**	**2**	**1**	**3**	**13**
Aden Bowman	2 - 5 Year									1	0	0	0	2	3
	5 - 25 Year									0	0	1	0	0	1
	25 - 100 Year									0	0	1	0	0	1
	> 100 Year									0	0	0	0	0	0
	Total									**1**	**0**	**2**	**0**	**2**	**5**
Acadia Reservoir	2 - 5 Year	4	1	2	1	2	2	0	2	2	0	1	4	1	22
	5 - 25 Year	0	0	0	1	0	0	0	1	0	1	1	0	0	4
	25 - 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 100 Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**4**	**1**	**2**	**2**	**2**	**2**	**0**	**3**	**2**	**1**	**2**	**4**	**1**	**26**

	Return Period	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Field House*	2 - 5 Year												0*	2	2
	5 - 25 Year												0*	0	0
	25 - 100 Year												0*	0	0
	> 100 Year												0*	0	0
	Total												**0***	**2**	**2**
Parks Ave P*	2 - 5 Year												0*	1	1
	5 - 25 Year												0*	1	1
	25 - 100 Year												0*	0	0
	> 100 Year												0*	0	0
	Total												**0***	**2**	**2**
WTP*	2 - 5 Year												0*	1	1
	5 - 25 Year												0*	1	1
	25 - 100 Year												0*	0	0
	> 100 Year												0*	0	0
	Total												**0***	**2**	**2**

*** Data collected from August 1 to September 30, 2023**