

CITY OF BURNS, OREGON

**Wastewater Collection System
Infiltration & Inflow Study**

July 2024

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HECO Project: BR24-0322

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Prepared for:



City of Burns
242 S Broadway Ave
Burns, OR 97720



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HECO Project No. BR24-0322



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1.0 Introduction

The City of Burns owns and operates a public wastewater system, which was originally commissioned in 1955 and upgraded in 2007, and serves approximately 2737 persons daily in Burns, Oregon as of 2024. The Burns system is comprised of approximately, 125,000 lineal feet of gravity sewer lines, 400 manholes, four (4) lift stations, one (1) wastewater treatment lagoon with two cells, chlorination/ de-chlorination facilities, and surface water discharge. The system also shares an emergency storage lagoon with the City of Hines.

The principal document governing the operation and maintenance of the facility is the National Pollutant Discharge Elimination System (NPDES), Water Pollution Control Facilities (WPCF) Permit No. 101046, issued by the Oregon Department of Environmental Quality (DEQ) (see Appendix A). The City's existing NPDES permit was issued on March 31, 2010, and is active until October 31, 2031.

The City Wastewater System has experienced high influent flows that are significantly above the design capacity of the wastewater treatment and land application facilities. These excessive influent flows are due to high levels of inflow and infiltration (I&I) into the sewer collection system. The City of Burns was issued a Pre-Enforcement Notice on February 8, 2024 due to permit violations associated with excessive influent flows and the resulting overcapacity of treatment system. As part of that Pre-Enforcement Notice, the City of Burns is responsible for several corrective actions. One of those corrective actions is to submit an I&I evaluation of the collection system to DEQ that (1) identifies areas of primary I&I sources, (2) identify projects for I&I reduction, and (3) propose a timeline for the completion of the I&I reduction projects. The DEQ Pre-Enforcement Notice required the City to complete and submit this I&I Evaluation by August 1, 2024.

The City has not conducted an I&I evaluation since 1995. However, data collected from 2018 through 2021 showed that I&I has been an ongoing issue. Infiltration and inflow (I&I) were previously found to be excessive in certain sections of the system. Currently, infiltration increases the influent flow rates at the wastewater treatment facility by an average of 0.84 mgd during an approximate three-month period (April, May, and June) or 580 gpm above the design dry weather flow of 0.565 mgd or 260 gpm expected from the current population.

This Inflow and Infiltration (I&I) Evaluation report has been written to meet the requirements of DEQ Pre-Enforcement Notice dated February 8, 2024, to determine excessive I&I within the sewer collection system.



2.0 Infiltration & Inflow Conditions

I&I is a significant portion of the City of Burns influent wastewater flows. The Recommended Standards for Wastewater Facilities (Ten States Standards)¹ recommends a design for new wastewater collection systems to be based on an average daily flow of 100 gallons per capita per day (GPCD) plus wastewater flow from industrial plants and major institutional and commercial facilities. Burns has very limited industrial flow and three public schools which would be considered major institutional facilities. The Ten States Standards also recommend that design account for normal infiltration for systems built with modern construction techniques by application of a population-based peaking factor to be multiplied by the 100 GPCD average design flow. Based on the 2024 census, the population of Burns is 2,737. Therefore, the peaking factor recommended by Ten States Standards is approximately 3.5, which would make the recommended peak hourly design flow approximately 350 GPCD. The facility has flow meters both for influent and effluent flow measurements. This allows for review of recorded peak instantaneous influent flow readings to compare with the Ten States Standards design guidelines. Sewer average annual dry weather flow rates exceeding 120 GPCD are considered to be excessive.

Based on recent flows from 2023 and 2024, there was at least 1 occurrence in which the average monthly influent flows exceeded 512 GPCD. With a current service population of approximately 2737 persons, the 512 GPCD is equivalent to approximately 1,140,000 gallons per day (gpd). In April 2023, the maximum flow exceeded 512 GPCD on 3 separate days of that month. Also, in May 2023 the maximum flow exceeded the threshold on 24 separate occasions. This is primarily due to the infiltration of shallow groundwater into the collection system due to deteriorated piping.

HECO Engineers conducted an I&I study of the Burn's collection system by taking flow measurements were taken between approximately 8:00 PM to 5:00 AM on May 13, 2024, through May 16, 2024. Flows were measured at a total of three hundred and thirty-three (333) manhole locations throughout the collection system. Effluent discharged from residential, commercial, industrial, and institutional facilities were at a minimum during the study hours resulting in flows that will be primarily indicative of I&I.

Collected data from the study are presented in Table 2.1, 2.2, and 2.3, as well as Appendix B. During the study period, it is estimated that total I&I contribution at the WWTF was approximately 1,461,991 gallons per day (GPD). Based on the estimated service area population of 2,737 persons, the I&I contribution during the period was equivalent to approximately 534 gpcd. As shown in the Flowrate Maps (Appendix B), I&I appears to be an issue in almost every segment of the sewer collection system. However, there are well-defined collection system segments with significant I&I contributions. The sewer trunk main such as the Gordonia Ave. pipeline accumulates approximately 683,570 GPD of I&I flow near the downstream portion of its reach. Secondly, the lift station located at the Egan to Railroad Ave intersection accumulates

¹ Recommended Standards
For Wastewater Facilities 2014 ed. (Ch. 10 Fig 1)



approximately 778,421 GPD of I&I flow. That being 464,922 GPD from the Railroad Ave main line, and 313,499 GPD from the Filmore St main line.

I&I that was observed to be present within an individual manhole is shown in Table 1(Appendix B). There are 21 separate pipe runs with 46 manholes that had observable I&I issue.

The severity of the collection system has been prioritized based upon the following criteria:

PRIORITY 1: I&I Flows of 55,000 GPD or more

PRIORITY 2: I&I Flows of between 15,000 and 55,000 GPD

PRIORITY 3: I&I Flows of between 1 and 15,000 GPD

The prioritization of the sewer collection system segments is presented in Figures 2.1, 2.2, and 2.3.

TABLE 2.1			
Priority 1 – I&I			
	NET	TOTAL	DEDUCT
FOLEY DRIVE	518,425	586,929	68,504
W. PIERCE ST TO W. FILMORE	313,499		
N EGAN AVE	133,101	133,101	
N COURT	77,254	77,254	
N ALVORD	65,824	65,824	
SUBTOTAL	1,108,103		

TABLE 2.2			
Priority 2 – I&I			
	NET	TOTAL	DEDUCT
N DATE AVE	52,467		
W. MADISON ST.	45,322	45,360	38
N BROADWAY AVE	35,165		
N BIRCH AVE	35,151		
N BUENA VISTA AVE	17,646		
SUBTOTAL	185,751		

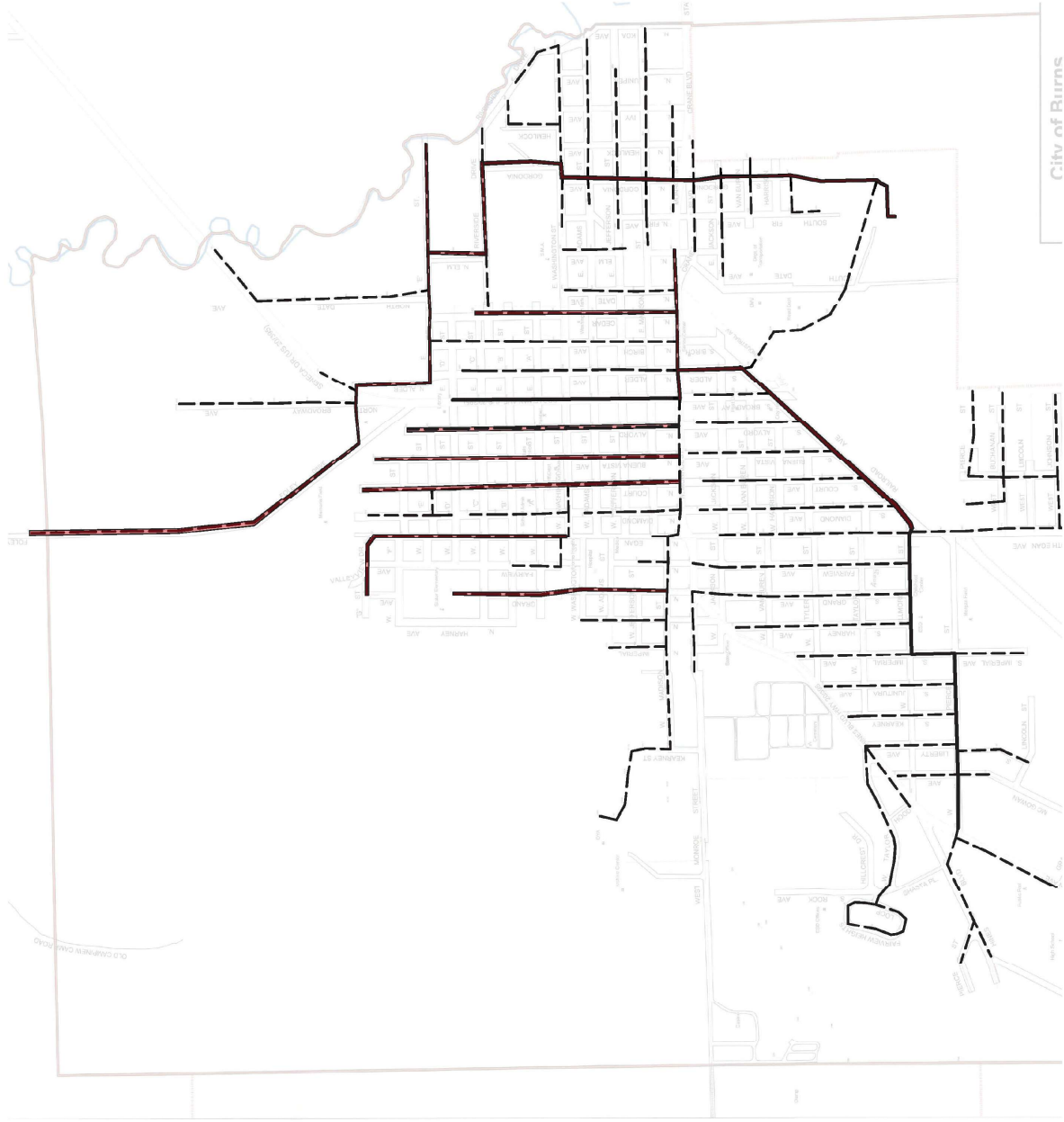


TABLE 2.3 Priority 3 – I&I			
	NET	TOTAL	DEDUCT
SOUTH EGAN AVE	19,892	21,926	2,034
S. BROADWAY AVE	13,300	13,300	
N. FAIRVIEW AVE	13,178	13,178	
E. JEFFERSON	12,973	12,973	
W. MONROE ST. TO S. GRAND AVE.	11,025	11,025	
N. ALDER AVE	9,282	9,282	
RIVERSIDE DR. TO E. WASHINGTON ST.	7,706	7,706	
S. HARNEY AVE	7,228	7,228	
E. MONROE ST	5,843	5,843	
S. FAIRVIEW AVE.	5,073	5,073	
N. BROADWAY AVE	4,596	4,596	
E. ADAMS ST.	4,581	4,581	
COURT ROAD	3,895	3,895	
S. IMPERIAL AVE	3,600	3,600	
E. MADISON ST	3,082	3,082	
N ELM AVE	2,589	2,589	
S. EGAN AVE	2,246	2,246	
(HWY 20) OREGON AVE	1,680	1,680	
COURT ROAD	1,066	1,066	
IMPERIAL AVE	779	779	
COURT ROAD FROM BUCHANAN ST.	779	779	
SUBTOTAL	134,393		



2.1 Priority 1 Summary – I&I (Denoted as Red on Figure 2.1)

- MH A4 to MH A20 on Foley Dr. began with 68,504 gpd and accumulated 586,929 gpd at the end of the run. (Net increase 518,425 gpd)
- MH C75 to MH D61 routing from W. Pierce St to W. Filmore St. began with NF and accumulated 313,499 gpd. Recommend CCTV from MH C31 to MH C27.
- MH A9 to MH A69 on 'G' St. to N. Egan Ave began with NF to accumulate 133,101 gpd at the end of the run. Recommend CCTV from MH A25 to MH A69.
- MH A14 to MH A83 on N. Court Ave. began with NF to accumulate 77,254 gpd. Recommend CCTV from MH A31 to MH A76.
- MH A22 to MH A81 on N. Alvord Ave began with NF to accumulate 65,824 gpd at the end of the run. Recommended CCTV from MH A26-A78.



NOT TO SCALE

FIGURE 2.1
PRIORITY FLOWS 1
(Denoted as Red)
BURNSVILLE, OR



2.2 Priority 2 Summary – I&I (Denoted as Orange on Figure 2.2)

- MH B3 to MH B10 on N. Date Ave began with NF to accumulate 52,467 gpd at the end of the run.
- MH A114 to MH A94 on W. Madison St. began with a flow of 38 gpd and accumulated 45,360 gpd. Recommend CCTV on entire run.
- MH A16 to MH A19 on N. Broadway Ave began with NF to accumulate 35,165 gpd at the end of the run.
- MH B65 appeared to be connected to MH B24 and MH B62 on N. Birch Ave began with NF to accumulate 35,151 gpd at the end of the run.
- MH A15 to MH A82 on N. Buena Vista Ave began with NF to accumulate 17,646 gpd. Recommend CCTV from MH A32 to MH A82.





2.3 Priority 3 Summary – I&I (Denoted as Yellow on Figure 2.3)

- MH D78 to MH D72 on South Egan Ave began with 2,034 gpd to accumulate 21,926 gpd. Recommend CCTV on MH D78 to MH D77.
- MH D5 to MH D27 on S. Broadway Ave began with NF to accumulate 13,300 gpd at the end of the run.
- MH A45 to MH A57 on N. Fairview Ave began with NF to accumulate 13,178 gpd at the end of the run.
- MH B69 to MH B68 on E. Jefferson began with NF to accumulate 12,973 gpd.
- MH A105 to MH C72 routing from W. Monroe St. to S. Grand Ave. began with NF to accumulate 11,025 gpd. Recommend CCTV entire run.
- MH B23 to MH B70 on N. Alder Ave began with NF to accumulate 9,282 gpd at the end of the run.
- MH B37 to MH B48 from Riverside Dr. to E. Washington St. began with NF to accumulate 7,706 gpd. Recommend CCTV from MH B37 to MH B50.
- MH C3 to MH C71 on S. Harney Ave began with NF to accumulate 7,228 gpd. Recommend CCTV from MH C4 to MH C71.
- MH B84 on E. Monroe St. tying into MH B83 on Gordonia Ave began with MH B84 (not measured) and ended with a flow of 5,843 gpd.
- MH A101 to MH C73 on S. Fairview Ave. began with NF to accumulate 5,073 gpd picking up all 5,073 gpd from MH C7 to MH C73.
- MH A34 to MH A80 on N. Broadway Ave began with NF to accumulate 4,596 gpd at the end of the run. Recommended CCTV from MH A35 to MH A79.
- Manhole (MH) B60 to MH B58 on E. Adams St. start at NF and pick up a flow of 4,581 gpd.
- MH D65 to MH D76 on Court Road began with NF to accumulate 3,895 gpd. Recommend CCTV on entire stretch.
- MH SI3 to MH SI1 on S. Imperial Ave began with NF to accumulate 3,600 gpd.
- MH B76 to MH B75 on E. Madison St. began with NF to accumulate 3,082 gpd.
- MH B44 to MH B55 on N. Elm Ave began with NF to accumulate 2,589 gpd.
- MH D9 to MH D56 on S. Egan Ave began with NF to accumulate 2,246 gpd at the end of the run.



- MH C45 to MH C36 on (HWY 20) Oregon Ave began with NF to accumulate 1,680 gpd. Recommend CCTV from C44-C36.
- MH 89 on Court Road began with an unknown upstream terminal point and ended with a flow of 1,066 gpd tying into South Egan Ave.
- MH C11 to MH C70 on S. Imperial Ave began with NF to accumulate 779 gpd.
- MH D69 connecting to MH D70 on Court Road from Buchanan St. began with an unknown beginning terminal MH to accumulate a flow of 779 gpd.



NOT TO SCALE

FIGURE 2.3
PRIORITY FLOWS 3
 (Denoted as Yellow)
 BURNS, OR