

ORDINANCE NO. 3638
(Establish Henderson Municipal Code Section 14.18.047 - West Henderson-Bermuda
Wastewater Backbone Infrastructure Rates)

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF HENDERSON,
NEVADA, TO ESTABLISH SECTION 14.18.047 – WEST HENDERSON-
BERMUDA WASTEWATER BACKBONE INFRASTRUCTURE RATES – OF
THE HENDERSON MUNICIPAL CODE.

- WHEREAS, with the exception of the Inspirada master-planned community, the area generally bounded by Las Vegas Boulevard to the west, St. Rose Parkway to the north, the master-planned communities of Seven Hills and Anthem to the east, the Sloan Canyon National Conservation Area to the south (“West Henderson”) is forecasted to increase in population by approximately 70,000 people by the year 2050; and
- WHEREAS, between now and the year 2050, West Henderson is expected to add considerable new residential and commercial development, including both retail and industrial development projects; and
- WHEREAS, Article II, Section 2.270 of the City of Henderson (“City” or “Henderson”) City Charter gives the Henderson City Council (the “City Council”) authority to provide for any part of a sanitary sewer system, extend sewer lines and “[e]stablish sewer fees and provide for the enforcement and collection thereof”; and
- WHEREAS, Article II, Section 2.280.1(b) of the Henderson City Charter gives the City Council authority to provide for the construction of any facility necessary for the provision of wastewater service; and
- WHEREAS, Henderson Municipal Code (HMC) Section 14.18.020.D provides that the assessment and collection of all fees and charges shall be made in accordance with the established procedures of the City; and
- WHEREAS, in addition, Section 278.02591 of the Nevada Revised Statutes (NRS) allows a governing body to establish an analysis of the cost to construct infrastructure in an area which is undeveloped land and which is likely to become developed and NRS 278.02598 allows the governing body, through that analysis, to distribute equitably the infrastructure development costs among those persons who wish to develop the land; and
- WHEREAS, the land in West Henderson is largely undeveloped and is likely to become developed; and
- WHEREAS, wastewater backbone infrastructure must be constructed to enable the City to provide wastewater service in the West Henderson area; and
- WHEREAS, on May 1, 2018, City Council approved amendment no.1 to an agreement between the City and Atkins North America, Inc. (the “Atkins On-Call Agreement”) for increased engineering support services on an as-needed basis; and

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- WHEREAS, task order no. 26 to the Atkins On-Call Agreement was necessary to provide strategic infrastructure planning support to determine the wastewater backbone infrastructure required to provide wastewater service to approximately 6,890 acres of land within West Henderson based on then-existing zoning (the "West Henderson Study Area"); and
- WHEREAS, the West Henderson Study Area is comprised of five (5) separate drainage basins referred to as the Bermuda, Giles pie, St. Rose, Las Vegas Boulevard and Airport Sewer Basins; and
- WHEREAS the Bermuda Sewer Basin is comprised of approximately 4,135 acres and is depicted in Exhibit A, consisting of one page, (the "Bermuda Basin Boundary") and incorporated by reference herein; and
- WHEREAS, to assist with West Henderson wastewater backbone infrastructure planning, including identifying the size, capacity and locations for the backbone sewer main construction phases and segments within the Bermuda Sewer Basin, Atkins North America, Inc. produced the West Henderson Sewer Study – Bermuda Basin, dated May 24, 2019, attached as Exhibit B, consisting of 31 pages, (the "Bermuda Basin Study") and incorporated by reference herein; and
- WHEREAS, the Bermuda Basin Study identifies an estimated total quantity of wastewater contribution equivalent to Twenty-Six Thousand, Three-Hundred Fifty-Five (26,355) Equivalent Residential Units ("ERUs") within the Bermuda Basin Boundary and furthermore identifies nine backbone infrastructure segments that are required to be constructed to provide wastewater service to properties from that infrastructure; and
- WHEREAS, to assist with identifying the estimated available capacities and costs for Segment 1, Segment 2, Segment 3 and Segment 9 (collectively, the "WH-Bermuda Wastewater Backbone Infrastructure"), Atkins North America, Inc. produced the West Henderson Phase 1 Wastewater Backbone Infrastructure Rate – Bermuda Sewer Phase 1 Analysis, dated August 29, 2019, consisting of 11 pages, the West Henderson Phase 2 Wastewater Backbone Infrastructure Rate – Bermuda Sewer Phase 2 Analysis, dated May 23, 2019, consisting of eight pages, (collectively, the "Bermuda Basin Rate Studies"), attached as Exhibit C and incorporated by reference herein; and
- WHEREAS, the estimated available capacities for Segments 1, 2, 3 and 9 are as follows: 32,338 ERUs for Segment 1; 25,386 ERUs for Segment 2; 24,565 ERUs for Segment 3; and, 15,280 ERUs for Segment 9; and

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- WHEREAS, the Bermuda Basin Rate Studies identify the engineer's opinion of probable cost for the design and construction of the WH-Bermuda Wastewater Backbone Infrastructure to be approximately Five Million, Two Hundred Thirty-Six Thousand, Four Hundred Ninety-Nine dollars (\$5,236,499.00) in 2019 dollars, which amount is comprised of One Million, Nineteen Thousand, Two Hundred Ninety-Seven dollars (\$1,019,297.00) for Segment 1; One Million, Two Hundred Sixteen Thousand, Six Hundred Forty-Four dollars (\$1,216,644.00) for Segment 2, One Million; Nine Thousand, Seven Hundred Fifty-Eight dollars (\$1,009,758.00) for Segment 3; and One Million, Nine Hundred Ninety Thousand, Eight Hundred dollars (\$1,990,800.00) for Segment 9; and
- WHEREAS, after the Bermuda Basin Rate Studies were prepared, City staff received pricing from the contractor constructing Segment 3 and Segment 9 of the WH-Bermuda Wastewater Backbone Infrastructure as follows: One Million, One Hundred Seventy-Five Thousand, Three Hundred Thirty-Nine dollars (\$1,175,339.00) for Segment 3; and One Million, Eight Hundred Ninety-Three Thousand, Three Hundred Sixty-Five dollars (\$1,893,365.00) for Segment 9; and
- WHEREAS, the City has determined that, although each customer is responsible for constructing and paying for wastewater backbone infrastructure, given the significant acreage and extensive coordination required to ensure orderly development, it provides a public benefit for the City to assume responsibility for planning and constructing the WH-Bermuda Wastewater Backbone Infrastructure and establishing rates for that infrastructure to enable the City to pay for this infrastructure through rates collected from customers who benefit from it (the "WH-Bermuda Wastewater Backbone Infrastructure Rates"); and
- WHEREAS, the City may include all costs associated with the WH-Bermuda Wastewater Backbone Infrastructure, including the types of costs identified in HMC 14.16.050.A.5.a through HMC 14.16.050.A.5.f, when calculating the rates for that infrastructure; and
- WHEREAS, in order for the City to recover the costs it has incurred and will incur to plan, design, construct and finance the WH-Bermuda Wastewater Backbone Infrastructure, the City shall establish specific rates, per ERU, with such rates being assessed to projects that benefit from the WH-Bermuda Wastewater Backbone Infrastructure; and

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WHEREAS, the initial rate for the WH-Bermuda Wastewater Backbone Infrastructure shall be based on the cumulative benefit received from each segment of backbone infrastructure constructed and shall be \$31.52 per ERU to connect to Segment 1, \$79.45 per ERU to connect to Segment 2, \$131.39 per ERU to connect to Segment 3 and \$270.83 per ERU to connect to Segment 9, and may be adjusted to reflect actual costs; and

WHEREAS, in addition, NRS 278.02598 allows the City Council to distribute equitably the infrastructure development costs among those persons who wish to develop the land, and the wastewater backbone infrastructure is also part of the City's comprehensive plan for West Henderson infrastructure; and

WHEREAS, a Business Impact Statement was posted by the City of Henderson to collect comments on potential impacts of the required contribution created by the West Henderson wastewater backbone infrastructure rates; and

WHEREAS, the City of Henderson staff addressed the comments from the Business Impact Statement in the WH-Bermuda Wastewater Backbone Infrastructure Rates; and

NOW, THEREFORE, the City Council of the City of Henderson, Nevada, does ordain:

SECTION 1. The Bermuda Basin Study and Bermuda Basin Rate Studies are hereby adopted as the analysis of the cost to plan, design and construct the WH-Bermuda Wastewater Backbone Infrastructure and, together with actual costs of WH-Bermuda Wastewater Backbone Infrastructure designed and constructed, provide the basis for the City Council to fix the WH-Bermuda Wastewater Backbone Infrastructure Rates (defined in HMC 14.18.047.B).

SECTION 2. Section 14.18.047 - West Henderson Wastewater Backbone Infrastructure Rates - is established as follows:

14.18.047 - West Henderson-Bermuda Wastewater Backbone Infrastructure Rates

A. Planning and design of wastewater backbone infrastructure for West Henderson, construction of that infrastructure, financing of that construction, and phasing of that construction are required to support wastewater service to existing and future developments in the West Henderson area. The director has the right to determine the size and capacity of that wastewater backbone infrastructure, phasing of construction of that wastewater backbone infrastructure, and method of financing the construction, taking into account projected service needs of the West Henderson area served and the need for the orderly and efficient development of the publicly-owned treatment works.

Editor's Note: Pursuant to City Charter Section 2.090(3), language to be omitted is red and enclosed in [brackets], and language proposed to be added is in blue italics and underlined.

Establish HMC Section 14.18.047 - West Henderson-Bermuda Wastewater Backbone Infrastructure Rates

B. The rates charged to projects that the city determines will receive a benefit from segment 1, segment 2, segment 3 or segment 9 of the wastewater backbone infrastructure planned, designed, constructed, and/or financed for the Bermuda Sewer Basin within West Henderson are referred to as the "segment 1 wastewater infrastructure rate," "segment 2 wastewater infrastructure rate," "segment 3 wastewater infrastructure rate" and "segment 9 wastewater infrastructure rate," respectively, and, collectively, as the "WH-Bermuda backbone wastewater infrastructure rates." The WH-Bermuda wastewater backbone infrastructure rates shall be in addition to system development and other applicable charges for wastewater service.

C. Effective November 25, 2019, all new projects that the city determines will receive a benefit from existing or future wastewater backbone infrastructure planned, designed, constructed, and/or financed for the Bermuda Sewer Basin within West Henderson shall be charged and pay the segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate and/or the segment 9 wastewater infrastructure rate, as the city determines is appropriate. The amount(s) charged shall be based upon the total ERUs proposed for the project, as reflected in the civil improvement plans for the project approved by the city, and the rate(s) used will be the one(s) in effect on the date the city processes the building permit for the project or, if a project is not required to obtain a building permit from the city, at the rate in effect on the date the city approves the civil improvement plans for the project.

D. Any project that was initiated at the city before November 25, 2019 and whose approval was conditioned on the city being paid the rate(s) established or other amount charged by the city for existing or future wastewater backbone infrastructure planned, designed, constructed, and/or financed for West Henderson shall be charged and pay the segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate and/or the segment 9 wastewater infrastructure rate, as the city determines is appropriate. The amount(s) charged shall be based upon the total ERUs proposed for the project, as reflected in the civil improvement plans for the project approved by the city, and the rate(s) used will be the one(s) in effect on the date the city processes the building permit for the project or November 25, 2019, whichever is later.

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E. Effective November 25, 2019, all projects that proceed with additional improvements to a property that result or might result in an increase in the amount of wastewater discharged to the publicly owned treatment works above that previously proposed – as reflected in the civil improvement plans, in the building permit or by other means of receiving city approval for such additional improvements – and that the city determines will receive a benefit from existing or future wastewater backbone infrastructure planned, designed, constructed, and/or financed for West Henderson shall be charged and pay the segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate and/or the segment 9 wastewater infrastructure rate, as the city determines is appropriate. Whether the improvements result or might result in an increase in the amount wastewater discharged to the publicly-owned treatment works above that previously proposed shall be determined by the director in his or her sole discretion. The rate(s) charged shall be based upon the increase in total additional ERUs associated with the property improvements and at the rate in effect on the date the city processes the building permit for the proposed improvements or, if a project is not required to obtain a building permit from the city, at the rate in effect on the date the city approves the civil improvement plans for the proposed improvements or provides its approval of the additional improvements by other means.

F. The initial segment 1 wastewater infrastructure rate shall be \$31.52 per ERU. The initial segment 2 wastewater infrastructure rate shall be \$79.45 per ERU. The initial segment 3 wastewater infrastructure rate shall be \$131.39per ERU. The initial segment 9 wastewater infrastructure rate shall be \$270.83per ERU. Initially, these rates have been based upon actual and estimated costs for the city to fund the planning, design, construction, and/or financing of the West Henderson wastewater backbone infrastructure. After construction of the particular segment is completed, the city manager may adjust the rate for that segment to reflect the actual costs to plan, design, construct, and finance the West Henderson wastewater backbone infrastructure in that segment. The city will identify the then-current segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate and/or the segment 9 wastewater infrastructure rate in the department service rules. Unless otherwise approved in writing by the director at his or her sole discretion, the rate(s) assessed shall be paid to the city when the city issues a building permit, prior to issuance of a certificate of occupancy or prior to commencement of permanent wastewater service, whichever is earliest.

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Infrastructure Rates

G. For five (5) years after a certificate of occupancy is issued for a project or an improvement is made to a project, the city has the right to audit that project to confirm that the project's average annual wastewater discharge to the publicly owned treatment works is substantially the same as the total ERUs proposed for the project or project improvement. If the city determines the project is using more capacity of the West Henderson wastewater backbone infrastructure than proposed, the city may require the original developer of the project or project improvement, as applicable, to pay the difference between the total ERUs charged the project and total ERUs actually used at the property at the segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate and/or the segment 9 wastewater infrastructure rate, as appropriate, in effect on the date the city prepares a bill for the additional payment.

H. If the segment 1 wastewater infrastructure rate, the segment 2 wastewater infrastructure rate, the segment 3 wastewater infrastructure rate or the segment 9 wastewater infrastructure rate is adjusted after the city receives a payment, the city is not obligated to true-up the payment received or to refund/collect any difference.

SECTION 3. The Bermuda Basin Study and Bermuda Basin Rate Studies meet the applicable criteria established in NRS 278.02591.2.

SECTION 4. Each project must pay City that project's equitable share of the wastewater backbone infrastructure planned, designed, constructed, and/or financed for the West Henderson in accordance with the applicable procedure in HMC Chapter 14.18, the established procedures of the City and/or through a development agreement.

SECTION 5. If any section, subsection, paragraph, clause or provision of this Ordinance shall for any reason be held invalid or unenforceable, the invalidity or unenforceability of such section or subsection, paragraph, clause or provision shall not affect any of the remaining provisions of this Ordinance.

SECTION 6. All ordinances, or parts of ordinances, sections, subsection, phrases, sentences, clauses or paragraphs contained in the Municipal Code of the City of Henderson, Nevada, in conflict herewith are repealed and replaced as appropriate.

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Infrastructure Rates

SECTION 7. A copy of this Ordinance shall be filed with the office of the City Clerk, and notice of such filing shall be published once by title in the Las Vegas Review-Journal, a newspaper having general circulation in the City of Henderson, at least ten (10) days prior to the adoption of said Ordinance, and following approval shall be published by title (or in full if the Council by majority vote so orders) together with the names of the Councilmen voting for or against passage for at least one (1) publication before the Ordinance shall become effective. This Ordinance is scheduled for publication on November 22, 2019, in the Las Vegas Review-Journal.

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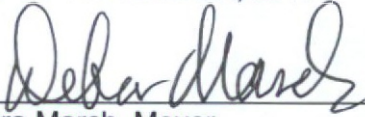
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Establish HMC Section 14.18.047 - West Henderson-Bermuda Wastewater Backbone
Infrastructure Rates

PASSED, ADOPTED, AND APPROVED THIS 19TH DAY OF NOVEMBER, 2019.


Debra March, Mayor

ATTEST:

Sabrina Mercadante, MMC, City Clerk

The above and foregoing Ordinance was first proposed and read in title to the City Council on November 5, 2019, which was a Regular Meeting, and referred to a Committee of the following Councilmen:

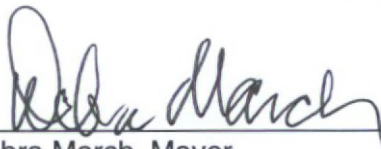
“COUNCIL AS A WHOLE”

Thereafter on November 19, 2019, said Committee reported favorably on the Ordinance and forwarded it to the Regular Meeting with a do-pass recommendation. At the Regular Meeting of the Henderson City Council held November 19, 2019, the Ordinance was read in title and adopted by the following roll call vote:

Those voting aye:

Debra March, Mayor
Councilmembers:
John F. Marz
Dan K. Shaw
Dan H. Stewart

Those voting nay: None
Those abstaining: None
Those absent: Michelle Romero

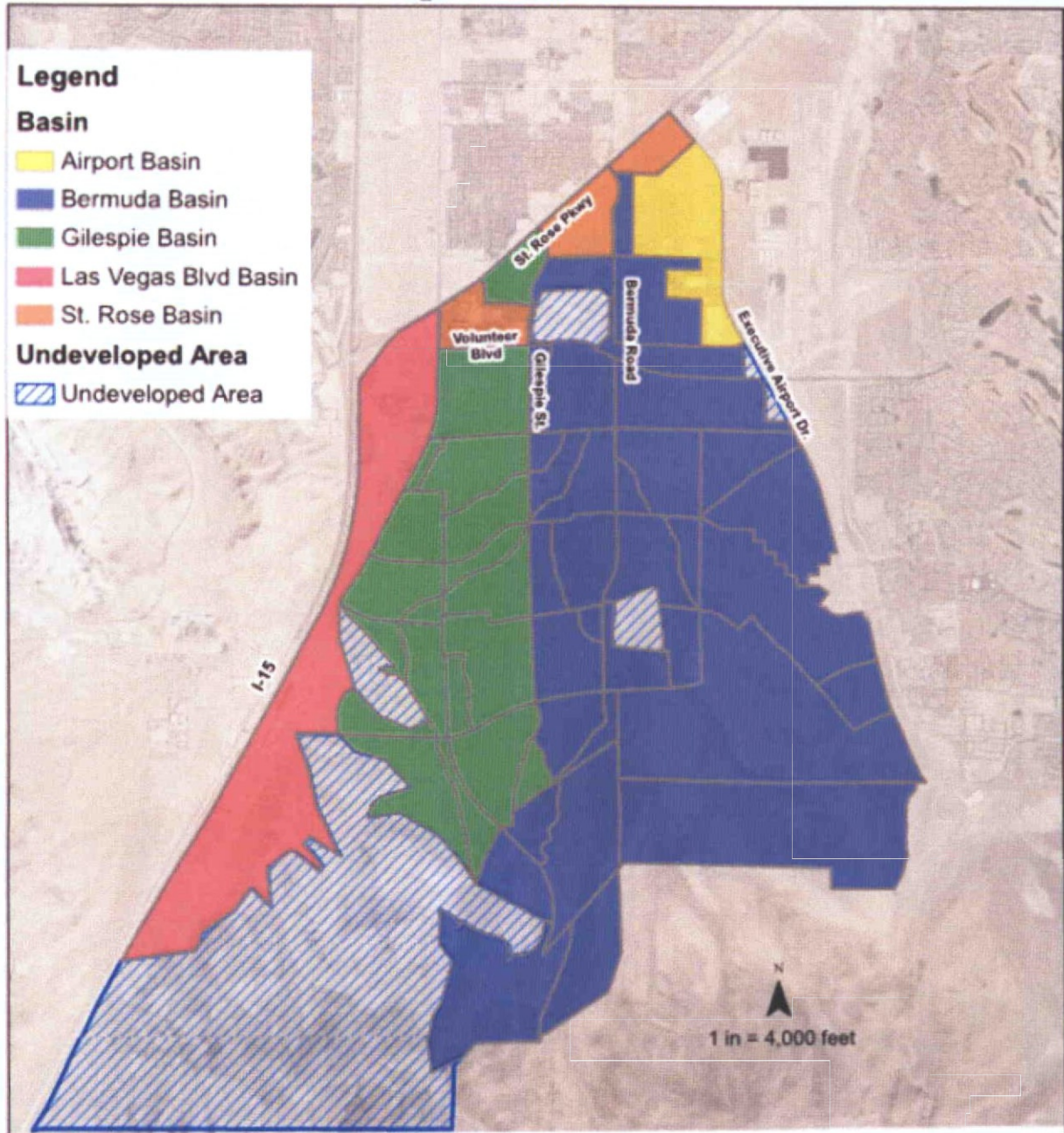

Debra March, Mayor

ATTEST:

Sabrina Mercadante, MMC, City Clerk

Exhibit A
Bermuda Basin Boundary

Figure 2 - Sewer Basins



Editor's Note: Pursuant to City Charter Section 2.090(3), language to be omitted is red and enclosed in [brackets], and language proposed to be added is in blue italics and underlined.

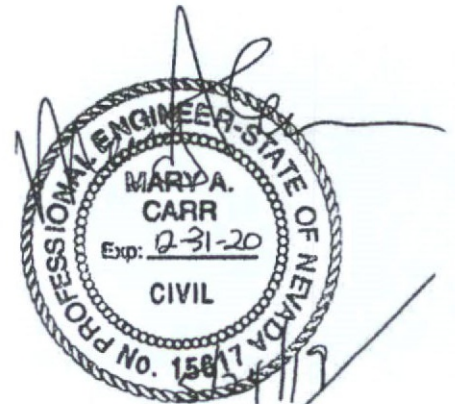
Exhibit B
Bermuda Basin Study
[Attached]

West Henderson Sewer Study

Bermuda Basin

City of Henderson

24 May 2019



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Introduction

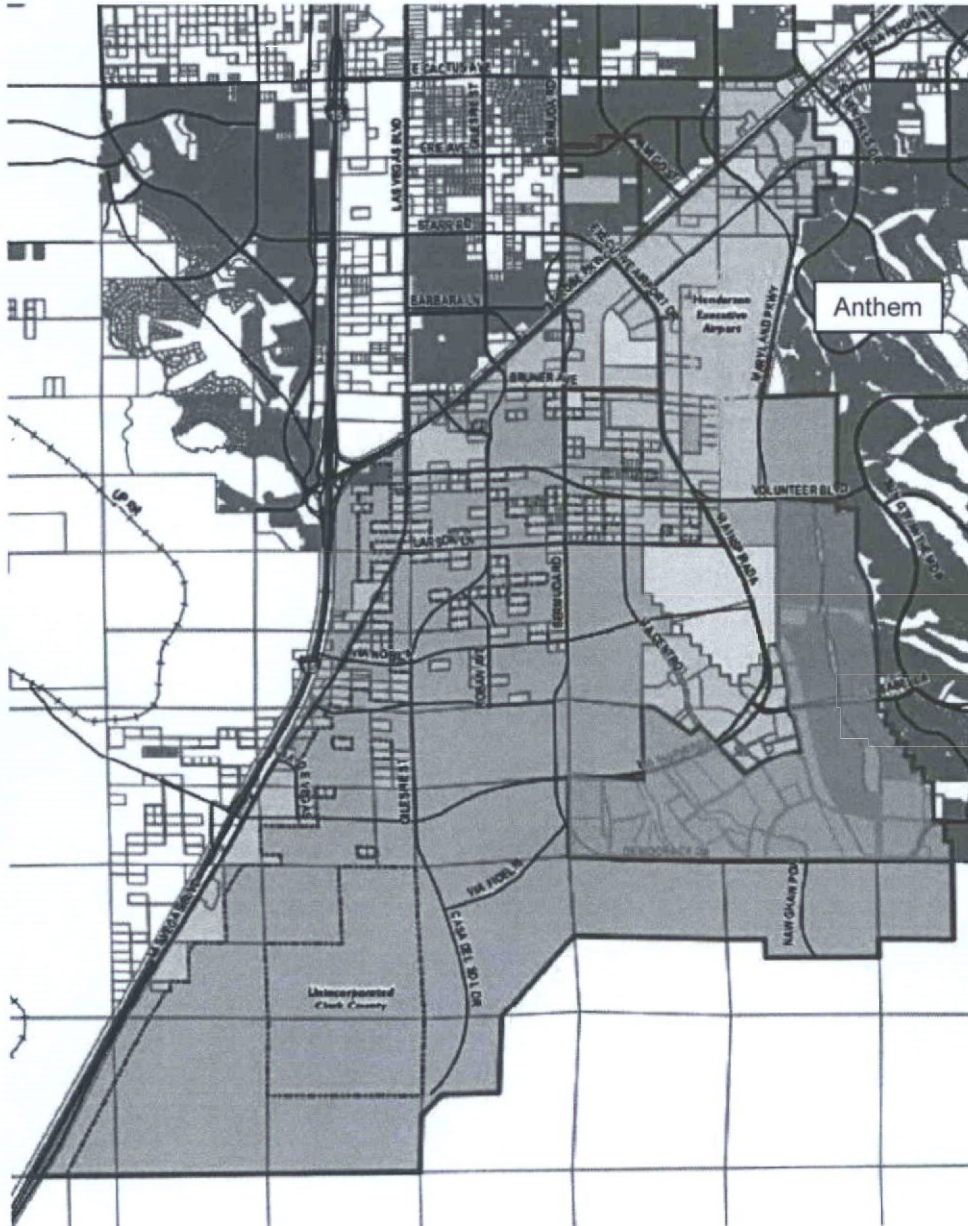
The West Henderson planning area consists of approximately 12,100 acres as identified in the City of Henderson's (City) 2017 Public Facility Needs Assessment. In order to determine the cost of the sewer backbone infrastructure to serve this area, the City needs to update the sewer master plan for the West Henderson planning area.

This report will provide the engineering basis for determining the size of the sewer infrastructure in the Bermuda Basin.

1. West Henderson Land Use

As stated above, the West Henderson planning area consists of approximately 12,100 acres. The area is located south of St. Rose Parkway, east of Interstate I-15 and west of the Anthem development as shown on Figure 1.

Figure 1 - West Henderson Planning Area



The West Henderson Land Use Plan was supplied by the City in the form of a GIS (geographic information system) map, which includes land use types shown in Table 1.

Table 1 - West Henderson Land Use Types

| ID | Land Use Type |
|-------|---------------------------------|
| NT1 | Neighborhood Type 1 |
| NT2 | Neighborhood Type 2 |
| NT3 | Neighborhood Type 3 |
| NT4 | Neighborhood Type 4 |
| PC | Planned Community |
| PS | Public / Semi Public |
| NC | Neighborhood Commercial |
| COM | Commercial |
| HC | Highway Commercial |
| EC | Employment Center |
| TC | Tourist Commercial |
| UC | Urban Center |
| MU | Gateway Mixed Use |
| TOD | Transit Oriented Development |
| CO/RD | Office / Research & Development |
| LBI | Light Business / Industry |
| IND | Industrial |
| BI | Business / Industry |

In the June 2017 West Henderson Land Use Plan Update, various Residential/Neighborhood Types were given densities or ranges of density. The following Land Use Types for residential were present in the areas for the Bermuda Basin:

Neighborhood Type 1: 4 units per gross acre

Neighborhood Type 2: 2 to 8 units per gross acre

Neighborhood Type 3: 8 to 16 units per gross acre

Neighborhood Type 4: 16 to 36 units per gross acre

Assumed densities used for the sewer analysis are presented in Table 2.

Table 2 - Residential Densities

| Type of Development | Units per Gross Acre |
|---------------------|----------------------|
| Neighborhood Type 1 | 4 |
| Neighborhood Type 2 | 6 |
| Neighborhood Type 3 | 12 |
| Neighborhood Type 4 | 26 |

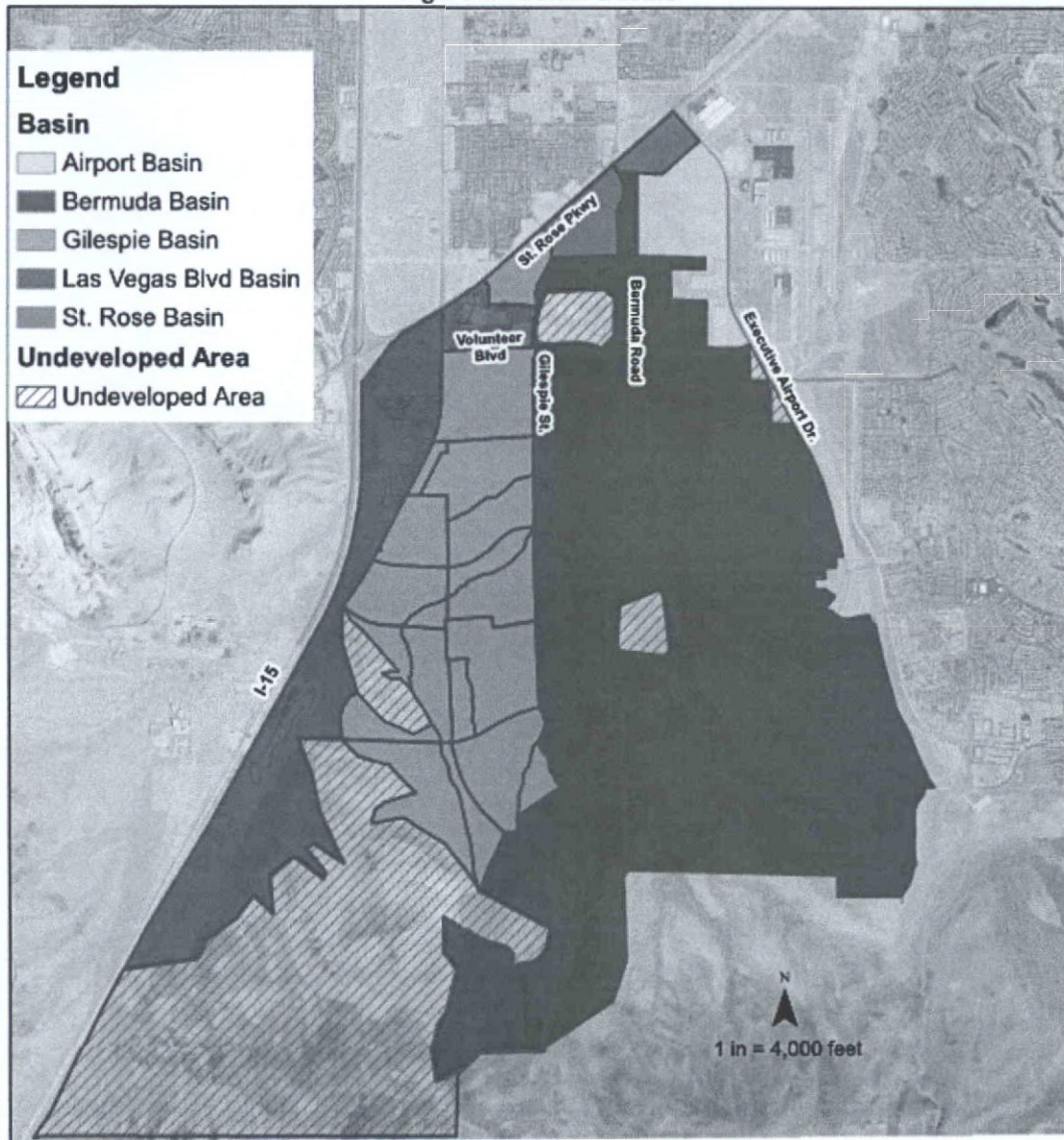
Major sewer basins in West Henderson, which are named according to the street name of the corresponding sewer alignment, include the Bermuda Basin, Gillespie Basin, St. Rose Basin, Las Vegas Boulevard Basin and Executive Airport Basin. Areas are shown on Figure 2.

Table 3 provides an estimate of the tributary acreage for each of the major sewer basins related to West Henderson.

Table 3 - Basin Areas

| Basin | Area (Acres) |
|-------------------|--------------|
| Bermuda | 4,135 |
| Gillespie | 1,490 |
| St. Rose | 155 |
| Las Vegas Blvd. | 860 |
| Executive Airport | 250 |

Figure 2 - Sewer Basins



2. Constraints

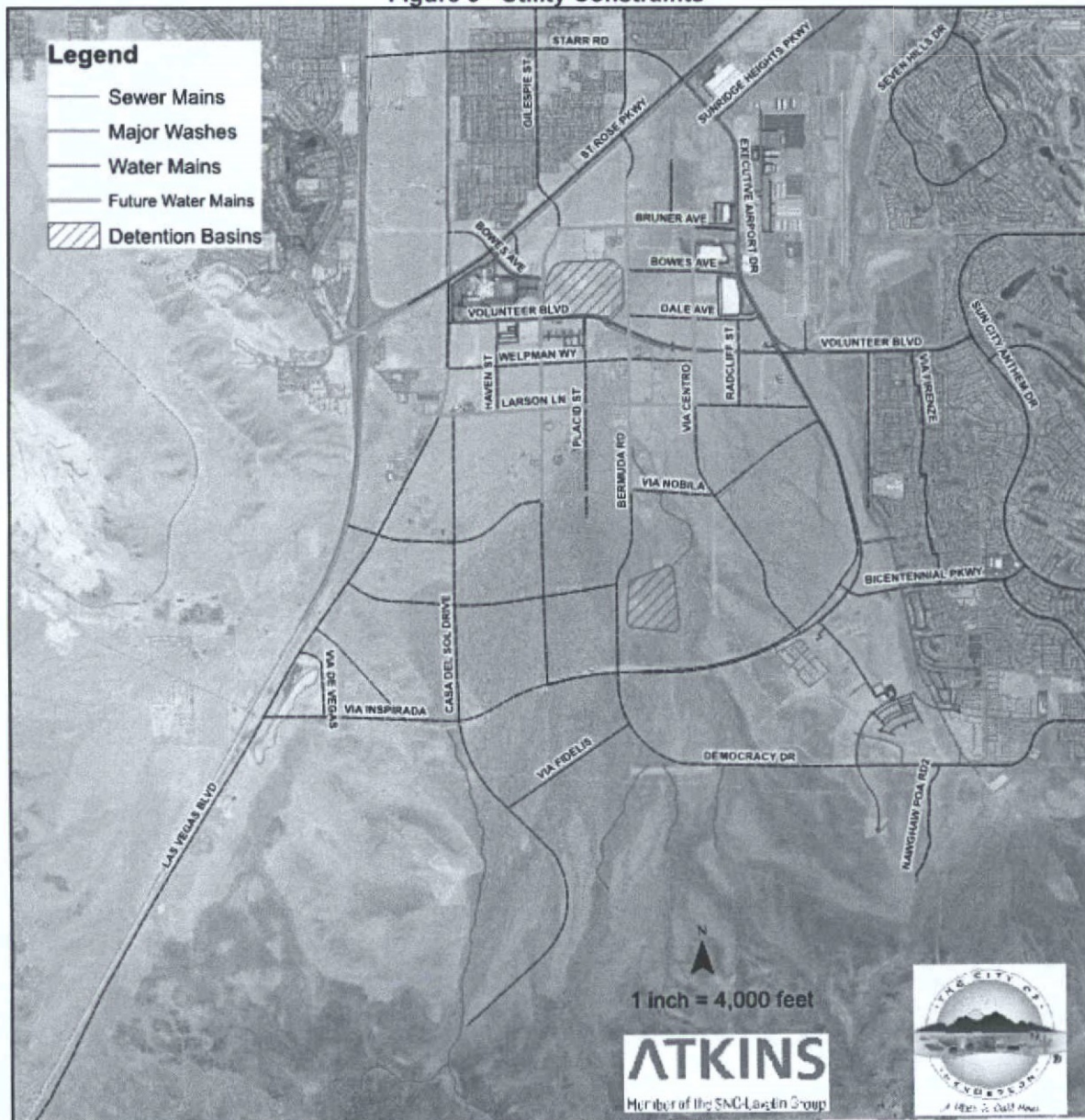
Utility constraints for the proposed Bermuda Sewer include facilities for storm drainage and water distribution, as shown on Figure 3.

In the study area there are numerous existing washes that will affect the depth of proposed sewer infrastructure. There are also existing and future detention basins that will affect future alignments. The Pittman North Detention Basin Outfall Channel is under construction on the west side of the proposed Bermuda Sewer just north of Bowes Avenue. Parcels west of Bermuda Road adjacent to the outfall channel are unable to access the Bermuda Sewer because it is on the other side of the outfall channel. A parallel sewer, which will cross the outfall channel further north, is required to serve these parcels.

A future detention basin, the North Bermuda Detention Basin, is located northeast of the intersection of Bermuda Road and Via Inspirada.

There are existing water lines and sewer lines in Volunteer Boulevard. Future pipelines are also being planned for this area.

Figure 3 - Utility Constraints



3. Wastewater Flow Projections

Wastewater flow projections are developed by applying standard wastewater contribution rates for average daily flow to the planning units from Chapter 1.

Peak flows were calculated using the ASCE (American Society of Civil Engineers) peaking factor. The following are criteria used in developing the wastewater flow projections:

- Average Flow = 250 gpd/ERU for residential or per Table 4 - Wastewater Contribution Rates for non-residential
- Peaking Factor = $[(\text{Average Flow in million gallons per day (MGD)})^{-0.0956}] 2.6186$

- Peak Dry Weather Flow = [(Average Flow in MGD)^{0.9044}] 2.6186
- Peak Wet Weather Flow = Peak Dry Weather Flow * 1.25
- Maximum depth/Diameter (d/D) = 0.75 with peak wet weather flow.
- Manning's n value = 0.013
- Downstream pipes sizes are equal to or greater diameter

Table 4 - Wastewater Contribution Rates

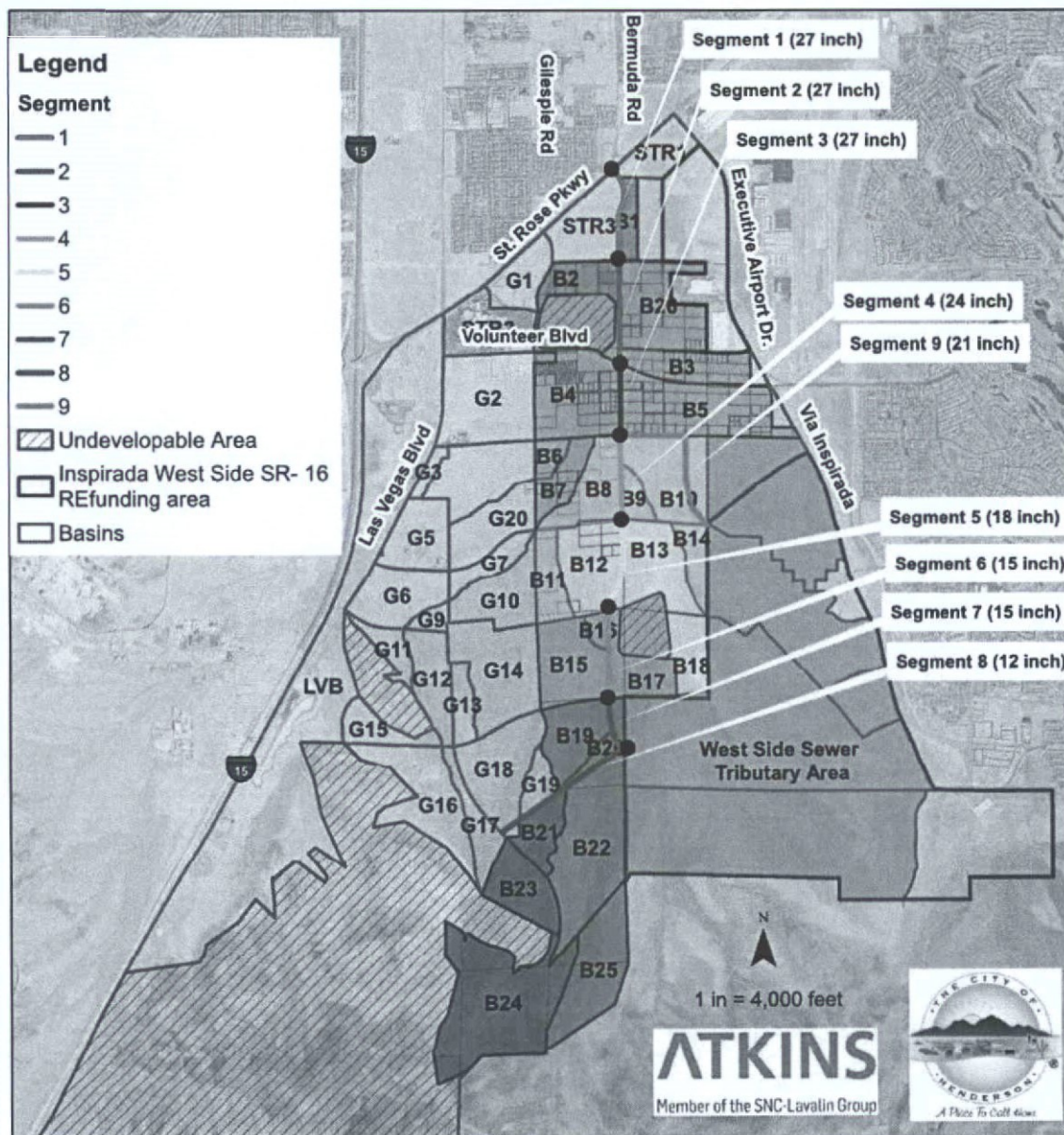
| Code | Description | ERU Equivalent Residential Unit (ERU/unit) | Sewer Contribution Rate | Unit |
|-------|--|--|-------------------------------|--------------|
| DRL | Downtown Low Density Residential | 1.0 | 0 | gal/day/ERU |
| DRM | Downtown medium density residential | 1.0 | 0 | gal/day/ERU |
| DR | Downtown high density residential | 0.7 | 0 | gal/day/ERU |
| DHC | Downtown highway commercial | | 2,000 | gal/day/acre |
| DCC | Downtown core commercial | | 2,000 | gal/day/acre |
| DP | Downtown public/semi-public | | 2,000 | gal/day/acre |
| RNP-1 | Rural neighborhood preservation 1 du/ac | 1.0 | 0 | gal/day/ERU |
| RNP-2 | Rural neighborhood preservation 2 du/ac | 1.0 | 0 | gal/day/ERU |
| VLDR | Very low density residential | 1.0 | 0 | gal/day/ERU |
| LDR | Low density residential | 1.0 | 0 | gal/day/ERU |
| MDR | Medium density residential | 0.7 | 0 | gal/day/ERU |
| HDR | High density residential | 0.7 | 0 | gal/day/ERU |
| NT1 | Neighborhood type 1 | 1.0 | 0 | gal/day/ERU |
| NT2 | Neighborhood type 2 | 1.0 | 0 | gal/day/ERU |
| NT3 | Neighborhood type 3 | 1.0 | 0 | gal/day/ERU |
| NT4 | Neighborhood type 4 | 0.7 | 0 | gal/day/ERU |
| PC | Planned community | 1.0 | 0 | gal/day/ERU |
| PS | Public/semi public | | 2,000 | gal/day/acre |
| NC | Neighborhood commercial | | 2,000 | gal/day/acre |
| COM | Commercial | | 2,000 | gal/day/acre |
| HC | Highway commercial | | 2,000 | gal/day/acre |
| EC | Employment center | | 2,000 | gal/day/acre |
| TC | Tourist commercial | | 2,000 | gal/day/acre |

| | | | | |
|-------|-------------------------------|--|-------|--------------|
| UC | Urban center | | 4,000 | gal/day/acre |
| MU | Gateway mixed use | | 3,000 | gal/day/acre |
| TOD | Transit oriented development | | 2,000 | gal/day/acre |
| CO/RD | Office/research & development | | 2,000 | gal/day/acre |
| LBI | Light business/industry | | 2,000 | gal/day/acre |
| IND | Industrial | | 3,000 | gal/day/acre |
| BI | Business/industry | | 2,000 | gal/day/acre |

The major sewer basins are further divided into sub-basins as shown on Figure 4. Bermuda Basin sub-basins have a B prefix such as B1, B2, etc. and Giles pie Basin sub-basins have a G prefix, etc. The sewer pipe is divided in nine segments as follows:

- Segment 1 – Bermuda Road from St. Rose Parkway to Bruner Avenue – 2,660 feet
- Segment 2 – Bermuda Road from Bruner Avenue to Volunteer Boulevard – 3,175 feet
- Segment 3 – Bermuda Road from Volunteer Boulevard to Larson Lane – 2,170 feet
- Segment 4 – Bermuda Road from Larson Lane to Via Nobila – 2,590 feet
- Segment 5 – Bermuda Road from Via Nobila and to the south 2,900 feet – 2,900 feet
- Segment 6 – Bermuda Road from 2,900 feet south of Via Nobila to Via Inspirada – 2,660 feet
- Segment 7 – Bermuda Road from Via Inspirada to Via Fidelis – 1,610 feet
- Segment 8 – Via Fidelis from Giles pie Road to Bermuda Road – 2,400 feet
- Segment 9 – Larson Lane and Via Centro – 5,250 feet

Figure 4 - Bermuda Sewer Segments and Tributary Sub-basins



Wastewater flow projections, and the allocation of such, are shown in Table 5.

Table 5 - Wastewater Flow Projections

| BASIN/ PARCEL | CATEGORY | DENSITY | LANDUSE | AREA (acres) | UNITS | AVE. FLOW (GPD) | TOTAL IN BASIN (GPD) | ERU IN SUBBASIN |
|------------------|----------|---------|---------|-----------------|--------|--------------------|-------------------------|--------------------|
| B1 | | | | | | | 155293.5269 | 621.17 |
| | 1 MDR | 12 | NT3 | 0.00 | 0.00 | 0.16 | | |
| | 2 MDR | 26 | NT4 | 0.62 | 16.15 | 2875.38 | | |
| | 3 MDR | 26 | NT4 | 3.52 | 91.52 | 16015.42 | | |
| | 4 BI | 0 | BI | 0.00 | | 3.35 | | |
| | 4 COM | 0 | UC | 19.24 | | 76960.00 | | |
| | 5 BI | 0 | EC | 29.74 | | 59489.22 | | |
| B2 | | | | | | | 125959.07 | 503.84 |
| | 1 MDR | 26 | NT4 | 4.18 | 108.68 | 19019.00 | | |
| | 2 MDR | 12 | NT3 | 2.41 | 28.92 | 7230.00 | | |
| | 3 MDR | 12 | NT3 | 2.96 | 35.40 | 8850.00 | | |
| | 4 BI | 0 | BI | 0.00 | | 0.01 | | |
| | 5 BI | 0 | BI | 0.00 | | 0.05 | | |
| | 6 MDR | 12 | NT3 | 4.35 | 52.20 | 13050.00 | | |
| | 7 COM | 0 | NC | 1.82 | | 3640.00 | | |
| | 8 COM | 0 | NC | 0.00 | | 0.00 | | |
| | 9 PS | 0 | PS | 28.88 | | 57760.00 | | |
| | 10 MDR | 12 | NT3 | 5.47 | 65.64 | 16410.00 | | |
| B3 | | | | | | | 227722.8754 | 910.89 |
| | 1 BI | 0 | BI | 0.04 | | 80.74 | | |
| | 2 BI | 0 | BI | 0.29 | | 770.19 | | |
| | 3 MDR | 26 | NT4 | 14.30 | 371.72 | 65050.19 | | |
| | 4 COM | 0 | COM | 8.96 | | 17918.69 | | |
| | 5 MDR | 12 | NT3 | 16.21 | 194.53 | 48632.11 | | |
| | 6 PS | 0 | PS | 14.21 | | 28429.01 | | |
| | 7 BI | 0 | EC | 33.42 | | 66841.58 | | |
| B4 | | | | | | | 241698.4834 | 966.79 |
| | 1 MDR | 12 | NT3 | | 0.00 | 0.00 | | |
| | 2 MDR | 12 | NT3 | | 0.00 | 0.00 | | |
| | 3 COM | 0 | UC | 0.01 | | 28.96 | | |
| | 4 PS | 0 | PS | 2.24 | | 4484.84 | | |
| | 5 COM | 0 | COM | 5.87 | | 11738.21 | | |
| | 6 MDR | 12 | NT3 | | 0.00 | 0.00 | | |
| | 7 LDR | 6 | NT2 | 99.14 | 594.83 | 148706.93 | | |
| | 8 PS | 0 | PS | 15.24 | | 30481.24 | | |
| | 9 PS | 0 | PS | 23.13 | | 46258.20 | | |
| B5 | | | | | | | 426309.2978 | 1705.24 |
| | 1 PS | 0 | PS | 0.75 | | 1495.74 | | |
| | 2 PS | 0 | PS | 1.13 | | 2264.40 | | |
| | 3 MDR | 12 | NT3 | 0.12 | 1.42 | 354.59 | | |
| | 4 MDR | 26 | NT4 | 19.11 | 496.76 | 86932.46 | | |
| | 5 LDR | 6 | NT2 | 39.46 | 236.74 | 59184.01 | | |
| | 6 MDR | 12 | NT3 | 28.60 | 343.15 | 85788.44 | | |
| | 7 COM | 0 | COM | 10.38 | | 20760.47 | | |
| | 8 PS | 0 | PS | 8.10 | | 16209.35 | | |
| | 9 BI | 0 | EC | 76.66 | | 153319.84 | | |
| B6 | | | | | | | 39561.48175 | 158.25 |
| | 1 MDR | 12 | NT3 | 4.84 | 58.07 | 14516.68 | | |
| | 2 LDR | 6 | NT2 | 13.58 | 81.46 | 20365.44 | | |
| | 3 COM | 0 | COM | 2.34 | | 4679.36 | | |
| B7 | | | | | | | 78392.52924 | 313.57 |
| | 1 MDR | 12 | NT3 | 1.79 | 21.48 | 5369.51 | | |
| | 2 LDR | 6 | NT2 | 35.61 | 213.68 | 53420.51 | | |
| | 3 PS | 0 | PS | 5.37 | | 10735.03 | | |
| | 4 PS | 0 | PS | 1.73 | | 3464.63 | | |
| | 5 COM | 0 | COM | 2.55 | | 5090.32 | | |
| | 6 COM | 0 | NC | 0.16 | | 312.51 | | |
| B8 | | | | | | | 188005.5328 | 752.02 |
| | 1 LDR | 6 | NT2 | 20.77 | 124.63 | 31157.77 | | |
| | 2 LDR | 6 | NT2 | 1.13 | 6.78 | 1695.83 | | |
| | 3 PS | 0 | PS | 44.79 | | 89578.93 | | |
| | 4 PS | 0 | PS | 4.00 | | 8009.33 | | |
| | 5 MDR | 12 | NT3 | 0.11 | 1.37 | 343.67 | | |
| | 6 COM | 0 | NC | 4.85 | | 9692.83 | | |
| | 7 MDR | 12 | NT3 | 2.34 | 28.13 | 7033.29 | | |
| | 8 MDR | 12 | NT3 | 11.48 | 137.76 | 34440.25 | | |
| | 9 COM | 0 | NC | 3.03 | | 6053.63 | | |
| B9 | | | | | | | 60671.84209 | 242.89 |
| | 1 MDR | 12 | NT3 | 0.11 | 1.33 | 331.83 | | |
| | 2 PS | 0 | PS | 27.68 | | 55368.20 | | |
| | 3 MDR | 12 | NT3 | 1.66 | 19.89 | 4971.82 | | |

Table 5 – Wastewater Flow Projections Continued

| BASIN/ PARCEL | CATEGORY | DENSITY | LANDUSE | AREA (acres) | UNITS | AVE. FLOW (GPD) | TOTAL IN BASIN (GPD) | ERU IN SUBBASIN |
|------------------|----------|---------|---------|-----------------|--------|--------------------|-------------------------|--------------------|
| B10 | | | | | | | 281580.6011 | 1126.32 |
| 1 | BI | | 0 BI | 13.74 | | 27485.49 | | |
| 2 | COM | | 0 UC | 0.10 | | 409.37 | | |
| 3 | PS | | 0 PS | 0.00 | | 5.57 | | |
| 4 | PS | | 0 PS | 0.04 | | 88.38 | | |
| 5 | HDR | 26 | NT4 | 1.41 | 36.55 | 6395.81 | | |
| 6 | BI | | 0 BI | | | 0.00 | | |
| 7 | MDR | 12 | NT3 | 0.68 | 8.18 | 2044.69 | | |
| 8 | PS | | 0 PS | 115.06 | | 230110.34 | | |
| 9 | MDR | 12 | NT3 | 4.98 | 59.71 | 14926.62 | | |
| 10 | BI | | 0 EC | 0.06 | | 114.33 | | |
| B11 | | | | | | | 96663.44208 | 386.65 |
| 1 | COM | | 0 COM | 5.73 | | 11467.69 | | |
| 2 | LDR | 6 | NT2 | 43.83 | 262.96 | 65741.17 | | |
| 3 | PS | | 0 PS | 5.28 | | 10566.82 | | |
| 4 | COM | | 0 NC | 4.44 | | 8887.77 | | |
| B12 | | | | | | | 170991.1469 | 683.96 |
| 1 | COM | | 0 COM | 2.45 | | 4903.86 | | |
| 2 | LDR | 6 | NT2 | 80.34 | 482.04 | 120510.50 | | |
| 3 | PS | | 0 PS | 15.40 | | 30800.47 | | |
| 4 | PS | | 0 PS | 0.82 | | 1647.50 | | |
| 5 | PS | | 0 PS | 6.56 | | 13128.83 | | |
| B13 | | | | | | | 246451.1125 | 985.80 |
| 1 | COM | | 0 COM | 0.26 | | 516.65 | | |
| 2 | MDR | | 0 NT3 | 0.00 | 0.04 | 11.12 | | |
| 3 | LDR | 6 | NT2 | 6.74 | 40.42 | 10104.53 | | |
| 4 | MDR | 12 | NT3 | 7.77 | 93.18 | 23295.62 | | |
| 5 | PS | | 0 PS | 103.16 | | 206321.07 | | |
| 6 | HDR | 26 | NT4 | 1.36 | 35.44 | 6202.22 | | |
| B14 | | | | | | | 126840.6318 | 507.36 |
| 1 | HDR | 26 | NT4 | 5.45 | 141.61 | 24782.22 | | |
| 2 | COM | | 0 NC | 3.83 | | 7653.89 | | |
| 3 | MDR | 12 | NT3 | 16.27 | 195.27 | 48817.36 | | |
| 4 | PS | | 0 PS | 2.10 | | 4191.60 | | |
| 5 | HDR | 26 | NT4 | 9.10 | 236.55 | 41395.55 | | |
| B15 | | | | | | | 221043.3093 | 884.17 |
| 1 | COM | | 0 COM | 106.38 | | 212769.94 | | |
| 2 | COM | | 0 COM | 2.22 | | 4430.33 | | |
| 3 | COM | | 0 NC | 0.49 | | 989.30 | | |
| 4 | PS | | 0 PS | 0.02 | | 49.97 | | |
| 5 | LDR | 6 | NT2 | 1.68 | 10.10 | 2524.99 | | |
| 6 | LDR | 6 | NT2 | 0.19 | 1.12 | 278.78 | | |
| B16 | | | | | | | 34973.52468 | 139.89 |
| 1 | COM | | 0 COM | 17.49 | | 34973.52 | | |
| B17 | | | | | | | 136130.4312 | 544.52 |
| 1 | COM | | 0 COM | 67.30 | | 134609.41 | | |
| 2 | PS | | 0 PS | 0.44 | | 875.08 | | |
| 3 | MDR | 8 | PC | 0.30 | 2.43 | 607.34 | | |
| 4 | LDR | 6 | NT2 | 0.03 | 0.15 | 38.61 | | |
| B18 | | | | | | | 118250.9008 | 473.00 |
| 1 | COM | | 0 COM | 58.30 | | 116594.57 | | |
| 2 | MDR | | 0 NT3 | 0.03 | 0.31 | 76.37 | | |
| 3 | MDR | 8 | PC | 0.12 | 0.97 | 243.70 | | |
| 4 | MDR | 12 | NT3 | 0.02 | 0.30 | 74.26 | | |
| 5 | PS | | 0 PS | 0.36 | | 722.88 | | |
| 6 | HDR | 26 | NT4 | 0.12 | 3.08 | 539.13 | | |
| B19 | | | | | | | 132651.6229 | 530.61 |
| 1 | COM | | 0 COM | 0.14 | | 279.94 | | |
| 2 | COM | | 0 NC | 1.62 | | 3233.23 | | |
| 3 | PS | | 0 PS | 20.31 | | 40621.53 | | |
| 4 | PS | | 0 PS | 14.22 | | 28441.01 | | |
| 5 | LDR | 6 | NT2 | 9.12 | 54.73 | 13681.88 | | |
| 6 | LDR | 6 | NT2 | 29.65 | 177.93 | 44481.49 | | |
| 7 | LDR | 6 | NT2 | 0.58 | 3.46 | 866.10 | | |
| 8 | LDR | 4 | NT1 | 1.05 | 4.19 | 1046.46 | | |
| B20 | | | | | | | 49536.08275 | 198.14 |
| 1 | PS | | 0 PS | 22.45 | | 44893.82 | | |
| 2 | LDR | 6 | NT2 | 0.02 | 0.11 | 27.03 | | |
| 3 | LDR | 4 | NT1 | 4.62 | 18.46 | 4615.23 | | |
| B21 | | | | | | | 97227.38749 | 388.91 |
| 1 | PS | | 0 PS | 42.71 | | 85414.41 | | |
| 2 | LDR | 4 | NT1 | 11.76 | 47.03 | 11756.77 | | |
| 3 | LDR | 4 | NT1 | 0.06 | 0.22 | 56.20 | | |

[illegible]

4. Sewer Analysis

The profile of a portion of the proposed sewer in Bermuda Road from approximately 600 feet south to 1,200 feet north Bruner Avenue will prevent certain parcels west of Bermuda Road from connecting into the pipeline because of a storm drain that is west of the sewer line. For various reasons, groups of parcels are excluded from the Bermuda Basin. The parcels shown below in Table 6 will require a parallel sewer to St. Rose and are not included in the calculation of ERUs for the Bermuda alignment.

Table 6 - Parcels Tributary to St. Rose Sewer

| Parcel | Name | Acreage | Land Use |
|----------------|-------------------|---------|----------|
| 191-04-801-006 | Western Henderson | 3.81 | UC |
| 191-04-801-005 | Western Henderson | 4.37 | UC |
| 191-04-801-003 | Western Henderson | 4.37 | UC |
| 191-04-801-012 | Western Henderson | 50.43 | UC |
| 191-04-801-008 | Western Henderson | 4.37 | UC |
| 191-04-801-007 | Western Henderson | 4.19 | UC |
| 191-04-703-001 | Western Henderson | 0.97 | UC |
| 191-04-703-002 | Western Henderson | 1 | UC |
| 191-04-703-003 | Western Henderson | 1.04 | UC |
| 191-04-703-004 | Western Henderson | 0.77 | UC |

The parcels shown in Table 7 will require a parallel sewer line in Bermuda and will connect into the Bermuda Sewer in Basin 1 where the storm drain alignment allows for connection.

Table 7 - Parcels Tributary to Segment 1 via Parallel Sewer

| Parcel | Name | Acreage | Land Use |
|----------------|--------------------------------|---------|----------|
| 191-09-501-005 | Keith Evans -Lion habitat | 4.37 | NT3 |
| 191-09-501-002 | Crystal Capital | 1.9 | NT3 |
| 191-09-501-003 | Keith Evans -Lion habitat | 1.76 | NT3 |
| 191-09-601-005 | USA Portion for LVVWD facility | 28.88 | PS |
| 191-09-501-001 | Paradise Oasis | 5 | NT3 |
| 191-09-501-008 | D F & L M LLC | 2.08 | NT3 |
| 191-09-501-009 | D F & L M LLC | 2.08 | NT3 |
| 191-09-501-007 | E K M LLC | 1.93 | NT4 |
| 191-09-501-006 | E K M LLC | 2.07 | NT4 |

The ERUs of parcels shown in Table 8 are existing developments that will flow into the Giles pie Sewer and are not included in the calculation of ERUs and flows for the Bermuda alignment. Parcels in Table 8 were originally in sub-basin B4.

Table 8 - Parcels Tributary to Giles pie Sewer

| Parcel | Name | Acreage | Land Use |
|----------------|---------------------------|---------|----------|
| 191-09-701-001 | 205 Volunteer LLC | 4.3 | COM |
| Various APN | Single Family Development | 14.56 | NT2 |

SewerCAD was used to model the flows projected for the Bermuda Sewer. The average flows were applied to selected manholes according to Table 9.

Table 9 - Wastewater Flow Allocation

| Basin | Sub-basins in each Basin | Total in Sub-basin (gpd) | ERUs in Sub-basin | ERUs for Basin | Manhole |
|-------|--------------------------|--------------------------|-------------------|----------------|---------|
| 1 | B1 | 155,294 | 621 | 1,125 | 6A |
| | B2 | 125,959 | 504 | | |
| 2 | | | | 2,016 | 12 |
| | B26 | 1,105 | 1,105 | | |
| | B3 | 227,723 | 911 | | |
| 3 | | | | 3,144 | 21 |
| | B4 | 241,698 | 967 | | |
| | B5 | 426,309 | 1,705 | | |
| | B6 | 39,561 | 158 | | |
| | B7 | 78,393 | 314 | | |
| 4 | | | | 3,015 | 26 |
| | B8 | 188,006 | 752 | | |
| | B9 | 60,672 | 243 | | |
| | B10 | 281,581 | 1,126 | | |
| | B11 | 96,663 | 387 | | |
| 5 | B14 | 126,841 | 507 | | |
| | | | | 2,143 | 33 |
| | B12 | 170,991 | 684 | | |
| | B13 | 246,451 | 986 | | |
| 6 | B18 | 118,251 | 473 | | |
| | | | | 1,569 | 36 |
| | B15 | 221,043 | 884 | | |

| | | | | | |
|-------------|-----------|---------|-------|--------|-----|
| | B16 | 34,974 | 140 | | |
| | B17 | 136,130 | 545 | | |
| 7 | | | | 1,922 | 39 |
| | B20 | 49,536 | 198 | | |
| | B22 | 297,680 | 1,191 | | |
| | B25 | 626 | 3 | | |
| | B19 | 132,652 | 531 | | |
| 8 | | | | 2,382 | 40 |
| | B21 | 97,227 | 389 | | |
| | B23 | 140,410 | 562 | | |
| | B24 | 357,865 | 1,431 | | |
| 9 | | | | | |
| | B27 | 184,923 | 740 | 9,040 | 103 |
| | Inspirada | | 8,300 | | |
| Grand Total | | | | 26,355 | |

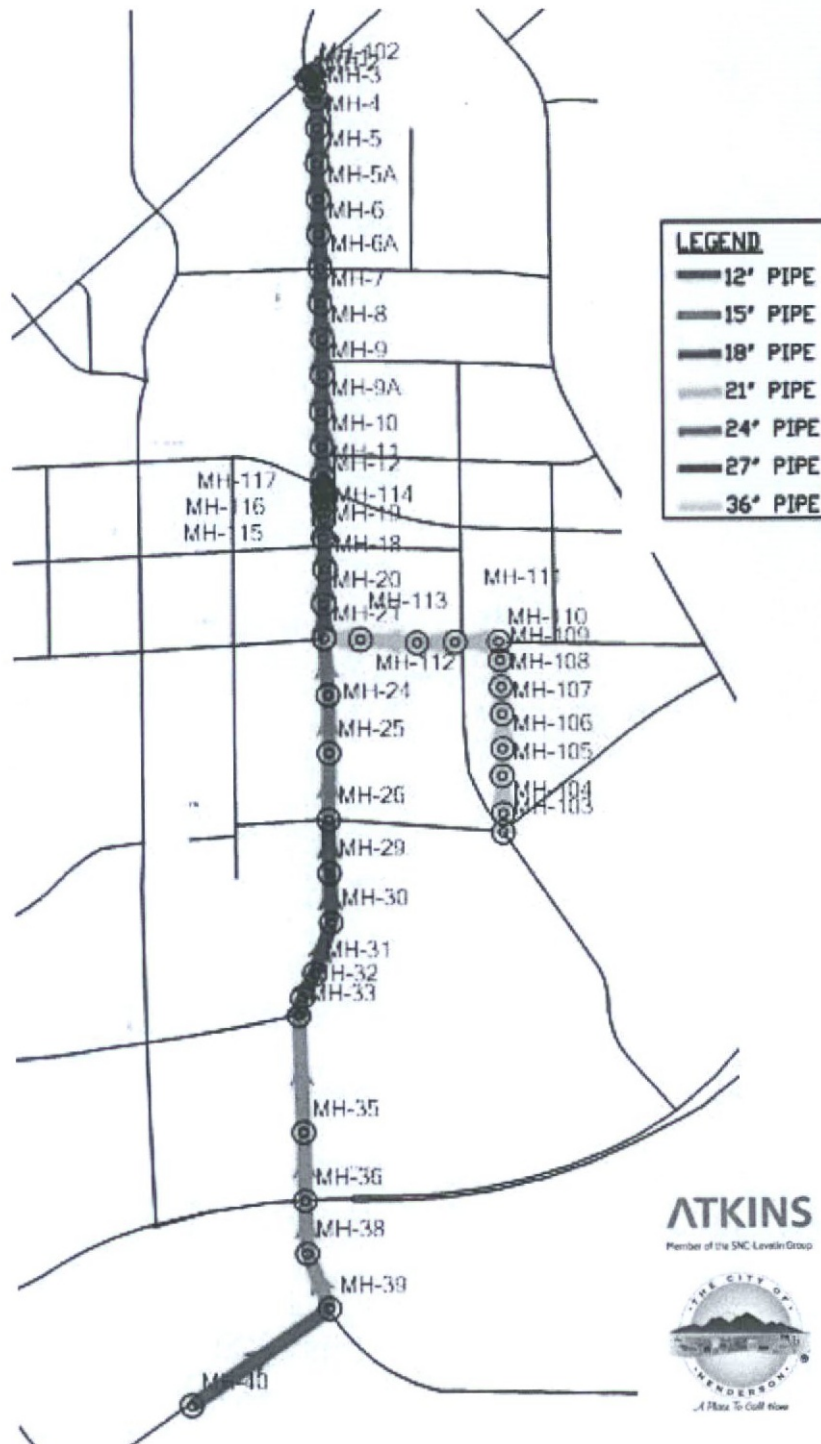
Table 10 shows the pipe diameters and ERUs for each segment of the Bermuda Sewer.

Table 10 - Bermuda Sewer Segments

| Segment | Description | Pipeline Length (ft) | Diameter (in) | Direct ERUs | Cumulative ERUs |
|---------|---|----------------------|---------------|-------------|-----------------|
| 1 | St. Rose to Bruner | 2,660 | 27 | 1,125 | 26,355 |
| 2 | Bruner to Volunteer | 3,175 | 27 | 2,016 | 25,230 |
| 3 | Volunteer to Larson | 2,170 | 27 | 3,144 | 23,214 |
| 4 | Larson to Via Nobila | 2,590 | 24 | 3,015 | 11,030 |
| 5 | Via Nobila to south for 2900 FT | 2,900 | 18 | 2,143 | 8,015 |
| 6 | 2900 South of Via Nobila to Via Inspirada | 2,660 | 15 | 1,569 | 5,873 |
| 7 | Via Inspirada to Via Fidelis | 1,610 | 15 | 1,922 | 4,304 |
| 8 | Via Fidelis- Bermuda to Gillespie | 2,400 | 12 | 2,382 | 2,382 |
| 9 | Larson Lane and Via Centro | 5,250 | 21 | 9,040 | 9,040 |
| | Totals | 25,415 | | 26,355 | |

Reports are attached showing the output tables for manholes, pipes, and outflow for average flow and peak wet weather flow. Pipe diameters for the Bermuda Sewer are shown in Figure 5.

Figure 5 - Bermuda Sewer Pipe Diameters



Appendix SewerCAD Data

West Henderson
FlexTable: Conduit Table
Active Scenario: Average Flow

| Label | Start Node | Invert (Start) (ft) | Stop Node | Invert (Stop) (ft) | Length (User Defined) (ft) | Length (Scaled) (ft) | Slope (Calculate d) (ft/ft) | Diameter (in) | Manning's n | Flow (MGD) | Velocity (ft/s) | d/D | Capacity (Design) (MGD) |
|-------|------------|---------------------|-----------|--------------------|----------------------------|----------------------|-----------------------------|---------------|-------------|------------|-----------------|-------|-------------------------|
| P-39 | MH-40 | 2,653.00 | MH-39 | 2,618.00 | | 2,398.7 | 0.0146 | 12.0 | 0.013 | 0.60 | 4.36 | 0.314 | 2.54 |
| P-34 | MH-35 | 2,568.00 | MH-33 | 2,535.00 | | 1,678.5 | 0.0197 | 15.0 | 0.013 | 1.47 | 6.14 | 0.341 | 5.34 |
| P-35 | MH-36 | 2,586.00 | MH-35 | 2,568.00 | | 980.3 | 0.0184 | 15.0 | 0.013 | 1.47 | 5.99 | 0.348 | 5.16 |
| P-37 | MH-38 | 2,600.00 | MH-36 | 2,586.00 | | 766.3 | 0.0183 | 15.0 | 0.013 | 1.08 | 5.48 | 0.296 | 5.15 |
| P-38 | MH-39 | 2,618.00 | MH-38 | 2,600.00 | | 841.7 | 0.0214 | 15.0 | 0.013 | 1.08 | 5.80 | 0.284 | 5.57 |
| P-28 | MH-26 | 2,484.00 | MH-29 | 2,494.00 | | 757.1 | 0.0132 | 18.0 | 0.013 | 2.00 | 5.72 | 0.346 | 7.12 |
| P-29 | MH-29 | 2,494.00 | MH-30 | 2,509.00 | | 707.7 | 0.0212 | 18.0 | 0.013 | 2.00 | 6.78 | 0.305 | 9.01 |
| P-30 | MH-30 | 2,509.00 | MH-31 | 2,525.00 | | 766.5 | 0.0209 | 18.0 | 0.013 | 2.00 | 6.75 | 0.307 | 8.95 |
| P-31 | MH-31 | 2,525.00 | MH-32 | 2,530.00 | | 379.4 | 0.0132 | 18.0 | 0.013 | 2.00 | 5.72 | 0.346 | 7.11 |
| P-32 | MH-33 | 2,535.00 | MH-32 | 2,530.00 | | 287.5 | 0.0174 | 18.0 | 0.013 | 2.00 | 6.31 | 0.322 | 8.16 |
| P-109 | MH-103 | 2,561.90 | MH-104 | 2,559.23 | 190.7 | 261.7 | 0.0140 | 21.0 | 0.013 | 2.26 | 5.97 | 0.293 | 11.05 |
| P-110 | MH-104 | 2,559.23 | MH-105 | 2,548.66 | 501.5 | 535.4 | 0.0211 | 21.0 | 0.013 | 2.26 | 6.91 | 0.263 | 13.56 |
| P-111 | MH-105 | 2,548.66 | MH-106 | 2,538.06 | 494.0 | 388.0 | 0.0215 | 21.0 | 0.013 | 2.26 | 6.95 | 0.262 | 13.68 |
| P-112 | MH-106 | 2,538.06 | MH-107 | 2,527.46 | 494.0 | 491.2 | 0.0215 | 21.0 | 0.013 | 2.26 | 6.95 | 0.262 | 13.68 |
| P-113 | MH-107 | 2,527.46 | MH-108 | 2,516.86 | 494.0 | 389.8 | 0.0215 | 21.0 | 0.013 | 2.26 | 6.95 | 0.262 | 13.68 |
| P-114 | MH-108 | 2,516.86 | MH-109 | 2,506.26 | 494.0 | 381.6 | 0.0215 | 21.0 | 0.013 | 2.26 | 6.95 | 0.262 | 13.68 |
| P-115 | MH-109 | 2,506.26 | MH-110 | 2,495.99 | 426.8 | 268.3 | 0.0241 | 21.0 | 0.013 | 2.26 | 7.24 | 0.255 | 14.49 |
| P-116 | MH-110 | 2,495.99 | MH-111 | 2,484.53 | 494.0 | 623.7 | 0.0232 | 21.0 | 0.013 | 2.26 | 7.14 | 0.257 | 14.22 |
| P-117 | MH-111 | 2,484.53 | MH-112 | 2,477.61 | 494.0 | 542.9 | 0.0140 | 21.0 | 0.013 | 2.26 | 5.97 | 0.292 | 11.05 |
| P-118 | MH-112 | 2,477.61 | MH-113 | 2,470.70 | 494.0 | 811.5 | 0.0140 | 21.0 | 0.013 | 2.26 | 5.96 | 0.293 | 11.04 |
| P-119 | MH-113 | 2,470.70 | MH-21 | 2,464.38 | 451.6 | 524.8 | 0.0140 | 21.0 | 0.013 | 2.26 | 5.97 | 0.293 | 11.05 |
| P-23 | MH-21 | 2,464.38 | MH-24 | 2,468.00 | | 812.3 | 0.0045 | 24.0 | 0.013 | 2.76 | 4.13 | 0.364 | 8.90 |
| P-24 | MH-25 | 2,472.00 | MH-24 | 2,468.00 | | 826.9 | 0.0048 | 24.0 | 0.013 | 2.76 | 4.26 | 0.356 | 9.27 |
| P-25 | MH-26 | 2,484.00 | MH-25 | 2,472.00 | | 947.5 | 0.0127 | 24.0 | 0.013 | 2.76 | 6.02 | 0.277 | 15.00 |
| P-2 | MH-3 | 2,355.55 | MH-2 | 2,351.61 | 262.6 | 186.6 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.36 |
| P-3 | MH-4 | 2,363.25 | MH-3 | 2,355.75 | 500.0 | 414.7 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.35 |
| P-4 | MH-5 | 2,370.95 | MH-4 | 2,363.45 | 500.0 | 508.1 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.35 |
| P-7 | MH-8 | 2,403.61 | MH-7 | 2,399.06 | 500.0 | 509.4 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.41 |

West Henderson
FlexTable: Conduit Table
Active Scenario: Average Flow

| Label | Start Node | Invert (Start) (ft) | Stop Node | Invert (Stop) (ft) | Length (User Defined) (ft) | Length (Scaled) (ft) | Slope (Calculate d) (ft/ft) | Diameter (in) | Manning's n | Flow (MGD) | Velocity (ft/s) | d/D | Capacity (Design) (MGD) |
|-------|------------|---------------------|-----------|--------------------|----------------------------|----------------------|-----------------------------|---------------|-------------|------------|-----------------|-------|-------------------------|
| P-8 | MH-9 | 2,408.36 | MH-8 | 2,403.81 | 499.8 | 512.0 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.42 |
| P-10 | MH-11 | 2,421.90 | MH-10 | 2,418.06 | 422.3 | 422.5 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.41 |
| P-11 | MH-12 | 2,423.40 | MH-11 | 2,422.10 | 142.9 | 138.7 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.41 |
| P-17 | MH-18 | 2,449.98 | MH-19 | 2,442.78 | 494.0 | 457.4 | 0.0146 | 27.0 | 0.013 | 5.80 | 7.73 | 0.334 | 22.03 |
| P-18 | MH-19 | 2,442.78 | MH-114 | 2,428.63 | 373.2 | 262.9 | 0.0379 | 27.0 | 0.013 | 5.80 | 10.89 | 0.261 | 35.54 |
| P-19 | MH-20 | 2,457.18 | MH-18 | 2,449.98 | 494.0 | 497.2 | 0.0146 | 27.0 | 0.013 | 5.80 | 7.73 | 0.334 | 22.03 |
| P-20 | MH-21 | 2,464.38 | MH-20 | 2,457.18 | 494.0 | 483.6 | 0.0146 | 27.0 | 0.013 | 5.80 | 7.73 | 0.334 | 22.03 |
| P-99 | MH-10 | 2,417.86 | MH-9A | 2,413.31 | 499.9 | 502.4 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.41 |
| P-100 | MH-9A | 2,413.11 | MH-9 | 2,408.56 | 500.1 | 526.0 | 0.0091 | 27.0 | 0.013 | 6.31 | 6.67 | 0.396 | 17.41 |
| P-101 | MH-5A | 2,378.65 | MH-5 | 2,371.15 | 500.0 | 506.0 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.35 |
| P-102 | MH-6 | 2,386.35 | MH-5A | 2,378.85 | 500.0 | 496.5 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.35 |
| P-103 | MH-6A | 2,394.05 | MH-6 | 2,386.55 | 500.0 | 489.6 | 0.0150 | 27.0 | 0.013 | 6.59 | 8.09 | 0.354 | 22.35 |
| P-104 | MH-7 | 2,398.86 | MH-6A | 2,394.25 | 500.0 | 502.6 | 0.0092 | 27.0 | 0.013 | 6.31 | 6.70 | 0.394 | 17.53 |
| P-105 | MH-2 | 2,351.41 | MH-1 | 2,351.01 | 26.8 | 140.6 | 0.0149 | 27.0 | 0.013 | 6.59 | 8.07 | 0.355 | 22.29 |
| P-107 | MH-102 | 2,349.67 | O-1 | 2,349.63 | 3.2 | 152.6 | 0.0140 | 27.0 | 0.013 | 6.59 | 7.89 | 0.361 | 21.60 |
| P-108 | MH-1 | 2,350.81 | MH-102 | 2,349.75 | | 86.0 | 0.0123 | 27.0 | 0.013 | 6.59 | 7.54 | 0.373 | 22.22 |
| P-121 | MH-115 | 2,426.33 | MH-116 | 2,424.57 | 194.2 | 140.3 | 0.0091 | 27.0 | 0.013 | 5.80 | 6.51 | 0.379 | 17.38 |
| P-122 | MH-114 | 2,428.63 | MH-115 | 2,426.33 | 65.9 | 189.1 | 0.0349 | 27.0 | 0.013 | 5.80 | 10.57 | 0.266 | 34.10 |
| P-123 | MH-116 | 2,424.57 | MH-117 | 2,423.96 | 12.9 | 84.2 | 0.0473 | 27.0 | 0.013 | 5.80 | 11.77 | 0.247 | 39.69 |
| P-124 | MH-117 | 2,423.96 | MH-12 | 2,423.40 | 33.9 | 48.9 | 0.0165 | 27.0 | 0.013 | 5.80 | 8.09 | 0.323 | 23.46 |

West Henderson
FlexTable: Manhole Table
Active Scenario: Average Flow

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Flow (Total In) (MGD) | Flow (Total Out) (MGD) |
|------|--------|-------------------------------|-------------------------------|-----------------------------|------------------------------|
| 817 | MH-1 | 2,374.30 | 2,350.81 | 6.59 | 6.59 |
| 818 | MH-2 | 2,374.30 | 2,351.41 | 6.59 | 6.59 |
| 820 | MH-3 | 2,376.83 | 2,355.55 | 6.59 | 6.59 |
| 822 | MH-4 | 2,384.06 | 2,363.25 | 6.59 | 6.59 |
| 824 | MH-5 | 2,389.41 | 2,370.95 | 6.59 | 6.59 |
| 826 | MH-6 | 2,402.63 | 2,386.35 | 6.59 | 6.59 |
| 828 | MH-7 | 2,412.96 | 2,398.86 | 6.31 | 6.31 |
| 830 | MH-8 | 2,416.30 | 2,403.61 | 6.31 | 6.31 |
| 832 | MH-9 | 2,422.97 | 2,408.36 | 6.31 | 6.31 |
| 834 | MH-10 | 2,436.19 | 2,417.86 | 6.31 | 6.31 |
| 836 | MH-11 | 2,441.50 | 2,421.90 | 6.31 | 6.31 |
| 838 | MH-12 | 2,444.58 | 2,423.40 | 5.80 | 6.31 |
| 849 | MH-18 | 2,459.68 | 2,449.98 | 5.80 | 5.80 |
| 851 | MH-19 | 2,452.70 | 2,442.78 | 5.80 | 5.80 |
| 854 | MH-20 | 2,468.93 | 2,457.18 | 5.80 | 5.80 |
| 856 | MH-21 | 2,478.37 | 2,464.38 | 5.02 | 5.80 |
| 862 | MH-24 | 2,481.00 | 2,468.00 | 2.76 | 2.76 |
| 864 | MH-25 | 2,488.00 | 2,472.00 | 2.76 | 2.76 |
| 866 | MH-26 | 2,494.00 | 2,484.00 | 2.00 | 2.76 |
| 872 | MH-29 | 2,513.00 | 2,494.00 | 2.00 | 2.00 |
| 874 | MH-30 | 2,524.00 | 2,509.00 | 2.00 | 2.00 |
| 876 | MH-31 | 2,540.00 | 2,525.00 | 2.00 | 2.00 |
| 878 | MH-32 | 2,545.00 | 2,530.00 | 2.00 | 2.00 |
| 880 | MH-33 | 2,550.00 | 2,535.00 | 1.47 | 2.00 |
| 884 | MH-35 | 2,578.00 | 2,568.00 | 1.47 | 1.47 |
| 886 | MH-36 | 2,598.00 | 2,586.00 | 1.08 | 1.47 |
| 890 | MH-38 | 2,616.00 | 2,600.00 | 1.08 | 1.08 |
| 892 | MH-39 | 2,634.00 | 2,618.00 | 0.60 | 1.08 |
| 894 | MH-40 | 2,668.00 | 2,653.00 | 0.00 | 0.60 |
| 1007 | MH-9A | 2,429.74 | 2,413.11 | 6.31 | 6.31 |
| 1010 | MH-5A | 2,396.55 | 2,378.65 | 6.59 | 6.59 |
| 1013 | MH-6A | 2,408.15 | 2,394.05 | 6.31 | 6.59 |
| 1021 | MH-102 | 2,371.05 | 2,349.67 | 6.59 | 6.59 |
| 1031 | MH-103 | 2,569.31 | 2,561.90 | 0.00 | 2.26 |
| 1032 | MH-104 | 2,568.36 | 2,559.23 | 2.26 | 2.26 |
| 1034 | MH-105 | 2,558.08 | 2,548.66 | 2.26 | 2.26 |
| 1036 | MH-106 | 2,546.56 | 2,538.06 | 2.26 | 2.26 |
| 1038 | MH-107 | 2,535.32 | 2,527.46 | 2.26 | 2.26 |
| 1040 | MH-108 | 2,525.43 | 2,516.86 | 2.26 | 2.26 |
| 1042 | MH-109 | 2,515.41 | 2,506.26 | 2.26 | 2.26 |
| 1044 | MH-110 | 2,504.74 | 2,495.99 | 2.26 | 2.26 |
| 1048 | MH-111 | 2,496.46 | 2,484.53 | 2.26 | 2.26 |
| 1049 | MH-112 | 2,492.85 | 2,477.61 | 2.26 | 2.26 |
| 1050 | MH-113 | 2,487.58 | 2,470.70 | 2.26 | 2.26 |
| 1051 | MH-114 | 2,447.79 | 2,428.63 | 5.80 | 5.80 |

West Henderson
FlexTable: Manhole Table
Active Scenario: Average Flow

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Flow (Total In) (MGD) | Flow (Total Out) (MGD) |
|------|--------|-------------------------------|-------------------------------|-----------------------------|------------------------------|
| 1052 | MH-115 | 2,447.24 | 2,426.33 | 5.80 | 5.80 |
| 1054 | MH-116 | 2,444.03 | 2,424.57 | 5.80 | 5.80 |
| 1056 | MH-117 | 2,444.09 | 2,423.96 | 5.80 | 5.80 |

West Henderson
FlexTable: Outfall Table
Active Scenario: Average Flow

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Hydraulic Grade (ft) | Flow (Total Out) (MGD) |
|-----|-------|-------------------------------|-------------------------------|-------------------------|---------------------------|
| 896 | O-1 | 2,371.05 | 2,349.63 | 2,350.62 | 6.59 |

West Henderson
FlexTable: Conduit Table

Active Scenario: Peak Flow (Wet Weather)

| Label | Start Node | Invert (Start) (ft) | Stop Node | Invert (Stop) (ft) | Length (User Defined) (ft) | Length (Scaled) (ft) | Slope (Calculate d) (ft/ft) | Diameter (in) | Manning's n | Flow (MGD) | Velocity (ft/s) | d/D | Capacity (Design) (MGD) |
|-------|------------|---------------------|-----------|--------------------|----------------------------|----------------------|-----------------------------|---------------|-------------|------------|-----------------|-------|-------------------------|
| P-39 | MH-40 | 2,653.00 | MH-39 | 2,618.00 | | 2,398.7 | 0.0146 | 12.0 | 0.013 | 2.05 | 5.99 | 0.638 | 2.54 |
| P-34 | MH-35 | 2,568.00 | MH-33 | 2,535.00 | | 1,678.5 | 0.0197 | 15.0 | 0.013 | 4.63 | 8.18 | 0.671 | 5.34 |
| P-35 | MH-36 | 2,586.00 | MH-35 | 2,568.00 | | 980.3 | 0.0184 | 15.0 | 0.013 | 4.63 | 7.96 | 0.688 | 5.16 |
| P-37 | MH-38 | 2,600.00 | MH-36 | 2,586.00 | | 766.3 | 0.0183 | 15.0 | 0.013 | 3.50 | 7.49 | 0.570 | 5.15 |
| P-38 | MH-39 | 2,618.00 | MH-38 | 2,600.00 | | 841.7 | 0.0214 | 15.0 | 0.013 | 3.50 | 7.96 | 0.542 | 5.57 |
| P-28 | MH-26 | 2,484.00 | MH-29 | 2,494.00 | | 757.1 | 0.0132 | 18.0 | 0.013 | 6.13 | 7.57 | 0.668 | 7.12 |
| P-29 | MH-29 | 2,494.00 | MH-30 | 2,509.00 | | 707.7 | 0.0212 | 18.0 | 0.013 | 6.13 | 9.11 | 0.570 | 9.01 |
| P-30 | MH-30 | 2,509.00 | MH-31 | 2,525.00 | | 766.5 | 0.0209 | 18.0 | 0.013 | 6.13 | 9.06 | 0.573 | 8.95 |
| P-31 | MH-31 | 2,525.00 | MH-32 | 2,530.00 | | 379.4 | 0.0132 | 18.0 | 0.013 | 6.13 | 7.56 | 0.668 | 7.11 |
| P-32 | MH-33 | 2,535.00 | MH-32 | 2,530.00 | | 287.5 | 0.0174 | 18.0 | 0.013 | 6.13 | 8.44 | 0.608 | 8.16 |
| P-109 | MH-103 | 2,561.90 | MH-104 | 2,559.23 | 190.7 | 261.7 | 0.0140 | 21.0 | 0.013 | 6.84 | 8.03 | 0.538 | 11.05 |
| P-110 | MH-104 | 2,559.23 | MH-105 | 2,548.66 | 501.5 | 535.4 | 0.0211 | 21.0 | 0.013 | 6.84 | 9.37 | 0.476 | 13.56 |
| P-111 | MH-105 | 2,548.66 | MH-106 | 2,538.06 | 494.0 | 388.0 | 0.0215 | 21.0 | 0.013 | 6.84 | 9.43 | 0.474 | 13.68 |
| P-112 | MH-106 | 2,538.06 | MH-107 | 2,527.46 | 494.0 | 491.2 | 0.0215 | 21.0 | 0.013 | 6.84 | 9.43 | 0.474 | 13.68 |
| P-113 | MH-107 | 2,527.46 | MH-108 | 2,516.86 | 494.0 | 389.8 | 0.0215 | 21.0 | 0.013 | 6.84 | 9.43 | 0.474 | 13.68 |
| P-114 | MH-108 | 2,516.86 | MH-109 | 2,506.26 | 494.0 | 381.6 | 0.0215 | 21.0 | 0.013 | 6.84 | 9.43 | 0.474 | 13.68 |
| P-115 | MH-109 | 2,506.26 | MH-110 | 2,495.99 | 426.8 | 268.3 | 0.0241 | 21.0 | 0.013 | 6.84 | 9.83 | 0.459 | 14.49 |
| P-116 | MH-110 | 2,495.99 | MH-111 | 2,484.53 | 494.0 | 623.7 | 0.0232 | 21.0 | 0.013 | 6.84 | 9.71 | 0.463 | 14.22 |
| P-117 | MH-111 | 2,484.53 | MH-112 | 2,477.61 | 494.0 | 542.9 | 0.0140 | 21.0 | 0.013 | 6.84 | 8.03 | 0.537 | 11.05 |
| P-118 | MH-112 | 2,477.61 | MH-113 | 2,470.70 | 494.0 | 811.5 | 0.0140 | 21.0 | 0.013 | 6.84 | 8.03 | 0.538 | 11.04 |
| P-119 | MH-113 | 2,470.70 | MH-21 | 2,464.38 | 451.6 | 524.8 | 0.0140 | 21.0 | 0.013 | 6.84 | 8.03 | 0.538 | 11.05 |
| P-23 | MH-21 | 2,464.38 | MH-24 | 2,468.00 | | 812.3 | 0.0045 | 24.0 | 0.013 | 8.19 | 5.38 | 0.701 | 8.90 |
| P-24 | MH-25 | 2,472.00 | MH-24 | 2,468.00 | | 826.9 | 0.0048 | 24.0 | 0.013 | 8.19 | 5.57 | 0.680 | 9.27 |
| P-25 | MH-26 | 2,484.00 | MH-25 | 2,472.00 | | 947.5 | 0.0127 | 24.0 | 0.013 | 8.19 | 8.09 | 0.499 | 15.00 |
| P-2 | MH-3 | 2,355.55 | MH-2 | 2,351.61 | 262.6 | 186.6 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.36 |
| P-3 | MH-4 | 2,363.25 | MH-3 | 2,355.75 | 500.0 | 414.7 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.35 |
| P-4 | MH-5 | 2,370.95 | MH-4 | 2,363.45 | 500.0 | 508.1 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.35 |
| P-7 | MH-8 | 2,403.61 | MH-7 | 2,399.06 | 500.0 | 509.4 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.42 | 0.746 | 17.41 |

West Henderson
FlexTable: Conduit Table
Active Scenario: Peak Flow (Wet Weather)

| Label | Start Node | Invert (Start) (ft) | Stop Node | Invert (Stop) (ft) | Length (User Defined) (ft) | Length (Scaled) (ft) | Slope (Calculate d) (ft/ft) | Diameter (in) | Manning's n | Flow (MGD) | Velocity (ft/s) | d/D | Capacity (Design) (MGD) |
|-------|------------|---------------------|-----------|--------------------|----------------------------|----------------------|-----------------------------|---------------|-------------|------------|-----------------|-------|-------------------------|
| P-8 | MH-9 | 2,408.36 | MH-8 | 2,403.81 | 499.8 | 512.0 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.42 | 0.746 | 17.42 |
| P-10 | MH-11 | 2,421.90 | MH-10 | 2,418.06 | 422.3 | 422.5 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.41 | 0.746 | 17.41 |
| P-11 | MH-12 | 2,423.40 | MH-11 | 2,422.10 | 142.9 | 138.7 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.42 | 0.746 | 17.41 |
| P-17 | MH-18 | 2,449.98 | MH-19 | 2,442.78 | 494.0 | 457.4 | 0.0146 | 27.0 | 0.013 | 16.04 | 10.06 | 0.595 | 22.03 |
| P-18 | MH-19 | 2,442.78 | MH-114 | 2,428.63 | 373.2 | 262.9 | 0.0379 | 27.0 | 0.013 | 16.04 | 14.43 | 0.447 | 35.54 |
| P-19 | MH-20 | 2,457.18 | MH-18 | 2,449.98 | 494.0 | 497.2 | 0.0146 | 27.0 | 0.013 | 16.04 | 10.06 | 0.595 | 22.03 |
| P-20 | MH-21 | 2,464.38 | MH-20 | 2,457.18 | 494.0 | 483.6 | 0.0146 | 27.0 | 0.013 | 16.04 | 10.06 | 0.595 | 22.03 |
| P-99 | MH-10 | 2,417.86 | MH-9A | 2,413.31 | 499.9 | 502.4 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.42 | 0.746 | 17.41 |
| P-100 | MH-9A | 2,413.11 | MH-9 | 2,408.56 | 500.1 | 526.0 | 0.0091 | 27.0 | 0.013 | 17.29 | 8.41 | 0.746 | 17.41 |
| P-101 | MH-5A | 2,378.65 | MH-5 | 2,371.15 | 500.0 | 506.0 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.35 |
| P-102 | MH-6 | 2,386.35 | MH-5A | 2,378.85 | 500.0 | 496.5 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.35 |
| P-103 | MH-6A | 2,394.05 | MH-6 | 2,386.55 | 500.0 | 489.6 | 0.0150 | 27.0 | 0.013 | 17.99 | 10.42 | 0.636 | 22.35 |
| P-104 | MH-7 | 2,398.86 | MH-6A | 2,394.25 | 500.0 | 502.6 | 0.0092 | 27.0 | 0.013 | 17.29 | 8.46 | 0.742 | 17.53 |
| P-105 | MH-2 | 2,351.41 | MH-1 | 2,351.01 | 26.8 | 140.6 | 0.0149 | 27.0 | 0.013 | 17.99 | 10.40 | 0.638 | 22.29 |
| P-107 | MH-102 | 2,349.67 | O-1 | 2,349.63 | 3.2 | 152.6 | 0.0140 | 27.0 | 0.013 | 17.99 | 10.14 | 0.652 | 21.60 |
| P-108 | MH-1 | 2,350.81 | MH-102 | 2,349.75 | | 86.0 | 0.0123 | 27.0 | 0.013 | 17.99 | 9.63 | 0.683 | 22.22 |
| P-121 | MH-115 | 2,426.33 | MH-116 | 2,424.57 | 194.2 | 140.3 | 0.0091 | 27.0 | 0.013 | 16.04 | 8.31 | 0.703 | 17.38 |
| P-122 | MH-114 | 2,428.63 | MH-115 | 2,426.33 | 65.9 | 189.1 | 0.0349 | 27.0 | 0.013 | 16.04 | 13.99 | 0.458 | 34.10 |
| P-123 | MH-116 | 2,424.57 | MH-117 | 2,423.96 | 12.9 | 84.2 | 0.0473 | 27.0 | 0.013 | 16.04 | 15.65 | 0.420 | 39.69 |
| P-124 | MH-117 | 2,423.96 | MH-12 | 2,423.40 | 33.9 | 48.9 | 0.0165 | 27.0 | 0.013 | 16.04 | 10.56 | 0.572 | 23.46 |

West Henderson
FlexTable: Manhole Table
Active Scenario: Peak Flow (Wet Weather)

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Flow (Total In) (MGD) | Flow (Total Out) (MGD) |
|------|--------|-------------------------------|-------------------------------|-----------------------------|------------------------------|
| 817 | MH-1 | 2,374.30 | 2,350.81 | 17.99 | 17.99 |
| 818 | MH-2 | 2,374.30 | 2,351.41 | 17.99 | 17.99 |
| 820 | MH-3 | 2,376.83 | 2,355.55 | 17.99 | 17.99 |
| 822 | MH-4 | 2,384.06 | 2,363.25 | 17.99 | 17.99 |
| 824 | MH-5 | 2,389.41 | 2,370.95 | 17.99 | 17.99 |
| 826 | MH-6 | 2,402.63 | 2,386.35 | 17.99 | 17.99 |
| 828 | MH-7 | 2,412.96 | 2,398.86 | 17.29 | 17.29 |
| 830 | MH-8 | 2,416.30 | 2,403.61 | 17.29 | 17.29 |
| 832 | MH-9 | 2,422.97 | 2,408.36 | 17.29 | 17.29 |
| 834 | MH-10 | 2,436.19 | 2,417.86 | 17.29 | 17.29 |
| 836 | MH-11 | 2,441.50 | 2,421.90 | 17.29 | 17.29 |
| 838 | MH-12 | 2,444.58 | 2,423.40 | 15.91 | 17.29 |
| 849 | MH-18 | 2,459.68 | 2,449.98 | 16.04 | 16.04 |
| 851 | MH-19 | 2,452.70 | 2,442.78 | 16.04 | 16.04 |
| 854 | MH-20 | 2,468.93 | 2,457.18 | 16.04 | 16.04 |
| 856 | MH-21 | 2,478.37 | 2,464.38 | 13.87 | 16.04 |
| 862 | MH-24 | 2,481.00 | 2,468.00 | 8.19 | 8.19 |
| 864 | MH-25 | 2,488.00 | 2,472.00 | 8.19 | 8.19 |
| 866 | MH-26 | 2,494.00 | 2,484.00 | 5.95 | 8.19 |
| 872 | MH-29 | 2,513.00 | 2,494.00 | 6.13 | 6.13 |
| 874 | MH-30 | 2,524.00 | 2,509.00 | 6.13 | 6.13 |
| 876 | MH-31 | 2,540.00 | 2,525.00 | 6.13 | 6.13 |
| 878 | MH-32 | 2,545.00 | 2,530.00 | 6.13 | 6.13 |
| 880 | MH-33 | 2,550.00 | 2,535.00 | 4.49 | 6.13 |
| 884 | MH-35 | 2,578.00 | 2,568.00 | 4.63 | 4.63 |
| 886 | MH-36 | 2,598.00 | 2,586.00 | 3.39 | 4.63 |
| 890 | MH-38 | 2,616.00 | 2,600.00 | 3.50 | 3.50 |
| 892 | MH-39 | 2,634.00 | 2,618.00 | 1.93 | 3.50 |
| 894 | MH-40 | 2,668.00 | 2,653.00 | 0.00 | 2.05 |
| 1007 | MH-9A | 2,429.74 | 2,413.11 | 17.29 | 17.29 |
| 1010 | MH-5A | 2,396.55 | 2,378.65 | 17.99 | 17.99 |
| 1013 | MH-6A | 2,408.15 | 2,394.05 | 17.22 | 17.99 |
| 1021 | MH-102 | 2,371.05 | 2,349.67 | 17.99 | 17.99 |
| 1031 | MH-103 | 2,569.31 | 2,561.90 | 0.00 | 6.84 |
| 1032 | MH-104 | 2,568.36 | 2,559.23 | 6.84 | 6.84 |
| 1034 | MH-105 | 2,558.08 | 2,548.66 | 6.84 | 6.84 |
| 1036 | MH-106 | 2,546.56 | 2,538.06 | 6.84 | 6.84 |
| 1038 | MH-107 | 2,535.32 | 2,527.46 | 6.84 | 6.84 |
| 1040 | MH-108 | 2,525.43 | 2,516.86 | 6.84 | 6.84 |
| 1042 | MH-109 | 2,515.41 | 2,506.26 | 6.84 | 6.84 |
| 1044 | MH-110 | 2,504.74 | 2,495.99 | 6.84 | 6.84 |
| 1048 | MH-111 | 2,496.46 | 2,484.53 | 6.84 | 6.84 |
| 1049 | MH-112 | 2,492.85 | 2,477.61 | 6.84 | 6.84 |
| 1050 | MH-113 | 2,487.58 | 2,470.70 | 6.84 | 6.84 |
| 1051 | MH-114 | 2,447.79 | 2,428.63 | 16.04 | 16.04 |

West Henderson
FlexTable: Manhole Table

Active Scenario: Peak Flow (Wet Weather)

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Flow (Total In) (MGD) | Flow (Total Out) (MGD) |
|------|--------|-------------------------------|-------------------------------|-----------------------------|------------------------------|
| 1052 | MH-115 | 2,447.24 | 2,426.33 | 16.04 | 16.04 |
| 1054 | MH-116 | 2,444.03 | 2,424.57 | 16.04 | 16.04 |
| 1056 | MH-117 | 2,444.09 | 2,423.96 | 16.04 | 16.04 |

West Henderson
FlexTable: Outfall Table

Active Scenario: Peak Flow (Wet Weather)

| ID | Label | Elevation (Ground) (ft) | Elevation (Invert) (ft) | Hydraulic Grade (ft) | Flow (Total Out) (MGD) |
|-----|-------|-------------------------------|-------------------------------|-------------------------|---------------------------|
| 896 | O-1 | 2,371.60 | 2,349.63 | 2,351.35 | 17.99 |

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Exhibit C

Bermuda Basin Rate Studies

[Attached]

West Henderson Phase 1 Wastewater Backbone Infrastructure Rate

Bermuda Sewer Phase 1 Analysis
City of Henderson

29 August 2019



Contents

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Appendix A – Detailed Cost Estimates

List of Tables

Table 1 – Residential Densities

Table 2 – Available ERUs

Table 3 – Cost Apportionment

List of Figures

Figure 1 – West Henderson Planning Area

Figure 2 – Bermuda Sewer Basin

1. Project Background

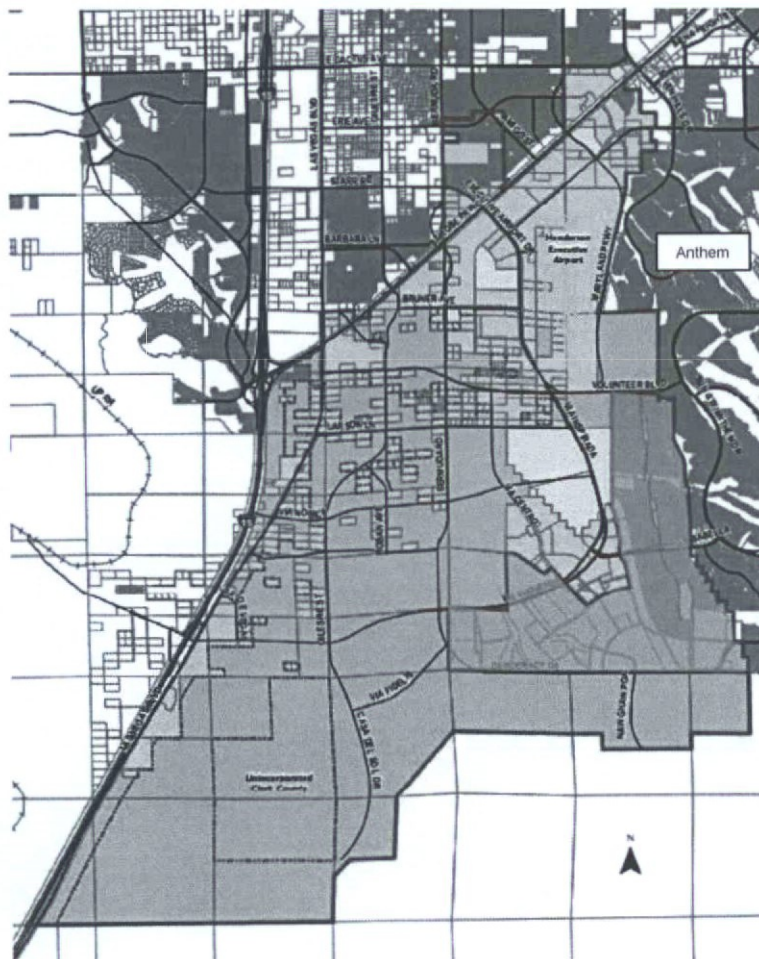
The purpose of this Report is to provide the engineering basis for determining the project cost and the cost for each Equivalent Residential Unit (ERU) for the proposed sanitary sewer in the Bermuda Road alignment between Volunteer Blvd and St Rose Pkwy.

The West Henderson planning area consists of approximately 12,100 acres as identified in the City of Henderson's (City) 2017 Public Facility Needs Assessment. To determine the cost of the sewer backbone infrastructure to serve a portion of this area, the City needs to update the sewer master plan for the West Henderson planning area.

2. Location

As stated above, the planning area consists of approximately 12,100 acres. The area is located south of St. Rose Parkway, east of Interstate I-15 and west of the Anthem development as shown on Figure 1 below.

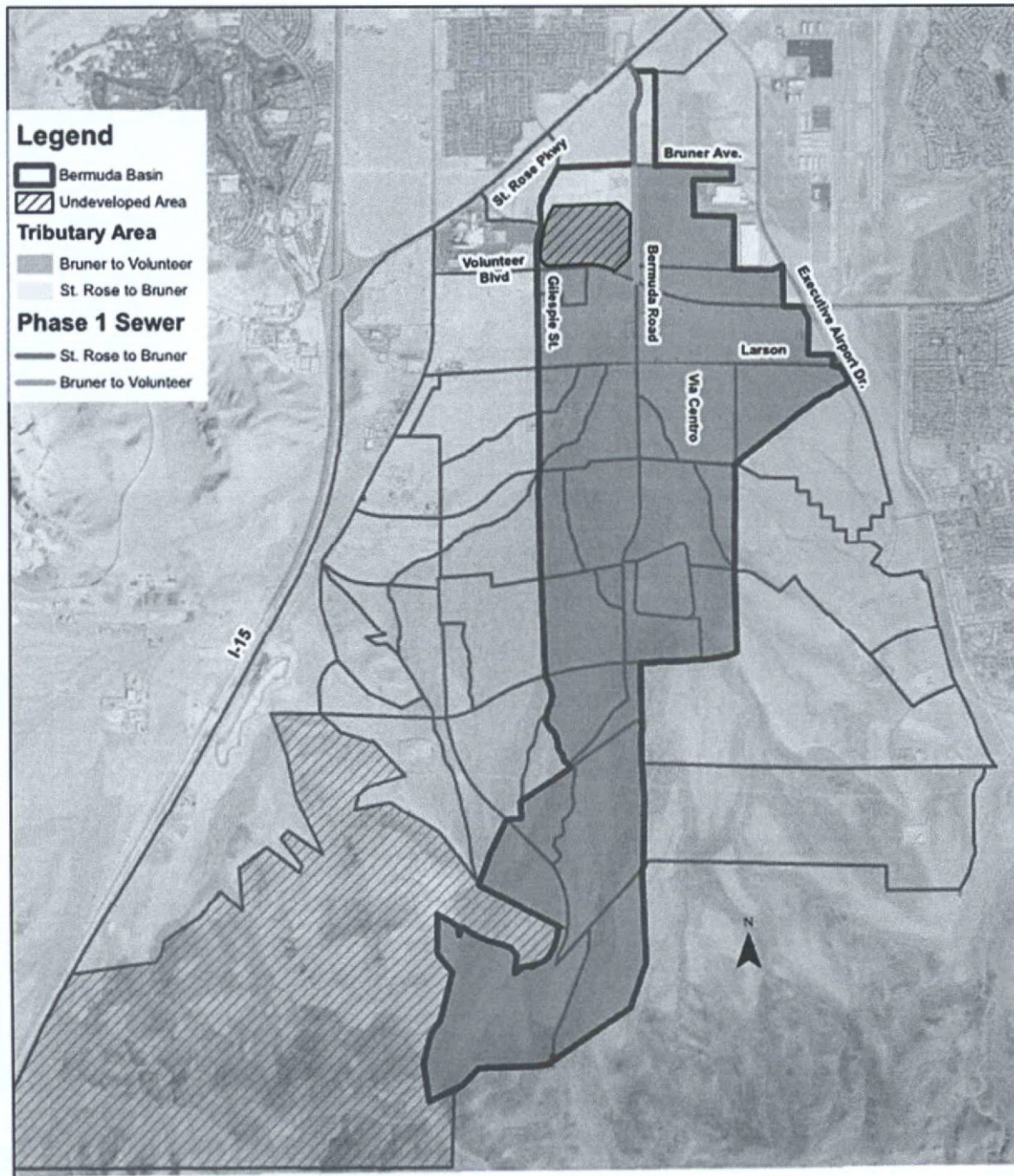
Figure 1 – West Henderson Planning Area



3. Bermuda Sewer Basin

The tributary area for the Bermuda Sewer, defined as the Bermuda Basin, is delineated on the west by Gilespe Road, St. Rose Parkway on the north and Executive Airport Drive on the east. The Bermuda Basin is approximately 4,135 gross acres as shown on Figure 2.

Figure 2 – Bermuda Sewer Basin



4. Wastewater Flow Projections

Wastewater flows projections are based on the West Henderson Land Use Plan and the following assumptions:

- 250 gpd (average daily flow) per ERU
- Wastewater peaking factor according to ASCE curve
- Wet weather allowance, an additional twenty five percent of dry weather peak hourly flow
- Maximum Depth/Diameter (d/D) = 0.75 with peak wet weather flow.
- Manning's n value = 0.013
- Downstream pipes sizes are equal to or greater diameter

5. Project Elements

Project elements of Bermuda Sewer Phase 1 (PCOH 08408) consist of pipelines and manholes between St. Rose Pkwy and Volunteer Blvd. The total length of proposed sewer pipe to be installed is 5,835 ft of 27" PVC. There are 18 sewer manholes total in this sewer line, all of which are 72" diameter apart from one 96" diameter manhole located where the Bermuda Sewer Phase 1 line meets St. Rose Parkway.

6. Land Acquisition

All construction for the Bermuda Sewer Phase 1 is to be done within public Right-of-Way. Therefore, no land acquisition costs were factored into this Rate Study.

7. Cost Apportionment

Table 2 presents the available flow capacity for the Bermuda Sewer Phase 1 as well as the pipe characteristics that affect capacity determination.

Table 2 – Available ERUs

| Description | Limiting Slope | Diameter (in) | d/D | Pipeline Capacity (MGD) | Average Flow (MGD) | Available ERUs |
|---------------------|----------------|---------------|------|-------------------------|--------------------|----------------|
| St. Rose to Bruner | 0.0141 | 27 | 0.75 | 21.67 | 8.08 | 32,338 |
| Bruner to Volunteer | 0.0091 | 27 | 0.75 | 17.41 | 6.35 | 25,386 |

Project costs include construction cost, according to the change order included as an appendix, and engineering cost. The project costs and the basis for apportionment are presented in Table 3.

Table 3 – Cost Apportionment

| Description | Construction Cost | Engineering | Total Cost | Available ERUs | Cost Per ERU |
|---------------------|-------------------|-------------|-------------|----------------|--------------|
| St. Rose to Bruner | \$934,100 | \$85,197 | \$1,019,297 | 32,338 | \$31.52 |
| Bruner to Volunteer | \$1,114,951 | \$101,693 | \$1,216,644 | 25,386 | \$47.93 |

The cost apportionment for the Bermuda Sewer Phase between St. Rose and Bruner is \$31.52 per ERU.

The cost apportionment for the Bermuda Sewer Phase between Bruner and Volunteer is \$47.93 per ERU.

Appendix A – Detailed Cost Estimates



CITY OF HENDERSON

CONTRACT CHANGE ORDER

CONTRACT NAME: Pittman North Detention Basin and Outfall, Phase III

C.O. NUMBER:

CO-3

CONTRACT NO.: 19050 (PCOH 2017-88-3019)

DATE:

12/18/2018

CONTRACTOR: Fisher Sand & Gravel Co.

Funding Sources:

| | |
|-------------------|------------------------|
| CCRFGD-Direct Pay | HEN46F47 |
| DUS Water | 5203-3620-701014-U0168 |
| DUS Sewer | 5303-3720-701014-U0168 |

CMTS: 19050

SUBJECT:

Change Order No. 3 for construction of the Bermuda Sewer Phase 1 project.

CONTRACTOR:

You are hereby requested to comply with the following change from the contract plans and specifications. Execution of this change order represents full and final costs of all direct, indirect, and delay costs for the scope of services identified hereon unless noted otherwise. This document shall become an amendment to the contract and all provisions of the contract will apply hereto:

| ITEM # | QTY or % INCREASE/ (DECREASE) | UNIT | UNIT PRICE | BID ITEM DESCRIPTION AND NECESSITY OF CHANGE | INCREASE/ (DECREASE) TO CONTRACT |
|-----------------------------------|-------------------------------------|------|---------------|--|--|
| ADDITIONAL WORK: | | | | | |
| 1 | 1 | LS | \$ 25,000.00 | Traffic Control | \$ 25,000.00 |
| 2 | 100 | CY | \$ 57.00 | R&R Type 2 Base Under Asphalt | \$ 5,700.00 |
| 3 | 1 | LS | \$ 32,280.00 | 1" Mill and Place UTACS on Volunteer | \$ 32,280.00 |
| 4 | 385 | SF | \$ 14.00 | R&R 2-Inch AC on Trail | \$ 5,390.00 |
| 5 | 600 | SF | \$ 50.00 | R&R 6-Inch Asphalt | \$ 30,000.00 |
| 6 | 1 | LS | \$ 5,400.00 | R&R Median Island & Landscaping | \$ 5,400.00 |
| 7 | 1 | LS | \$ 15,000.00 | Remove 10" Sewer (193 LF) & Manholes (3 Each) | \$ 15,000.00 |
| 8 | 1 | LS | \$ 10,500.00 | Demo Existing Structures in ROW | \$ 10,500.00 |
| 9 | 210 | LF | \$ 225.00 | Install 10" PVC Sewer Line | \$ 47,250.00 |
| 10 | 5835 | F | \$ 200.00 | Install 27" PVC Sewer | \$ 1,167,000.00 |
| 11 | 17 | EA | \$ 28,000.00 | Install 72" Sewer Manholes | \$ 476,000.00 |
| 12 | 1 | EA | \$ 35,000.00 | Install 96" Sewer Manhole | \$ 35,000.00 |
| 13 | 1 | EA | \$ 15,000.00 | Well Abandonment | \$ 15,000.00 |
| 14 | 1 | LS | \$ 102,531.45 | 60 & 66 Inch Casings | \$ 102,531.45 |
| ADDITIONAL WORK SUB-TOTAL: | | | | | \$ 1,972,051.45 |

ADDITIONAL ALTERNATIVES:

| | | | | | |
|--------------------------------|---|----|--------------|-------------------------------------|---------------------|
| AddAlt 1 | 1 | LS | \$ 27,000.00 | Bypass Sewer Line @ Volunteer | \$ 27,000.00 |
| AddAlt 2 | 1 | LS | \$ 50,000.00 | Bypass Sewer Line @ St Rose Parkway | \$ 50,000.00 |
| ALTERNATIVES SUB-TOTAL: | | | | | \$ 77,000.00 |

| | | | | |
|---|--|-----------------|-------------------------------------|-------------------------|
| COMPLETION DATE: | | <u>7/9/2019</u> | Total This Change Order | \$ 2,049,051.45 |
| DAYS ADDED THIS CO: | | <u>0</u> | Total PREVIOUS Change Orders | (529,645.96) |
| Days Added--PRIOR COs/Conflicts: | | <u>0</u> | NET CHANGE TO CONTRACT | 1,519,405.49 |
| Adjusted COMPLETION DATE: | | <u>7/9/2019</u> | ORIGINAL CONTRACT TOTAL | 23,500,000.00 |
| | | | ADJUSTED CONTRACT TOTAL | \$ 25,019,405.49 |

Effect on Operation and Maintenance NONE
Will this affect expiration or extent of insurance coverage? ...NO If "YES" will policies be extended?

| | | | |
|-------------------|-------------|--|-------|
| Contractor: | Name/Title: | Robert Nelson, Sr. Project Manager | Date: |
| Quality Control: | Name/Title: | Lance Olson, P.E. Quality Control Manager | Date: |
| Utility Services: | Name/Title: | John Day, Deputy Dir-Util Eng/Asset Mgmt (or designee) | Date: |
| Engineering: | Name/Title: | Thomas Davy, P.E. City Engineer (or designee) | Date: |
| Public Works: | Name/Title: | Edward McGuire, P.E. Director of Public Works (or designee) | Date: |

Council Approval Date: 2/6/2018 Contract Funding: Construction - \$23,500,000.00 Contingency - \$1,000,000.00

DISTRIBUTION: Original: City Clerk's Office Copies: CONTRACTOR QC Sr Inspector--Ed Babine
Project Engineer--Al Jankowiak QC--Lance Olson
QC Inspector(s)--Derek Ritchie/Rick Gwartyney



Fisher Industries | 2950 Sunridge Heights Parkway | Henderson, NV | ph (702) 929-3157 | fax (725) 222-7960

FISHER SAND & GRAVEL (FSG) SCOPE OF WORK

27" Sewer Line Installation

Project: Pittman North Detention Basin

Attn: Lance Olson

Email: Lance.Olson@cityofhenderson.com

Date: 11/27/2018



| Item # | Qty | Description | Unit | Price | TOTAL |
|---------|-------|---|------|-------------|-----------------|
| 1 | 1 | Traffic Control | LS | \$25,000.00 | \$ 25,000.00 |
| 2 | 100 | R&R Type 2 Base Under Asphalt | CY | \$57.00 | \$ 5,700.00 |
| 3 | 1 | 1" Mill and Place UTACS on Volunteer | LS | \$32,280.00 | \$ 32,280.00 |
| 4 | 385 | R&R 2-Inch AC on Trail | SF | \$14.00 | \$ 5,390.00 |
| 5 | 600 | R&R 6-Inch Asphalt | SF | \$50.00 | \$ 30,000.00 |
| 6 | 1 | R&R Median Island & Landscaping | LS | \$5,400.00 | \$ 5,400.00 |
| 7 | 1 | Remove 10" Sewer (193 LF) & Manholes (3 Each) | LS | \$15,000.00 | \$ 15,000.00 |
| 8 | 1 | Demo Existing Structures in ROW | LS | \$10,500.00 | \$ 10,500.00 |
| 9 | 210 | Install 10" PVC Sewer Line | LF | \$225.00 | \$ 47,250.00 |
| 10 | 5,835 | Install 27" PVC Sewer | LF | \$200.00 | \$ 1,167,000.00 |
| 11 | 17 | Install 72" Sewer Manholes | EA | \$28,000.00 | \$ 476,000.00 |
| 12 | 1 | Install 96" Sewer Manhole | EA | \$35,000.00 | \$ 35,000.00 |
| 13 | 1 | Well Abandonment @ Bermuda Road | LS | \$15,000.00 | \$ 15,000.00 |
| Add Alt | 1 | Bypass Sewer Line @ Volunteer | LS | \$27,000.00 | \$ 27,000.00 |
| Add Alt | 1 | Bypass Sewer Line @ St Rose Parkway | LS | \$50,000.00 | \$ 50,000.00 |

SubTotal

SPECIAL TERMS OR CONDITIONS:

TOTAL

\$ 1,946,520.00

Fisher Sand & Gravel

Robert Nelson

SR Project Manager

By

Title

| | |
|---------------------------|----------------------|
| SUBTOTAL | \$ 93,210.41 |
| Overhead and Markup (10%) | <u>\$ 9,321.04</u> |
| Total | \$ 102,531.45 |
| Grand Total | \$ 102,531.45 |

| | CAT CS56 B Compactor | Cat 8K Water Truck | Volvo 700 Excavator | Cat 825 Compactor | Cat D9 Dozer |
|------------|-------------------------|-------------------------|------------------------|----------------------|-----------------|
| | | | | | |
| MONTHLY | \$4,752.00 | \$13,680.00 | \$22,000.00 | \$14,080.00 | \$13,865.00 |
| | | | | | |
| HOURLY | \$27.00 | \$77.73 | \$125.00 | \$80.00 | \$78.78 |
| | | | | | |
| OPR COST | \$26.10 | \$113.55 | \$115.60 | \$87.35 | \$109.10 |
| | | | | | |
| TOTAL RATE | \$53.10 | \$191.28 | \$240.60 | \$167.35 | \$187.88 |
| | | | | | |
| | Cat 14H Blade | Volvo A60 Rock Truck | CAT 621 Water Pull | 3/4 Ton Pickup | Klein Tank |
| | | | | | |
| MONTHLY | \$9,695.00 | \$11,590.00 | \$7,720.00 | \$625.00 | \$1,360.00 |
| | | | | | |
| HOURLY | \$55.09 | \$65.85 | \$43.86 | \$3.55 | \$7.73 |
| | | | | | |
| OPR COST | \$57.00 | \$91.85 | \$52.80 | \$11.50 | \$7.10 |
| | | | | | |
| TOTAL RATE | \$112.09 | \$157.70 | \$96.66 | \$15.05 | \$14.83 |
| | | | | | |



West Henderson Phase 2 Wastewater Backbone Infrastructure Rate

Bermuda Sewer Phase 2 Analysis

City of Henderson

May 23, 2019



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Appendix A – Detailed Cost Estimates

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Figure 1 – West Henderson Planning Area

Figure 2 – Bermuda Sewer Phase 2 Tributary Area

1. Project Background

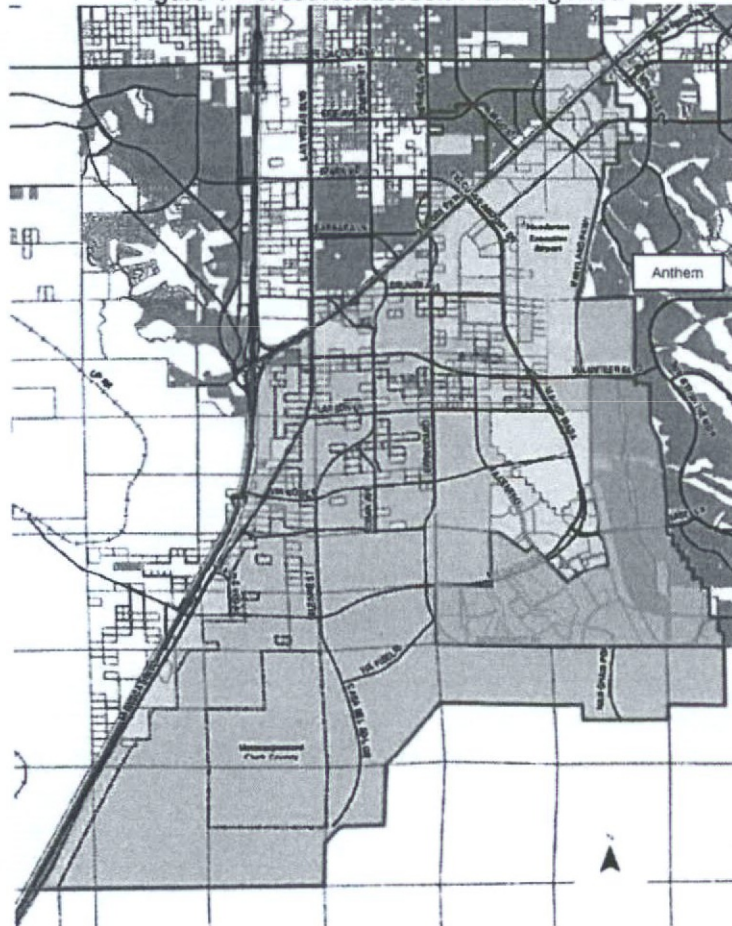
The purpose of this Report is to provide the engineering basis for determining the project cost and the cost for each Equivalent Residential Unit (ERU) for the proposed sanitary sewer in the Bermuda Road alignment between Larson Lane and Volunteer Boulevard, Larson Lane between Via Centro and Bermuda Road, and Via Centro from Via Nobila to Larson Lane.

The West Henderson planning area consists of approximately 12,100 acres as identified in the City of Henderson's (City) 2017 Public Facility Needs Assessment. To determine the cost of the sewer backbone infrastructure to serve a portion of this area, the City needs to update the sewer master plan for the West Henderson planning area.

2. Location

As stated above, the planning area consists of approximately 12,100 acres. The area is located south of St. Rose Parkway, east of Interstate I-15 and west of the Anthem development as shown on Figure 1 below.

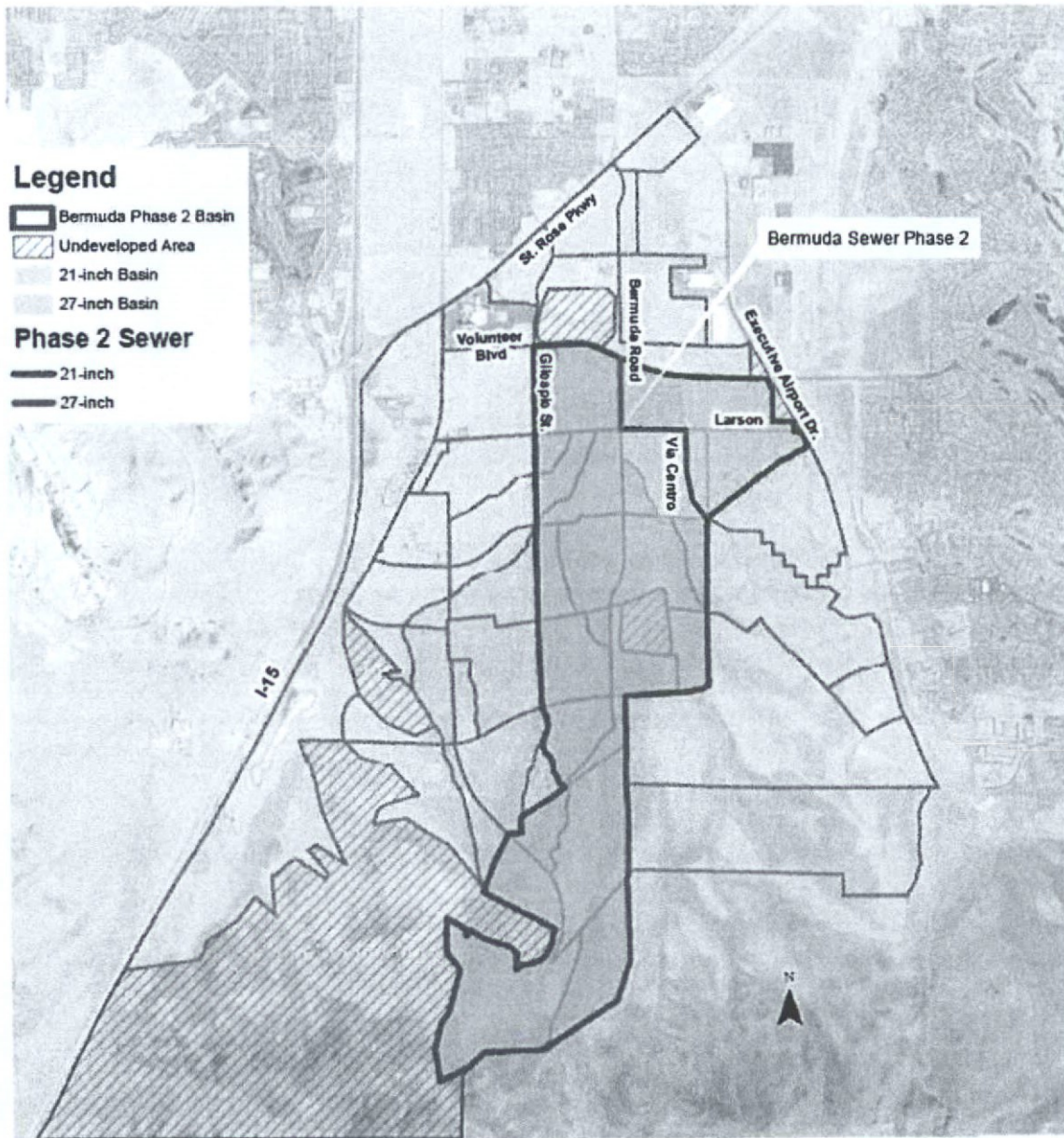
Figure 1 – West Henderson Planning Area



3. Bermuda Sewer Basin

The tributary area for the Bermuda Sewer, defined as the Bermuda Basin, is delineated on the west by Gilespe Road, St. Rose Parkway on the north and Executive Airport Drive on the east. The Bermuda Sewer Phase 2 is south of Volunteer Boulevard (Phase 1 is north) and has a tributary area of approximately 2,273 gross acres as shown on Figure 2.

Figure 2 – Bermuda Sewer Phase 2 Tributary Area



4. Wastewater Flow Projections

Wastewater flows projections are based on the West Henderson Land Use Plan and the following assumptions:

- 250 gpd (average daily flow) per ERU
- Wastewater peaking factor according to ASCE curve
- Wet weather allowance, an additional twenty five percent of dry weather peak daily flow
- Maximum Depth/Diameter (d/D) = 0.75 with peak wet weather flow.
- Manning's n value = 0.013
- Downstream pipes sizes are equal to or greater diameter

5. Project Elements

Project elements of Bermuda Sewer Phase 2 consist of pipelines and manholes in the Bermuda Road alignment between Larson Lane and Volunteer Boulevard, Larson Lane between Via Centro and Bermuda Road, and Via Centro from Via Nobila to Larson Lane. The total length of proposed sewer pipe to be installed is 2,155 feet of 27-inch PVC and 5,095 feet of 21-inch PVC. There are 18 sewer manholes total in this sewer line, all of which are 72" diameter.

6. Land Acquisition

The construction for the Bermuda Sewer Phase 2 to be done within public Right-of-Way includes Bermuda Road alignment between Larson Lane and Volunteer Boulevard, Larson Lane between Via Centro and Bermuda Road. There is right-of-way required on Via Centro from Via Nobila to Larson Lane.

7. Cost Apportionment

Table 1 presents the available flow capacity for the Bermuda Sewer Phase 2 as well as the pipe characteristics that affect capacity determination.

Table 1 – Available ERUs

| Description | Limiting Slope | Diameter (in) | d/D | Pipeline Capacity (MGD) | Average Flow (MGD) | Available ERUs |
|---|----------------|---------------|------|-------------------------|--------------------|----------------|
| Bermuda: Volunteer to Larson | 0.0086 | 27 | 0.75 | 16.90 | 6.14 | 24,565 |
| Bermuda/Larson to Via Centro/Via Nobila | 0.0140 | 21 | 0.75 | 11.00 | 3.82 | 15,280 |

The projected project costs and the basis for apportionment are presented in Table 2.

Table 2 – Cost Apportionment

| Description | Pipeline Length (ft) | Diameter (in) | Construction Cost | Engineering | Total Cost | Available ERUs | Cost Per ERU |
|---|----------------------|---------------|-------------------|-------------|-------------|----------------|--------------|
| Bermuda: Volunteer to Larson | 2,155 | 27 | \$878,050 | \$131,708 | \$1,009,758 | 24,565 | \$41.11 |
| Bermuda/Larson to Via Centro/Via Nobila | 5,095 | 21 | \$1,731,130 | \$259,670 | \$1,990,800 | 15,280 | \$130.29 |

The cost apportionment for the Bermuda Sewer Phase 2 is \$41.11 per ERU from Larson to Volunteer and \$130.29 from Via Nobila to Larson.

Appendix A – Detailed Cost Estimates

| Basin | Description | Pipeline Length (ft) ¹ | Diameter (in) | Pipe Cost/Lf | Pipeline Cost | No of Manholes ² | Manhole Cost (ea) | Manhole Cost | Construction Cost | Engineering/Design (15%) | Total Cost | Direct ERUs | Segment Cost per ERU |
|-------|---|-----------------------------------|---------------|--------------|---------------|-----------------------------|-------------------|--------------|-------------------|--------------------------|-------------|-------------|----------------------|
| 1 | Bermuda: Volunteer to Larson | 2,155 | 27 | \$310 | \$668,050 | 7 | \$30,000 | \$210,000 | \$878,050 | \$131,708 | \$1,009,758 | 24,565 | \$41.11 |
| 2 | Bermuda/Larson to Via Centro/Via Nobila | 5,095 | 21 | \$275 | \$1,401,130 | 11 | \$30,000 | \$330,000 | \$1,731,130 | \$259,670 | \$1,990,800 | 15,280 | \$130.29 |

¹ Rounded to the nearest tenth

² Manhole every 450 feet rounded up

| Basin 1 - Pipe Unit Cost | |
|--|--------------|
| Jack and bore length (LF) | 158 |
| Jack and bore unit cost (\$/LF) | \$ 1,500.00 |
| Jack and bore cost (\$) | \$237,000.00 |
| 27-inch length (LF) | 2155 |
| 27-inch unit cost (\$/LF) | \$ 200.00 |
| 27-inch cost (\$) | \$431,000.00 |
| Total cost of jack and bore + 27-inch (\$) | \$668,000.00 |
| Pipe unit cost (\$/LF) | \$ 309.98 |