FINAL EXECUTIVE SUMMARY
LANDER MASTER PLAN
LEVEL I STUDY
WYOMING WATER DEVELOPMENT COMMISSION
FREMONT COUNTY WYOMING

October 10, 2011
Project #: 418-006-001

SUBMITTED BY: Trihydro Corporation
1252 Commerce Drive, Laramie, WY 82070
EXECUTIVE SUMMARY: LANDER MASTER PLAN, LEVEL I

This Level I Lander Master Plan (Plan) addresses the tasks outlined in the project description, located within the Wyoming Water Development Commission (WWDC) 2011 Legislative Plan, and the corresponding contract (#305SC0293577). Each task summary contained in the main body of this Plan presents information regarding contractual/scope of work obligations, findings, recommendations, and conclusions. The WWDC contracted Trihydro Corporation to complete this Plan; the two parties signed an agreement on June 5, 2008.

SUMMARY OF WWDC 2011 LEGISLATIVE PLAN & MASTER PLAN PROJECT INFORMATION

This Plan is sponsored by the City of Lander (City), located in Fremont County, Wyoming, and water system improvements are categorized as a “New Development.” According to the Legislative Plan, “Present treatment, transmission, and storage components of the City of Lander’s water supply system have been replaced, upgraded, and expanded in the last 5 years…Source supply options remain tenuous depending on drought conditions and distribution system capabilities” (WWDC 2011). As such, the primary objective of this Plan is to inventory, evaluate, and map the existing water system by:

- Creating a geographic information system (GIS). Trihydro will customize its in-house, web-based GIS Direct tool, a component of Trihydro’s Project Direct data management system, to meet the sponsor’s project objectives. Trihydro will provide 1 year of GIS Direct support to WWDC. After this support period, the City will be prepared to collect, input, and analyze data relevant to optimizing the operation of the water system.

- Evaluating the adequacy of the water transmission and distribution systems, by means of a calibrated hydraulic model, to meet efficient pressure and flow requirements.

HYDRAULIC MODEL, SYSTEM CONDITIONS, AND SYSTEM DEFICIENCIES

On November 12, 2010, the City, the WWDC, and Trihydro attended a meeting to present ways in which the WaterGEMS® distribution model was prepared and calibrated and to review and discuss the results of the modeling as it pertains to the City’s current and future water demands. The hydraulic model was assembled using Bentley’s WaterGEMS® software, which has powerful interoperability between AutoCAD, ArcGIS, and MicroStation, allowing the project team to share data and databases. This water model allowed Trihydro to efficiently test several scenarios with separate demand and physical alternatives, such as response to current demand versus the projected 20-year demand for the period from 2010 to 2030. The model was also used to evaluate several design alternatives and rank
results according to least-cost or cost/performance tradeoff analyses. Modeling results were used to identify current and future system deficiencies, including areas that do not meet required fire-flows and pressures, as well as areas with velocity concerns. Additionally, areas with the greatest growth potential for the next 20 years were identified. Input from the November 12 meeting was used to prioritize areas of concern, which provided direction in determining solutions to deficiencies. System conditions and deficiencies are summarized below:

- **Treatment plant:** currently well maintained; monitoring tests show that the treated water is in compliance with current Safe Water Drinking Act (SDWA) regulations.

- **Primary storage tanks (4MG, Ellis, Mager, and Rodeo):** currently in service to supply the distribution system; levels in all tanks are controlled by altitude valves and available head from the water treatment plant (WTP) and the 4 MG tank. The tanks are not equipped with mixing mechanisms. With the City’s current storage capacity of 7 MG, a surplus of 4.59 MG exists. If regulations pertaining to required storage change within the 20-year planning period, further analysis may be required.

- **Distribution Lines:** currently deteriorating due to extensive corrosion of ductile iron and cast iron pipe, which causes water leaks, particularly in the Dillon area, where soil pH levels may not be compatible with pipe materials. Suspect areas include:
  - Airport
  - County Shop
  - Cemetery
  - Sewer Pond Road
  - Industrial Park
  - Golf Course
  - Tweed Lane
  - Johnson’s First Addition
  - Fox Park
  - Eugene Street, from 5th to 6th Street
  - 6th Street and Wood Street
  - Goodrich Addition
CONCEPTUAL DESIGN PRIORITIZATION, RECOMMENDATIONS, AND CORRESPONDING
An additional meeting occurred on January 31, 2011, to present conceptual designs and costs for proposed solutions to
system deficiencies. The prioritization of projects within City limits should coordinate with the current zoning and
land-use plan. The conceptual designs were prioritized with input from the Sponsor and WWDC. The proposed
project implementation schedule was designed to avoid large one-time changes to the water rate structure, while still
providing adequate funding for the proposed projects. The recommended priority list and construction dates are
follows:

REQUIRED CAPITAL IMPROVEMENTS
Of the 109 modeled fire flow nodes, 44 hydrants failed to meet the minimum fire-flow requirements under the
regulatory driven performance criteria. Areas with an aggregation of failed fire-flow nodes were examined with greater
detail to identify potential bottlenecks and shortfalls. These areas are as follows:

- WLRC and Dillon Areas Distribution
- High Pressure Zone Transmission and Distribution
- The Rodeo Zone Distribution
- The Mager Zone Distribution

PRIORITY 1: WYOMING LIFE RESOURCE CENTER (WLRC) AND DILLON SUBDIVISION; 2014
CONSTRUCTION
The campus may be without sufficient flows for its fire suppression systems. Water line upgrades and additions are
recommended. The recommended water line upgrades are in the following locations:

- Fourth Street from Main Street to Lincoln Street (upgrade existing 8-inch to 10-inch)
- Washington Street from Third Street to Second Street (upgrade existing 4-inch and 6-inch to 10-inch)
- From termination proposed 10-inch near Second and Washington to the WLRC along Poor Farm Road (upgrade
  existing 8-inch to 12-inch)

These upgrades meet or exceed the required performance criteria for this location and should provide enough capacity
for potential future growth in this location.
PRIORITY 2: HIGH PRESSURE ZONE (PHASE I); 2016 CONSTRUCTION

Moreover, the High Pressure Zone failed to meet fire flows upstream and downstream of the pressure reducing valves without exceeding the maximum velocity constraint. If the Rodeo Tank is filling while a fire event takes place in the High Pressure zone, the transmission line will exceed velocity constraints. In addition, large pressure fluctuations have been observed by Lander and Trihydro staff near the Lander Valley Medical Center.

The following is a summary of the upgrades required to meet regulatory driven performance criteria and minimize pressure fluctuations at the hospital:

- Replace 10-inch transition main from Sinks Canyon Road to the Rodeo tank and High Pressure Zone bypass water line with a 16-inch bypass water line. The Rodeo tank will remain in service.
- Replace 8-inch Rodeo Tank bypass water line with a 10-inch bypass water line
- Replace 8-inch hospital bypass water line with a 10-inch bypass water line

PRIORITY 3: HIGH PRESSURE ZONE (PHASE 2); 2018 CONSTRUCTION

Modeling efforts suggested that this area will likely fail fire flows, however, inherent limitations to the steady-state model may not represent this area as well as other areas in Lander. Prior to pursuing the recommendations provided in the Plan, further analysis will be required. Under the limitations of a steady-state model, the following recommendations resulted in a system that meets regulatory driven performance criteria:

- 8-inch lines under East Main Street from the PRV vault to Kingdom Hall with 10-inch lines

PRIORITY 4: RODEO ZONE; 2020 CONSTRUCTION

The entire Rodeo Zone fails to meet fire flows under the established criteria. Modeled total available fire flows with the 12 modeled hydrants range from 350 to 667 gpm. Additionally, City staff identified the Popo Agie Heights and Chevy Chase subdivisions as areas that frequently require maintenance.

The following is a summary of the upgrades required to meet regulatory driven performance criteria:

- Replace 8-inch pipes under Buena Vista Drive with 12-inch pipes.
• Replace all 6-inch pipes within the Popo Agie Heights and Chevy Chase subdivisions with 8-inch pipes.

• Replace 4-inch pipe under Sage Street with a 6-inch pipe.

**PRIORITY 5: WEST ANNEXATION; 2023 CONSTRUCTION**

Propose to commence prior to the North Annexation to accommodate the demands placed on the water distribution system by the Indian Lookout Subdivision and the Lander Valley High School. Demands in these areas are the highest in the City during each season, and area is serviced by two 8-inch pipes. The resulting steady-state velocities will likely accelerate the maintenance and servicing requirements of these 8-inch pipes. The West Annexation conceptual water system design will not only provide reliable water delivery in an area that was identified for potential growth, but will also provide redundancy of water delivery from another direction to the highest demand node in Lander. This will help to prolong the life of the existing infrastructure and will reduce the velocities in the pipes to that critical demand node.

**PRIORITY 6: NORTH ANNEXATION; 2030 CONSTRUCTION**

The City has an existing wastewater easement along the north boundary of this potential annexation. The areas around Tweed Lane, Pope Lane, and North Second were all defined as potential growth areas, and annexing this area would give the City an opportunity to loop some of the longest dead-end pipes in the distribution system. Looping these pipes will give more redundancy in the distribution system in an area that contains 2 of the top 10 demand nodes in the City. This project may be partially eligible for WWDC funding.

**WATER RATES AND USAGE**

Lander’s existing water rate structure recognizes that customers with larger meters have the potential to demand more water instantaneously by charging a higher monthly rate for the larger meters. Continuing the current practice of annually adjusting water rates is recommended.

City staff has expressed a strong preference to reduce excessive water use, which will affect expenditures for expansion and maintenance. Trihydro recommends that the City restructure the current rate method and follow a recognized “cost of service” methodology that prices the water commodity at its true value. Adoption of this approach is a radical departure from the historical method and more than doubles the cost per thousand gallons of water. Implementation of the “cost of service” method will require a period of adjustment for City customers and will likely cause some elective
water conservation. It is not recommended to combine a more restrictive conservation block rate in conjunction with the suggested method until the rate change has developed a usage history (approximately 3 years).

Trihydro further recommends that the City’s accounting separate the “enterprise fund” into a water enterprise fund and a sewer enterprise fund and that operations develop tap fees that reflect actual costs. The City should revise charges for out-of-town service to be consistent with Wyoming statutes and implement System Development Fees to support expansion necessary to serve growth.

Recent water base rates have been increasing at an average rate of about 2 percent per year. Comparisons between the suggested base rate and the existing base rate show that the existing rate will continue to increase at 2 percent per year. The comparison also includes the assumption that water provided for the existing rate is not charged at 1 dollar per thousand gallons for the initial 12,000 gallons. The suggested rate allows for 5,000 gallons at the indicated water base rate.

Water use will charge monthly consumer bills at an increased rate using the suggested rate structure. This should serve to raise customer awareness about the cost of water. In order to meet the anticipated expenses of the improvement programs, the suggested rate does not require adjustment between 2020 and 2023, whereas maintaining the existing rate structure will require a significant adjustment in the same period. The suggested rates have been increased at the indicated years to match revenues with the estimated costs to provide the recommended improvements while retiring the accumulated debt.

The City has indicated that they will retire the remaining debt, except for the Water Treatment Plant bond issue, using the $300,000 in Depreciation/New Capital for that purpose. This adjustment shifts the Depreciation/New Capital expense for the suggested rate for 1 year and provides the required funding to pursue the recommended improvements. This comparison assumes that the suggested rate of $2.03 per thousand gallons is imposed during the 2011 calendar year and raised to $2.10 per thousand gallons the following year. This approach will generate sufficient revenue to meet anticipated expenses for the next 3-year period. The existing structure remains in place, it would provide annual excess revenue of $300,000 in 2012 and 2013, and $220,000 in 2014; the suggested rate provides excess revenue of $180,000 in 2012, $140,000 in 2013, and $100,000 in 2014.
It is recommended that the rate structure be revised with a system-specific System Availability Charge (SAC) and a commodity charge that will support the necessary capital program. This will require a substantial increase in the commodity charge to offset the reduction of the basic monthly charge to low-end residential users.

This usage does not consider conservation of water for normal living. Because the City’s rates do not encourage conservation, it is recommended that a rate structure be imposed to create awareness that conservation is a City priority.

**POTENTIAL PROJECT FUNDING**

Funding for water-related projects is typically associated with water rights, storage, and transmission. Water distribution projects are primarily funded through fees associated with land development, though upsizing costs of existing infrastructure for these projects may be necessary with the expansion areas. These costs are typically smaller than the costs for transmission and supply.

Though not all water project expenses are eligible for reimbursement under the following grants, loans, and funding programs, some expenses may be covered. A list of these funding programs and web site links is provided below.

- WWDC:  [http://wwdc.state.wy.us/](http://wwdc.state.wy.us/)
- Community Development Block Grant:  [http://www.wyomingbusiness.org/community/cdbg_apps.aspx](http://www.wyomingbusiness.org/community/cdbg_apps.aspx)
SUMMARY OF RECOMMENDATIONS

Comprehensive planning efforts that will be completed after the publication of this Plan may affect the proposed location and timing of likely areas for the City to expand. At the time this Plan was prepared, these suggestions were agreeable to local officials who have been managing planning projects in lieu of a designated official or an adopted plan.

The following is a list of primary recommendations intended to improve infrastructure integrity, consumer costs, and water conservation.

- **Priority 1: Wyoming Life Resource Center (WLRC) and Dillon Subdivision; 2014 construction:**
  - Replace 8-inch pipe feeding the WLRC and Dillon subdivisions under Poor Farm Road with a 12-inch.
  - Replace 8-inch pipe under North 4th between Main Street and Lincoln Street with a 10-inch.
  - Replace 4- and 6-inch lines under Washington Street between 1st and 2nd Streets with a 10-inch.
  - These upgrades meet or exceed regulatory-driven performance criteria for this location and should provide enough capacity for potential future growth in this location.

- **Priority 2: High Pressure Zone (Phase 1); 2016 construction:**
  - Replace 10-inch transition main from Sinks Canyon Road to the Rodeo tank and High Pressure Zone bypass with a 16-inch bypass.
  - Replace 8-inch Rodeo Tank bypass with a 10-inch bypass.
  - Replace 8-inch hospital bypass with a 10-inch bypass.
  - These upgrades meet or exceed regulatory-driven performance criteria upstream of the PRV vaults. These upgrades should also minimize pressure fluctuations at the hospital.

- **Priority 3: High Pressure Zone (Phase 2); 2018 construction:**
  - Modeling efforts suggested that this area will likely fail fire flows, however, inherent limitations to the steady-state model may not represent this area as well as other areas in Lander. Prior to pursuing the recommendations provided in the Plan, further analysis will be required. Under the limitations of a steady-state model, the following recommendations resulted in a system that meets regulatory driven performance criteria:
○ 8-inch lines under East Main Street from PRV vault to Kingdom Hall with 10-inch lines.

• **Priority 4: Rodeo Zone; 2020 construction:**

Replace 8-inch pipes under Buena Vista Drive with 12-inch pipes.

Replace all 6-inch pipes within the Popo Agie Heights and Chevy Chase subdivisions with 8-inch pipes.

Replace 4-inch pipe under Sage Street with a 6-inch pipe.

The Rodeo Zone also fails to meet design standards specified in Chapter 12, Section 14 of the WDEQ/WQD Rules and Regulations, with approximately 2,450 feet of 4-inch pipe and many fire hydrants on 4-inch and dead-end 6-inch lines. These areas should be addressed in the City’s capital replacement schedule.

The aforementioned improvements result in improved fire flow across the pressure zone and enable 8 of the 12 modeled hydrants to meet flow requirements.

• **Priority 5: West Annexation; 2023 construction:**

Annex this area prior to the North Annexation to accommodate the demands placed on the water distribution system; the conceptual design will provide reliable water delivery in a potential growth area and redundancy of water delivery from another direction to the highest demand node in Lander. This will help to prolong the life of the existing infrastructure and will reduce the velocities in the pipes to that critical demand node.

• **Priority 6: North Annexation; 2030 construction:**

Annex this area so the City has the opportunity to loop the longest dead-end pipes in the distribution system; looping these pipes will give more redundancy in the distribution system in an area that contains 2 of the top 10 demand nodes in the City.

• **System operation and maintenance (O&M), listed sequentially (based on priority), below:**

  ○ Develop emergency action procedures and a chain of command to address natural disasters, civil disorders, vandalism/terrorism, water main breaks and other disruption in service.

  ○ Track and compare water consumption and production data at the smallest time interval available with the current data acquisition.

  ○ Systematically inspect fire hydrants, including stem valves, drains, isolations valves, and flow.
• Develop a water conservation ordinance (i.e., irrigation ordinances and high efficiency plumbing fixture requirements) and include residential and commercial audits to verify compliance. Ordinances should also include fines for non-compliance to incentivize compliance and add an additional revenue stream.

• Collaborate with city and county officials to include City public works and water officials in the review process of rural subdivision applications in the event that a water or wastewater easement would benefit the area.

• Digitize records of breaks and disruptions in service into a searchable database or geospatial representation, and track trends to assist in prioritizing projects in the capital replacement program. Records should include repairs per mile per year, cause of failure (loading, corrosion, etc.), replacement materials, dead ends, depth, type of break (longitudinal, circumferential, blowout), length, repair trends. Start tracking usable and consumed life on assets, including, but not limited to, the pump house, Pressure Reducing Valves, and altitude valves to assist in prioritizing projects in the capital replacement program.

• Send customer feedback surveys and conservation education flyers along with the annual water report published by the water treatment plant.

• Develop a program for implementing and tracking regularly scheduled preventative maintenance work with defined procedures (O&M manuals).

• Develop a program for prioritizing non-emergency failures (corrective maintenance).

• Develop a protocol for assigning manpower and equipment for emergency response (break down maintenance).

• Prioritize and schedule replacement of 4-inch pipes with 6-inch pipes or larger to comply with Ch. 12 Sec. 14 b (iv) of the WDEQ rules and regulations, or perform investigations on these lines that hydraulically justify their use.

• Inventory fire hydrants connected to 4-inch lines or on dead-ended 6-inch lines greater than 250 ft in length and either loop the line or increase line-size to comply with Ch. 12 Sec. 14 b (ii) of the WDEQ rules and regulations.

• Develop a prioritized schedule to repair and replace broken fire hydrants and hydrants without drain valves.
Implement a fire hydrant color-coding scheme and coordinate with the fire department to develop operating procedures so their pumper truck does not exceed the capacity of the distribution system under fire-flow demands.

Implement surge and sediment protection for the PRVs.

- **Water Usage and Rates:****
  - Revise the rate structure with a system-specific SAC and a commodity charge that will support the capital program.
  - Impose the rate structure to create consumer awareness and encourage conservation.
  - Continue the current practice of annually adjusting water rates.
  - Restructure the current rate method and follow a recognized “cost of service” methodology that prices the water commodity at its true value.
  - Combine a more restrictive conservation block rate with the suggested method after the rate change has developed a usage history (approximately 3 years).
  - Separate the “enterprise fund” into a water enterprise fund and a sewer enterprise fund.
  - Develop tap fees that reflect actual costs.
  - Revise charges for out-of-town service to be consistent with Wyoming statutes.
  - Implement System Development Fees to support expansion necessary to serve growth.