FINAL ENVIRONMENTAL COMMISSIONING PLAN

for

City of Austin
Jollyville and Forest Ridge
Transmission Mains

Prepared by

Hicks & Company
1504 West 5th Street
Austin, Texas 78703

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HICKS & COMPANY
ENVIRONMENTAL
ARCHEOLOGICAL
AND PLANNING
CONSULTANTS

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1.0 INTRODUCTION

1.1 Project Overview

The City of Austin (COA) plans to construct a water treatment plant and set of two transmission mains to serve the northwest part of the city (see **Appendix A**). The plant is referred to as Water Treatment Plant 4 (WTP 4) and the water lines coming out of the plant are the Jollyville and Forest Ridge Transmission Mains. The project has been envisioned since the late 1980ôs and is now a priority due to increased water needs related to population growth. The WTP 4 facilities will be constructed on an approximately 92-acre parcel to the south of RM 2222/Bullick Hollow Road and to the west of RR 620. The seven-mile long, 84-inch Jollyville Transmission Main will carry treated water from WTP 4 in Travis County to the Jollyville Reservoir near the intersection of McNeil Drive and US 183 in Williamson County. The two to three mile long, 48-inch Forest Ridge Transmission Main will carry treated water to the Forest Ridge Pump Station and Reservoir near the new Leander Middle and High School site near the intersection of McNeil Road and FM 2222. The following Environmental Commissioning Plan (EC Plan) document focuses upon both transmission mains with an over-arching goal of providing a ñroad mapòthat prioritizes avoiding and minimizing environmental impacts. This introduction provides context for the project that illustrates why this is a very challenging goal. The project is ambitious, the setting sensitive, and the regulatory environment fairly complex.

1.2 Environmental Sensitivity of Project Area

Both transmission lines traverse the Balcones Canyonlands Preserve (BCP), home to several rare, threatened, and endangered species including six karst invertebrates, the Golden-cheeked Warbler and the Black-capped Vireo, and have the potential to affect the environmentally sensitive Bull Creek watershed, including known Jollyville Plateau salamander habitat. Given the proximity and potential to affect these ecologically important resources, the following conditions warrant consideration when designing, constructing, and operating the transmission main facilities:

- The transmission main facilities are located over the Northern Edwards Aquifer Recharge Zone (as defined by the City of Austin).
- The proposed easement sites are subject to the requirements of a 10(a)(1)(B) permit issued by the U.S. Fish and Wildlife Service (USFWS) for the BCP.
- Both sites are at least partially within or directly adjacent to preserve land established under the 10(a)(1)(B) permit that is occupied by Golden-cheeked Warblers, Black-capped Vireos and endangered karst invertebrates.
- The sites are in close proximity to caves, springs, rimrocks, and other features that are classified by the COA as Critical Environmental Features (CEFs).

- The sites drain to Bull Creek, which is known to contain habitat for the Jollyville Plateau salamander, a candidate for Federal listing on the Endangered Species List.

1.2.1 Regional Overview

The Jollyville and Forest Ridge Transmission Mains project area lies along the eastern boundary of the Edwards Plateau region of Texas and within an area designated by the U.S. Geological Survey (Griffith et al. 2004) as the Balcones Canyonlands. This region is characterized by steeply rolling topography with soil and geology dissected by erosion and solution creating springs and creeks, with resulting effects both above and below ground. Percolation of surface water through porous limestone contributes to recharge of the Edwards Aquifer. High gradient streams originating from springs in steep-sided canyons supply water downstream at the eastern base of the escarpment. Groundwater is relatively shallow and could occur in several strata. In contrast, areas north and east of the Balcones Canyonlands are overlain by deeper, more fertile soils, and more gently rolling to flat terrain.

1.2.2 Climate

According to climate data maintained by the National Weather Service for the Austin, Camp Mabry Area (NOAA, 2009), average monthly temperature varies between 50º F. in January to 85º F. in August, with an annual average of 69º F. Average annual precipitation during the period from 1971 to 2000 was 33.7 inches.

1.2.3 Topography

Topography within the project area proceeding from the southwest to northeast begins as steeply rolling terrain, including steep cliffs, rocky outcrops, and canyons; with a continuation of this pattern through portions of the Bull Creek watershed, with an eventual transition to gently rolling and flat terrain on the northeast portion near U.S. 183. Elevations vary from about 1,000 feet above sea level near the southwest side of the project area, to about 900 feet near the northeast side.

1.2.4 Geology

The project area is located in the Jollyville Plateau area of the Edwards Plateau. The major units underlying the study area include, from oldest to youngest; the Upper Glen Rose Formation (Kgr(u)), the Walnut Formation (Kwa), the Comanche Peak Limestone (Kcp), and the Edwards Limestone (Ked) (Bureau of Economic Geology, 1992). In the study area, the Edwards Limestone is up to150 ft thick in areas where it hasn't been weathered away. The Edwards Limestone weathers by mechanical erosion and dissolution, an erosional process which contributes to its honeycombed and cavernous nature, forming karst topography. When this type of formation is exposed at the surface, it allows relatively rapid infiltration of rainfall and surface runoff providing recharge to the underlying aquifer. This condition, combined with the thin soils typical over the Edwards outcrop, make the aquifer sensitive to surface conditions.

Beneath the Edwards limestone are the Comanche Peak limestone and the Walnut formation. The Walnut formation is about 150 ft thick in southern Williamson County and the Comanche Peak limestone is 30 to 90 ft thick in Williamson County and thins southward, pinching out in Travis County. The Glen Rose formation is about 400 ft thick in the project area and the upper and lower Glen Rose members are associated with the Trinity Aquifer (Jones, 2003). In the project area, the plateau has been incised by the upper reaches of Bull Creek and its associated tributaries. Surface geology at the eastern edge of the project area has been altered by residential and highway development leading to increased impervious cover; however, the creek drainages are mostly protected on COA and Travis County lands.

1.2.5 Soils

Soils on the Edwards Plateau are typically shallow on uplands and include very stony, dark, alkaline clays and clay loams. On steep hillsides and valleys, soils are slightly deeper, lighter, and less stony. Soils in bottomlands are typically deep, dark, alkaline loams and clays. Surface drainage on Edwards Plateau soils is rapid. Land historically was agricultural, used primarily for cattle and sheep ranching, with forage crops grown in the deeper bottomland soils. Edwards Plateau soils generally have low shrink-swell potential, high foundation strength, low compressibility, high slope stability, low plasticity, and potentially moderate to difficult excavation potential (Kier et al. 1977).

1.2.6 Surface Water

Surface water in the project area is confined principally to the Bull Creek watershed. However, the project area also contains small portions of the Lake Travis watershed near the WTP 4 site, a small portion of the Panther Hollow watershed southeast of the intersection of FM 620 and FM 2222, and a small portion of Rattan Creek watershed at the eastern terminus of the project area near U.S. 183. The principal stream within the project area is Bull Creek, which runs approximately 11 miles to its confluence with the Colorado River at Lake Austin. According to environmental stream assessments conducted by the COA (2009a), Bull Creek ranks 8 out of 46 watersheds in overall quality. Water chemistry was rated fair, sediment qualityð good, recreation usesð excellent, aestheticsð excellent, and aquatic lifeð very good. In response to citizen complaints, roughly 33 pollution problems are investigated each year. Sewage is the most common problem, followed by petroleum and then sediment.

1.2.7 Groundwater

The outcrop of the Edwards Limestone in this area was described by Woodruff et al. (1985) as outcrop of the Edwards Aquifer. Springs emerge in this area at the base of the Edwards Limestone, and are probably the result of gravity flow from localized flow systems. Based on Veni and Associates (1992), there is a very low potential for conduits in the underlying Walnut and Glen Rose Formations. However, there is a small conduit known to exist within the Walnut Formation along the banks of Bull Creek downstream of the WTP 4 Special Use Tract. This area is not defined as being within the recharge zone of the Edwards Aquifer for regulatory

purposes by the Texas Commission of Environmental Quality (TCEQ); however, the COA does consider this part of the Edwards Aquifer recharge zone.

1.2.8 Jollyville Plateau Salamander and Karst Invertebrates

The Jollyville Plateau salamander (JPS), six endangered karst invertebrates, and numerous karst species of concern have been identified in the project area. The JPS occurs in springs and spring runs in tributaries draining the Jollyville Plateau. Karst invertebrates inhabit karst features formed by the dissolution of limestone in subsurface streams and passages. All of these species are sensitive to contamination of surface and groundwater entering the ecosystem and alterations to groundwater and surface water flow. Therefore, measures to address storm water quality must include consideration of spring and karst habitats that might be altered by surface and groundwater contamination and changes in flow.

1.3 Environmental Commissioning Process Overview

Following City Council action to fund Phase I of Preliminary Engineering for WTP 4 in May 2005, including ancillary facilities (intake, gate shaft, raw water lines), the Austin Water Utility (AWU) and Watershed Protection Department (WPD) organized a working group to develop a plan to minimize and mitigate environmental effects of the project and its construction on surrounding natural areas and natural resources. The Mitigation Working Group developed a strategy with three components: environmental goals; monitoring; and environmental commissioning. The Groupôs efforts are being carried forward into this EC Plan for the transmission mains.

The EC process will be implemented to help protect the nearby environmental resources, sensitive species, and their habitat. The EC process will balance the environmental conditions and sensitivities of the transmission main sites with the needs of the AWU to design, construct, and operate the facilities.

This EC Plan summarizes the EC process, the goals that will be targeted through the EC process, the proposed Best Management Practices (BMPs) and mitigation measures that are planned to achieve those goals, and the concept of adaptive management. The BMPs contained herein are not set in stone but are to be used as a guide to achieving the Cityôs ultimate goals. If through preliminary design it is determined that a proposed BMP cannot reasonably be implemented, the Design Engineer should feel compelled to amend the BMP or propose an alternate BMP to achieve the intended goal. Likewise, if a proposed measure does not appear to go far enough in achieving the ultimate aim, the Design Engineer should expand on the BMP or propose additional measures to meet or exceed the Cityôs environmental protection goals. Likewise, BMPs that are found to be ineffective during construction should be altered, upgraded, or replaced through a process of evaluation and approval by the EC Team.

1.4 Abbreviations

- AWU ð Austin Water Utility
- BCCP ð Balcones Canyonlands Conservation Plan
- BCP ð Balcones Canyonlands Preserve
- BMP ð Best Management Practices
- CEF ð Critical Environmental Feature
- E&S ð Erosion and Sedimentation
- EC ð Environmental Commissioning
- PMP ð Integrated Pest Management Plan
- LEEDÊ ð Leadership in Energy and Environmental Design
- JPS ð Jollyville Plateau Salamander
- mgd ð million gallons per day
- MOU ð Memorandum of Understanding
- OSHA ð Occupational Safety and Health Administration
- PDT ð Project Design Team
- SOP ð Standard Operating Procedures
- SPCC ð Spill Prevention Control and Countermeasures
- SW3P ð Stormwater Pollution Prevention Plan
- TAC ð Texas Administrative Code
- USFWS ð U.S. Fish and Wildlife Service
- WPD ð Watershed Protection Department
- WTP 4 ð Water Treatment Plant No. 4

2.0 ENVIRONMENTAL COMMISSIONING PROCESS SUMMARY

The concept of using an EC process for the transmission main projects is borrowed from the LEED™ process for sustainable design and the EC process for WTP 4. Environmental commissioning is intended to be a process whereby environmental goals are established and an ongoing auditing process is then used to help guide the project towards achieving those goals through project planning, design, construction, and operation. The process of environmental commissioning will occur throughout the project and involve multiple meetings, reviews, training, oversight, inspection, permitting, and other tasks. Generally, the EC function will be one of oversight; during design, construction and operation, the EC function will also include monitoring and reporting of impacts.

An EC team will be used to implement the EC process. The EC team will consist of the following:

- EC Team Leader, a staff member from WPD
- EC Project Coordinator, a staff member from WPD
- Environmental Compliance Manager, a staff member from WPD
- Austin Water Utility personnel
- Austin Public Works personnel
- EC Consultant
- Members of the Project Design Team
- Additional staff from WPD

The EC process will require collaborative efforts between the EC team, the project design team, and the construction management team throughout all project phases. Regular meetings will be used to involve the EC team in ongoing issues, decisions, and documentation. Beginning in preliminary design, and continuing through final design, the EC Team should be integrated into the design process to provide real-time input to evaluation and analysis of the transmission mains with respect to the commitments and recommendations made throughout this document. This interaction between the EC Team and the design teams is considered urgent and critical in seeing that the design of the transmission mains meets established environmental goals and the project stays on schedule for completion by 2014.

A revised Memorandum of Understanding (MOU) was developed to describe the roles and responsibilities of the AWU, WPD, and the Planning and Development Review Department in implementing the EC process for the WTP 4 project, including the transmission mains. (A copy is included in **Appendix B**).

3.0 ENVIRONMENTAL GOALS

The proposed routes are located within the watershed of Bull Creek, a tributary of which flows through the BCP. During peak run-off periods, Bull Creek can supply up to about 35 percent of the flow volume to Lady Bird Lake, while normal contributions on a monthly basis are about 2.4 percent of the total flow volume. Portions of the upper watershed remain undeveloped. Less development in the Bull Creek watershed relative to surrounding urbanized watersheds resulted in Bull Creek achieving the highest Environmental Integrity Index (EII) score of seven watersheds assessed in a 1999 study (per the Water Supply Suburban Watersheds Report: Watershed Protection and Traffic Analysis, COA-ERM 1999-02). Bull Creek also obtained the highest watershed score out of 18 watersheds evaluated in a 2004 EII assessment (Phase II Watershed Summary Report, COA-ERM SR-06-01) .The characteristics of the watershed result in important habitat being provided for indigenous species, which places a high degree of environmental value on the land within it.

Other environmental features of concern also characterize the proposed transmission main routes. The Northern Edwards Aquifer (as defined by the City of Austin) underlies portions of the project area, and stormwater quickly recharges the aquifer through infiltration and recharge through karst features that emerge as springs supplying Bull Creek. The springs and seeps provide extended downstream base flow that in turn creates habitat for the Jollyville Plateau salamander, a species petitioned for listing under the Endangered Species Act in May 2005 and for which the USFWS determined the listing to be warranted but precluded, and contributes to the habitat for Golden-cheeked Warblers that reside in the area. The routes are also partially within or directly adjacent to BCP land. In addition, at this stage of preliminary design, it is assumed that at least one drilled shaft (Forest Ridge retrieval shaft) would involve surface disturbance within the BCP. Maintaining the quality and quantity of stormwater discharging from the site and minimizing construction and operational impacts is critical for protecting these sensitive habitat areas.

The Mitigation Working Group determined that environmental protection goals should be established to both assure that the recommendations of the Environmental Board and City Council are addressed and to support actions to reduce the overall environmental impact of constructing and operating water transmission lines in the sensitive BCP and Bull Creek watershed. The goals will not only guide the preliminary and final design of the projects but will also continue to provide direction through the construction and operation of the facilities.

The environmental goals established for this project present the nature and level of environmental protection, beyond typical federal, state, and local regulatory requirements that will be targeted. The goals defined by the EC team consist of the following:

- Prevent adverse impacts to water quality.
- Maintain existing hydrologic regimes.

- Prevent discharge of pollutants from the sites.
- Meet or exceed the requirements of the BCCP.
- Avoid, minimize, and mitigate impacts to threatened or endangered species, and species of concern.
- Avoid, minimize, and mitigate impacts to the Jollyville Plateau salamander.

4.0 PROJECT REQUIREMENTS

In addition to the environmental goals and conditions established for the EC process, facility requirements will dictate the planning, design, construction, and operation of the Transmission Mains. The following requirements must be met and may require adjustment and reconsideration of the EC goals and BMPs as the project progresses:

- *Regulations:* The transmission main facilities will be required to meet a variety of regulations promulgated and enforced by various local, state, and federal agencies. These include water quality requirements (Texas Commission on Environmental Quality and City of Austin), the Endangered Species Act/BCCP permit requirements (USFWS), security requirements (U.S. Department of Homeland Security), risk management (U.S. Environmental Protection Agency), City of Austin requirements, and others. In some cases, regulatory requirements may take precedence over environmental goals; however, a common sense balance will be sought which errs upon the side of environmental protection whenever possible. If impact avoidance is impossible, efforts to minimize and/or mitigate the impacts will be explored in detail during the design phase and reviewed with the EC team for inclusion in the final design.

- *Site Variances:* The topography and configuration of the sites may require variances to the Cityôs Land Development Code for cut and fill in order to construct the necessary facilities. The need for additional variances may be identified during the design process. The EC Team shall review the design and evaluate the need for additional variances.

- *Constructability:* Tunnel shafts shall be excavated via hoe-ramming, or blasting. Tunnels shall be excavated via tunnel boring machine. Alternative means of excavation proposed by Contractor(s) will be reviewed and considered jointly by the EC and project teams.

5.0 BEST MANAGEMENT PRACTICES (BMPs)

The following paragraphs present proposed Best Management Practices (BMPs) that could potentially be incorporated into the Transmission Main facilities to help achieve the established environmental goals.

5.1 Stormwater Management

Given the environmental significance and characteristics of the project area, effectively managing storm water runoff from the proposed transmission main facilities is a vital concern and requires careful planning combined with stringent implementation and monitoring. Following discussions with the EC Team, several guiding principles emerge with respect to stormwater management for the transmission mains.

- Prioritize erosion control over sedimentation control (for example, place mulch over exposed soils as soon as practicable following construction activities to more effectively minimize sediment transport).
- Design erosion and sedimentation controls and BMPs to protect surface and groundwater quality and flow to the maximum extent practicable.
- Monitor surface water quality based on the anticipated level of disturbance and proximity to sensitive environmental features such as springs, known JPS habitat, karst features, Bull Creek, and tributaries to Bull Creek.

5.1.1 Stormwater Management Goals

The goals for stormwater management are to:

- Prevent adverse impacts to surface water quality from stormwater leaving the sites.
- Achieve water quality protection standards that go above and beyond existing COA code requirements.
- Maintain and protect the ecological integrity and aquatic habitats within the watershed.
- Minimize impervious areas as part of strategy to maintain pre-development hydrology.
- Avoid and preserve sensitive features such as springs, stream channels and karst features.

5.1.2 Stormwater Management BMPs

The following paragraphs describe the proposed approach and application of BMPs to meet the stated goals during all phases of the project. The temporary erosion and sedimentation (E&S)

plans for the Transmission Mains will be required to meet or exceed the applicable requirements of the TCEQ's Edwards Aquifer Rules, the Texas Pollutant Discharge Elimination System general permit requirements, and the COA Environmental Criteria Manual, Section 1.4 Erosion and Sedimentation Control Criteria (adopted first quarter 2009). These updates include requirements for:

- Phasing, enhanced soil stabilization techniques, and minimization of disturbance;
- Changing the design of silt fences from filtration to sedimentation devices; using mulch logs and berms; removing brush berms, tri-dikes, and sandbag berms; and modifying inlet protection;
- Confirmation that E&S Design Engineers are qualified for the scope of E&S design [the SW3P must be signed and certified by a Certified Professional in Erosion and Sedimentation Control (CPESC)]; and
- Requiring the Contractor to have a certified inspector [CPESC or Certified Erosion Sediment Storm Water Inspector (CESWII)] record the results of required daily inspections every five days and within one day following a rain event of over 0.5 inch as measured at the construction site.

5.1.2.1 Preliminary and Final Design

The measures outlined below represent the general water quality protection measures to be addressed in detail during the preliminary and final design phase and ultimately implemented during construction.

Prepare and Implement Water Quality Monitoring Program

A stormwater monitoring program will be implemented for the Transmission Mains depending on the siting of working shafts, access roads, lay down areas, and other ground disturbing activities and their proximity to JPS sites, springs, caves, Bull Creek, and other sensitive features. Depending on site location, the monitoring program may include hydrology, storm water quality and flow patterns, base flow water quality, spring water quality, groundwater quality and flow patterns, aquatic habitat, and JPS counts in the immediate proximity to stormwater discharge sites and in the nearby watershed. The monitoring program will: (1) establish baseline surface water quality conditions prior to construction; (2) establish monitoring locations; and (3) establish discharge limits for pollutants, including but not limited to, total suspended solids (TSS), pH, total dissolved solids (TDS), total petroleum hydrocarbons (TPH), and fecal coliform (see **Section 5.2.2.1** for related discussion). The results from the early monitoring phase will form baseline conditions for providing feedback to the Design Engineers to refine the planned mitigation and control measures. Monitoring over the course of the construction and operation of

the Transmission Main projects will provide additional feedback on the mitigation performance for confirmation of the effectiveness of the BMPs and for continual improvements.

Observation of storm water controls for design phase field activities

Erosion and sediment controls for field activities will be monitored as appropriate to analyze the effectiveness of those controls.

Establish a Land Preservation Strategy

Establish and maintain adequate buffer zones and setbacks to stream courses, wetlands, flood plains, karst features, and other environmentally sensitive features. Buffer areas will be kept in a natural state and the quality and quantity of runoff entering the buffers will be managed. Disturbance within buffer areas will be restored to pre-existing conditions or better. In addition, site planning will minimize impervious cover and the overall footprint of the site. Karst features within the BCCP permit area shall be buffered in a manner that protects the surface and subsurface hydrogeologic area around the feature. Consistent with the ñNo Surprisesò sections relevant to Listed Karst Invertebrates within Condition P of the BCCP Federal Permit (see **Appendix C**), where the surface and subsurface hydrogeologic area around the cave is not known, the area delineated by the contour level of the bottom of the cave, or, in the absence of such site specific information, 0.25 mile surrounding the cave entrance will constitute the buffer. A long-term maintenance plan for the buffer areas will be developed to include integrated pest management and vegetation management plans.

Establish Contingency Plan

A contingency plan will be established for unexpected events that might occur during or after construction. Procedures will be established to define the necessary actions to adequately respond to these events and avoid, minimize or mitigate potential adverse effects.

5.1.2.2 Construction and Start-up

Prior to construction, a storm water pollution prevention plan will be developed to address the use of BMPôs during construction. The plan will include a schedule to address phasing of construction activities and a plan for monitoring and compliance with the plan requirements. BMPs for storm water quality management including soil erosion and sedimentation controls will be implemented and checked throughout the construction of the project.

The following five steps will dictate the development and implementation of the erosion and sediment control plan:

- Planning: The construction activities will be planned to fit the existing sitesô features, including topography, soils, drainage ways, natural vegetation, and environmental features.

- Scheduling of Operations: Grading and earthmoving operations will be scheduled to expose the smallest practical area of land for the shortest possible time. These operations will follow earlier vegetation removal operations that will have converted the existing vegetative cover to mulch covering the areas scheduled for earthmoving.
- Soil Erosion Control: Soil erosion prevention and control practices will be applied as a first line of defense against off-site damage.
- Sediment Control: Sediment control practices will be applied as a second line of defense against off-site damage due to sedimentation.
- Maintenance: A thorough BMP maintenance program will be implemented before, during, and after construction.

The measures outlined below represent the general water quality protection measures to be implemented during the construction phase.

Install and Implement Erosion and Sediment Control Best Management Practices (BMPôs)

Construction phase BMPôs may include temporary BMPs such as mulch socks, silt fence, rock dams, and sedimentation ponds. Proper installation, operation, and maintenance of BMPôs will follow COA standard practices from the Cityôs Environmental Criteria Manual. BMPs will be established prior to the construction activities and will be maintained throughout the construction period.

Efficient Clearing

Clearing of vegetation will be minimized to the extent practicable. Areas of clearing will be designated during preliminary design and marked clearly on the ground prior to construction. To the extent practicable, large trees will be left in place and protected. In some instances, large oak trees may be relocated. Mitigation for the loss of trees will be consistent with the City of Austin regulations.

Protect Streams

Tributaries to Bull Creek and other drainage ways are particularly susceptible to sedimentation and would be the focus of the water quality protection measures. Except for environmental monitoring needs, the Construction Contractor will be excluded from the areas around the creek and intermittent drainages via a construction fence. Penalties will be assessed if access outside the limits of construction occurs.

Limit Soil Exposure

Clearing will be implemented in a manner that leaves the vegetative residue on the soil surface in a form similar to mulch. Construction activities will be phased to limit exposed soils. After the initial clearing, disturbed areas will be stabilized. The remaining sequences of work will disturb

soil only where necessary. As final grading is completed within certain areas, final stabilization (revegetation) will be performed quickly.

Establish Materials Management Plan

Prior to construction, a plan will be developed to address the safe handling, storage, treatment and/or disposal of materials that are brought onto the sites by the Contractor during construction ("Materials Management Plan"). The Materials Management Plan shall include, at a minimum: (1) a listing of all materials to be brought onto the sites (including lubricants and drilling epoxies) and, for each, the quantities, a brief description of the hazardous characteristics, and the Material Safety Data Sheet (MSDS); (2) defined appropriate storage practices, including designation of approved containers, container labeling, secondary containment and storage locations; (3) designated responsible individuals; and (4) procedures for proper disposal. The Materials Management Plan shall also include a plan for personnel training addressing management and response to hazardous waste situations and a contingency plan for spills or releases, including response and/or containment procedures and reporting requirements.

Implement Water Quality Monitoring Plan

Water quality monitoring will be implemented throughout the construction phase depending on the siting of working shafts, access roads, lay down areas, and other ground disturbing activities and their proximity to JPS habitat sites, springs and other sensitive features. Monitoring over the course of the construction of the transmission main projects, and in accordance with the plan outlined in **Section 5.1.2.1**, will provide additional feedback on the mitigation performance for confirmation of the effectiveness of the BMPs and for continual improvements. Monitoring results from this phase will be closely reviewed to identify improvement needs. Corrective and/or preventive actions will be taken as necessary. The Contract Documents will include provisions for stoppage of work as well as damages that can be assessed if the Contractor does not adhere to specified requirements for runoff control.

Implement Dust Control

Dust control shall be implemented per the Cityôs Standard Specification 220S, Sprinkling for Dust Control, in order to minimize nuisance dust and minimize impacts (on and off site). As part of this requirement, the Contractor shall submit and have a plan approved for achieving dust control during construction. his plan shall be reviewed through the EC process. Additional measures shall be considered as necessary to protect sensitive species or prevent public nuisance. The contract documents will specify the Contractorôs responsibilities associated with dust control throughout the duration of construction. In general terms: Institute corrective actions and dust control in the event that visible dust is observed leaving the site. Only water or approved alternatives will be allowable for use for dust control

5.1.2.3 Operations and Maintenance

The measures outlined below represent the general protection measures to be implemented during the operation and maintenance phase of the project.

Implement Integrated Pest Management (IPM) Plan

An Integrated Pest Management plan will be established to achieve long term environmentally sound pest suppression and prevention through the use of wide variety of technological and management practice. The plan will adopt a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health and environmental risks and impacts. The IPM will include preventive steps as well as non-chemical and chemical controls that minimize the use of pesticides and maximize natural processes.

Perform Training and Education

Successful stormwater management depends on the knowledge, training, and willingness of staff to implement and maintain protection measures. Training and education will be conducted as outlined in **Section 7.0**.

5.1.3 Groundwater Discharges from Tunneling Activities

Both the Jollyville and Forest Ridge Transmission Mains are required to tunnel at least the portions of the lines that traverse the BCP, and although the depths and construction methodologies have not yet been determined, it is reasonably foreseeable that the tunneling activities for one or both lines will encounter groundwater at some point. That groundwater would then need to be carried out of the tunnel and discharged at the surface. Through the EC process several concerns have been raised regarding this possibility, with respect both to the volume of groundwater potentially being removed from the system ï possibly causing disruption to natural recharge and groundwater flow patterns ï as well as the quality and quantity of the water discharged at the surface.

Structural controls to limit and/or mitigate groundwater migration in tunnels and shafts is a key BMP to limit impacts of discharges of collected groundwater. These measures are discussed in **Section 5.2**. There are multiple options for handling groundwater that is collected during the construction process:

- Water can be reused on-site for dust control and similar purposes;
- If land is available it can be discharged using sprinklers or other methods that provide for recharge of local groundwater;

- It may be discharged into nearby sanitary sewers with the permission of the Austin Water Utility; or
- It may be discharged into nearby storm sewers or streams.

Groundwater that is land applied or discharged to storm sewers or streams may require treatment to meet the project goals of no adverse impact to water quality. Discharges to surface water shall mimic or exceed the quality of the receiving stream. Additional BMPs to consider during preliminary engineering to address surface discharge include settling basins, active filtration (flocculation), and distributed discharge (sprinkler systems, level spreaders). Discharge standards will be developed through the environmental commissioning process with input from the EC Team and Project Design Team.

5.2 Groundwater Protection

The Edwards Limestone in this area is described by Woodruff et al. (1985) as an outcrop of the Edwards Aquifer. Many springs emerge in this area at the base of the Edwards Limestone, and are probably the result of gravity flow from localized flow systems. Other springs discharge from the Walnut and Glen Rose Limestones and the main stem of Bull Creek and its major tributaries.

The karstic nature of the Edwards Limestone creates a sensitive area where the groundwater quality will quickly reflect inputs from the surface. There are a significant number of caves and recharge features within the study area. These types of features provide a conduit for water and contaminants to make their way into the groundwater. There is also a diffuse component to flow from the surface into the groundwater through the soil, fractures, and smaller void spaces in the rocks; however in general the rapid nature of infiltration creates a sensitive system. The JPS and karst invertebrates are sensitive to contamination of groundwater entering the ecosystem and alterations to groundwater flow. Therefore, measures addressing groundwater quality must consider spring and karst habitats that might be altered by groundwater contamination and changes in flow.

5.2.1 Goals for Groundwater Protection

To the maximum extent practicable, the Jollyville and Forest Ridge Transmission Mains should be designed, constructed, and operated to prevent adverse impacts to downstream surface and subsurface water quality and quantity by providing no measurable increase in pollutant loading above the existing conditions. This will be achieved through the following goals.

- Prevent adverse impacts to water quality
- Maintain existing hydrologic regimes
- Manage discharge of pollutants

5.2.2 Groundwater Protection BMPs

5.2.2.1 Preliminary and Final Design

Implement Standards for the Protection of Groundwater Quality

Standards for watershed protection in sensitive habitats are available from a variety of local, state, and federal regulations, plans, and guidance documents. The Environmental Board requested consideration for adapting and applying those measures found to be necessary to protect the Barton Springs Salamander and the Edwards Aquifer to the sensitive watersheds of upper Bull Creek. The science used to develop these measures was thought to be transferable to the Northern Edwards Aquifer and the Jollyville Plateau salamander habitat requirements. Additional or alternate measures in transmission main planning and design include:

- TCEQ Edward Rules guidance including enhanced measures to eliminate take of endangered aquatic species (TCEQ RGA-348 and RGA-348a, 2005).
- LCRA Waterline agreement with USFWS (Biowest, 2003)
- Barton Springs Regional Water Quality Protection Plan (Naismith, 2005)
- USFWS Recovery Plan for the Barton Springs Salamander (USFWS, 2005)
- Environmental Goals & Recommendations for Mitigation, Best Management Practices, Monitoring, and Environmental Commissioning, Final Report, October 2005
- Environmental Commissioning Technical Memorandum Water Treatment Plant 4, Final January 2009
- Recovery plans for listed species and species of concern documented in the Balcones Canyonlands Conservation Plan (USFWS, 1996).

Many of these measures are applicable to the designs of the Transmission Mains and will be considered in conceptual design of structural BMPs for stormwater management. In preliminary engineering, other measures that can be adapted for appropriate application in this design will be considered.

Develop a Detailed Groundwater Assessment

Perform a detailed groundwater assessment of the affected area groundwater hydrology to predict potential impacts to groundwater quality and quantity, including area springs, and to determine the implications of the construction of the finished water transmission main tunnels and associated shafts to the Jollyville Plateau salamander.

Develop Avoidance and Minimization Methods

Develop methods to avoid or minimize groundwater impacts based on the results of the detailed groundwater assessment intended to utilize local geotechnical boring data, a hydrogeologic study, and a groundwater model to specifically target tunnel drilling at depths below the more karstic (porous) Edwards Formation and into the Glen Rose Formation.

Monitor groundwater, surface water and spring flow characteristics

Establish baseline conditions prior to construction for water quality indicator parameters including but not limited to TSS, dissolved oxygen, pH, TDS, TPH, and fecal coliform by implementing an Environmental Monitoring Program.

Develop a Contingency Plan

During design, develop a contingency plan that would address the potential for groundwater impacts to occur during construction in spite of the avoidance and minimization methods developed previously.

Monitor surface runoff stream flow characteristics

The naturally occurring drainage patterns to downstream tributaries will be maintained to the maximum extent practicable to preserve the quality of downstream habitat and to minimize channel erosion.

Maintain Existing Groundwater Flowpaths During Drilling, Shaft Construction, and Tunneling Activities

Due to the potential for groundwater to be present in the areas to be drilled and the importance of maintaining spring recharge and discharge characteristics, particular attention should be given to preventing the disruption of groundwater flow paths at drilling and shaft locations either vertically or horizontally along the shafts or tunnels. Periodic ñstopsò, conduits, or other means to maintain natural flow characteristics as appropriate should be integrated into the design to prevent disruption to existing groundwater flow patterns during the construction and operation phases of the shafts and transmission mains. Technical Memorandum No. 17 (see **Appendix D**) can be used as a guide in the design of the ñstopsò. Groundwater monitor wells will be used to monitor groundwater conditions including establishing baseline groundwater elevations prior to construction.

5.2.2.2 Construction

Prevent sediment from leaving the site

The Transmission Mains will be designed, constructed, and operated in a manner that will minimize degradation from sediment discharges (see **Section 5.1.2 Stormwater Management BMPs** for further discussion). Increases in the naturally occurring sediment discharges from the sites will degrade the quality of downstream surface water and groundwater. Sediment may

also physically block recharge features that occur in this area and degrade the associated seeps and springs that discharge groundwater into the streams.

Sediment releases due to poor construction management on nearby commercial developments have severely degraded the downstream waterways and compromised JPS habitat. In addition, sediment remediation efforts in Bull Creek are not feasible without creating additional undesirable effects. Erosion and sedimentation management both during and after construction will be modified as necessary to address deficiencies.

Prevent impacts to groundwater from release of chemicals during line disinfection or other maintenance

A release of water treatment chemicals or discharges of treated water may cause environmental impacts to downstream areas. It is critical that chemical transport, storage, and use be accomplished in a manner that will minimize the possibility of an accidental discharge or release. Further, Risk Management Plans and Emergency Response Plans will be developed and implemented for the Transmission Mains. Analysis of the impacts of treated and/or hyperchlorinated water will be done and BMPs will be designed to prevent impacts to groundwater.

Prevent release of fertilizers and pesticides

Increases in nutrients from fertilizers or pesticides will negatively impact downstream waterways. Fertilizers and pesticides that may be used on the site for revegetation or to control pests may be dissolved in stormwater and discharged from the site. Pesticides are also known to be harmful to aquatic and benthic organisms and the food chain. These types of pollutants are difficult to remove through conventional water quality controls. The best management practice is to eliminate the sources of these pollutants. The site should be revegetated using only native materials, and turf areas should be minimized to eliminate the need for fertilizers. Pest control should be accomplished using the least toxic alternative for pests. This is best achieved through adoption and strict enforcement of an Integrated Pest Management Plan (IPMP) that will guide the design, construction and management of the Transmission Mains to minimize or eliminate the sources of fertilizer and pesticide-related pollutants.

5.3 Threatened and Endangered Species Protection

Preliminary alignment alternatives for both the Jollyville and Forest Ridge Transmission Mains cross through the BCP and one retrieval shaft (the Forest Ridge retrieval shaft) is proposed to be located within the BCP. The BCP is a system of preserves that exists as a multi-agency effort to set aside 30,428 acres as mitigation for lost habitat for two neotropical migratory songbirds, six karst invertebrates, and 27 species of concern. The preserve also provides mitigation for rare plant species and 62 karst features (caves and other solution cavities), and provides important water quality and open space benefits for the residents of central Texas. Planned infrastructure corridors were established for both Transmission Main projects (along

with the original WTP 4 site) when the BCP was created. Impacts to threatened or endangered species and their habitat from development of these planned corridors were pre-mitigated through the Balcones Canyonlands Conservation Plan (BCCP) at a ratio of 5:1 (RECON, 1996).

The overall goals for the protection of Threatened, Endangered and Rare Species include:

- Comply with the BCCP with respect to constructing infrastructure within the BCP;
- Avoid, Minimize, and Mitigate for Impacts to the Jollyville Plateau salamander;
- Avoid, Minimize, and Mitigate for Impacts to the Golden-cheeked Warbler, Black-capped Vireo, Endangered Karst Invertebrates and Species of Concern and their habitat.

5.3.1 Comply with the BCCP with Respect to Constructing Infrastructure Within the Balcones Canyonlands Preserve

The Transmission Main construction is provided for in Appendix B of the BCCP EIS/HCP (see **Appendix E**) in approved Infrastructure corridors as authorized by the joint City of Austin/Travis County incidental take permit under section 10(a)(1)(B) of the Endangered Species Act. It will be necessary to adhere to the current permit conditions and BCCP commitments through all facets of design, construction and operation of the proposed Transmission Main facilities. The following paragraphs present goals and approaches for addressing this issue.

5.3.1.1 Goals

Avoid surface impacts in the BCP through tunneling

Surface impacts are to be avoided, to the extent feasible, through the BCP through the use of tunneling technology. One shaft site (Forest Ridge retrieval shaft) will necessarily be placed on BCP land due to the need to connect to the existing Forest Ridge infrastructure within BCP.

All shafts, particularly the Forest Ridge shaft within BCP, will be designed to minimize surface disturbance to the greatest extent practicable. These sites will be restored in a manner similar to pre-disturbance conditions.

Avoid habitat fragmentation

Actions that open up a woodland canopy are considered fragmentation. Because Golden-cheeked Warblers prefer expanses of closed woodland canopy for nesting habitat, fragmentation directly reduces the amount of habitat available to them. Efforts to reduce fragmentation in Transmission Main design and layout will potentially mitigate many negative repercussions of construction and operation to protected species and other species.

Control invasive species

The introduction of non-native and invasive plant species into preserves and other natural areas often result in significant long-term changes in natural plant communities and the ecosystems they support. The resulting changes in natural systems and their function are then observed as threats to other components to that system. In the case of land adjoining the Transmission Main routes, Golden-cheeked Warblers, Black-capped Vireos, Jollyville Plateau salamanders,

and six karst invertebrate species are other components that are endangered or are being considered for listing as endangered or threatened under the Endangered Species Act. The addition of threats from invasive species and resulting habitat changes would result in greater peril for these species.

Introduction of invasive species in projects usually occurs through two vectors in projects such as this. First, re-vegetation plans fail to consider the risk of spreading invasive plants into unintended sites through transport in runoff, or dispersal by wind. Spread may also occur by animals removing plant parts or seed from the site and planting it through defecation or other means on adjacent areas. In the other case, offending plant species are unintentionally introduced by transport on construction vehicles or in construction materials. Efforts to avoid introduction of invasive plant and animal species in Transmission Main design, layout, and construction will potentially mitigate negative repercussions of Transmission Main construction and operation to protected species and other species of concern. Minimizing introduction of invasive species could also reduce regulatory take below levels allowed in the regional permit. A zero tolerance goal of invasive species encroachment is used as an operating performance measure in this case, and will be determined through ongoing BCP monitoring.

5.3.1.2 Best Management Practices

Preliminary and Final Design

Comply with the BCCP with respect to Preliminary Engineering and Design Activities

The purpose of these guidelines is to provide a means by which to verify that construction activity in approved infrastructure corridors will be conducted in the most environmentally sound, time saving and cost effective means possible. Coordinating Committee Secretary review and approval for construction activity within these approved corridors will be required (unless it is pre-approved by the Coordinating Committee Secretary) (RECON, 1996).

During the Preliminary Engineering Phase, the following requirements apply:

During the preliminary phase of a project it may be necessary to obtain data from the field in order to begin the design process. To obtain this data, it may be necessary to survey the proposed construction site and or corridors, obtain soil borings, dig test holes or use other means of acquiring information necessary to begin design and conduct environmental impact or other studies. Such activities have the potential of disturbing species of concern within their designated habitat areas within the corridors, and therefore prior notice is to be given to the Coordinating Committee Secretary before proceeding with these activities.

Notice shall consist of written communication with the Coordinating Committee Secretary at least three (3) working days in advance of the proposed activities during the nesting season (March 1 to September 1).

Drilling, boring and digging within areas designated as potential cave invertebrate habitat shall be defined as minor construction, and the BCCP Appendix B (see **Appendix E**) provisions for notification and pre-approval therefore apply.

During the Design Phase, the following requirements apply:

The Austin Area Utility Coordinating Council (AAUCC) has been established in the Austin area to foster an open exchange of information among private and public utilities, governmental agencies and construction related organizations and to promote cooperation among said groups. Construction plans shall be submitted to the Coordinating Committee Secretary and the AAUCC sixty (60) calendar days prior to the proposed construction activity. The AAUCC shall have no authority to approve or disapprove the proposed construction, but shall serve as a coordinating body between governmental entities and utility companies sharing corridors.

The Coordinating Committee Secretary shall have thirty (30) calendar days from receipt of the construction plans submitted by the governmental agency or utility to approve, disapprove, or approve with modifications.

The approval of construction plans by the Coordinating Committee Secretary does not relieve the Design Engineer from the responsibility of securing approvals required by federal, state and local laws and ordinances.

Establish Buffers around Transmission Main Construction Activities

The BCCP requires buffers around potential karst features whether within the BCP or not. The extent of the buffer is dependent on the protected status of the cave. Caves protected by the BCCP and caves eligible for substitution require a buffer equal to:

- the surface and subsurface hydrogeologic area
- the contour interval representing the bottom of the cave; or
- ¼ mile radius around the cave entrance.

Karst features or potential karst features discovered or accidentally disturbed need to be investigated following the USFWS March 8, 2006 Scientific Permit Requirements for Conducting Presence/Absence Surveys for Endangered Karst Invertebrates in Central Texas (see **Appendix F**). If protected species are present as determined by the investigation, consultation with USFWS is required to determine what further action may be necessary. Areas within the established utility corridors have been mitigated under the existing permit.

Develop Karst Void Investigation Protocols

There are several void investigation requirements that apply to different areas of the project. These include the City of Austin's Land Development Code requirements and BCCP

requirements. Clearly outlined investigation protocols will be developed by the design team with input and review from the EC Team to guide construction contractors at the various work sites.

Implement Strategies to Avoid Habitat Fragmentation

Efforts will include implementing strategies during Transmission Main design and layout to minimize potential fragmentation of habitat for Golden-cheeked Warblers, Black-capped Vireos and other species under management in adjoining preserve and mitigation lands. The Transmission Mains shall be designed in such a way as to minimize surface disturbance during construction and operation, to use existing access routes wherever possible, and to minimize habitat disturbance to the maximum extent practicable.

Use Native Plants in Plans for Revegetation

Planning and design will comply with City of Austin Standard Specifications 604S and 609S regarding the use of native seeds and plants for erosion control and revegetation of temporarily disturbed areas. This would include protecting existing native vegetation from construction damage where possible. Furthermore, strategies for the construction contract scope and construction operations will be designed to minimize the introduction of invasive and non-native plant species into the Transmission Main easements and adjoining preserve land (for example, provide seed mix and tree and shrub list specifications for revegetation needs).

Construction and Start Up

No clearing of vegetation within the BCP during the nesting season (March 1 to September 1)

Monitor for the Presence of Golden-cheeked Warbler and Black-capped Vireo Nesting Activity

Monitoring by a USFWS permitted (Section 10(a)(1)(A) Scientific Permit) biologist affiliated with either the Design Engineer or the Contractor should be of sufficient duration to allow for the determination of whether protected birds are nesting in the vicinity of construction activity or just migrating through the area.

Stop work if nests or nesting activity of protected birds are detected within 300 feet of construction activity.

No construction activity shall be conducted within 300 feet of protected nesting birds. Construction activities could resume once nesting activity is no longer occurring within 300 feet.

Implement Strategies to Prevent the Spread of Oak Wilt

Oak wilt suppression on the sites and controlling the potential spread into the surrounding BCP habitat will be achieved by: 1) conducting oak wilt surveys on the easement sites and in the surrounding BCP land prior to vegetation clearing; 2) protecting existing oak trees in the easement sites during vegetation clearing and construction; 3) minimizing soil disturbance in the vicinity of oak trees; 4) treating all wounds to oak trees caused by vegetation clearing or

construction activities immediately with approved techniques and equipment; 5) removal of all cut oak wood from the site; 6) limiting access to the BCP land to authorized staff only; and 7) restricting the use of pesticides or herbicides on the easement sites.

To further suppress the spread of oak wilt disease, all non-city staff, City staff not directly involved with monitoring mitigation activities on the BCP land, and all construction activities will be confined to the transmission main limits of construction.

Adhere To Section 10(a)(1)(B) Incidental Take Permit Requirements

To protect endangered species and habitat, the following guidelines ï coming directly from Appendix B to the Balcones Canyonlands Preserve Habitat Conservation Plan and Final Environmental Impact Statement (see **Appendix E**) ï have been established and require strict compliance during the pre-construction and construction phases (RECON, 1996):

Notification. Prior to any construction activity defined as major construction (over 3,000 square feet) within the preserve corridor, the Contractor shall conduct a pre-construction conference with all parties affected by and involved in the construction of the project. The Coordinating Committee Secretary or their representative shall be notified in writing five (5) working days in advance of the meeting. The conference will be held to discuss detailed information concerning the project to maximize protection of the species and preserve.

Limits of Construction. Construction activity shall be confined to the areas designated as approved infrastructure corridors. The use of areas other than approved corridors for staging areas and access roads shall require prior approval of the Coordinating Committee Secretary and/or USFWS.

Timing of Construction. Construction activity may occur during the nesting season (between March 1 and September 1) only with the approval of the Coordinating Committee Secretary, and only if site clearing to remove potential nest sites of endangered species has occurred prior to the nesting season. No nests of endangered species will be allowed to be disturbed once they become occupied during nesting season. The Coordinating Committee Secretary shall allow the continuation of construction activities for major projects that cannot be started and completed outside of the nesting season, and for which the costs of starting and stopping construction are excessive.

Erosion and Sedimentation Controls and Surface/Groundwater Quality Protection Systems. Erosion and sedimentation controls and water quality protection system items if required, shall meet guidelines established by the responsible governmental authority, and be installed prior to starting construction. Prior to adoption of guidelines by the responsible governmental authority such installation shall be made in accordance with the rules and regulations of the City of Austin, Travis County or Texas Commission on Environmental Quality, whichever may apply. The erosion and sedimentation controls and water quality protection systems shall be maintained until revegetation is established and restoration is accepted by the Coordinating Committee Secretary.

Location of Facilities Within Approved Corridors. New construction of facilities will only be allowed at locations shown on the approved construction plans. If there is the possibility that a change in the vertical or horizontal location of facilities might have an impact on the endangered species habitat, the change shall require prior notification of the Coordinating Committee Secretary. The Coordinating Committee Secretary shall respond within three (3) working days.

Storage of Materials. Any hazardous chemicals and or materials shall be contained in a safe place with the person or entity performing the work taking whatever precautions are necessary to reduce the risk of such materials being accidentally released into the environment. In all cases, the use of these products shall be minimized and there shall be compliance with all laws and ordinances concerning the storage and use of these materials. The person or entity performing the work shall have an emergency response plan in place in case a spill should occur. The Materials Management Plan referenced in Section 5.1.2.2 should be developed to address this requirement of the 10(a)(1)(B) Permit. In addition, if and when required for the storage of fuel, the Contractor will develop and implement a Spill Prevention, Control and Countermeasure Plan (SPCC).

Restoration. Restoration will require revegetation of all disturbed areas using native grasses, forbs, and shrubs to optimize compatibility with the surrounding habitat, as detailed in the approved construction plans. All disturbed areas shall be monitored until revegetation is established and restoration is accepted by the Coordinating Committee Secretary.

Final Acceptance. When all construction activity is complete, the party responsible for the construction activity shall notify all entities affected by the construction, including the Coordinating Committee Secretary for final acceptance of restoration. The Coordinating Committee Secretary shall have two weeks from notification to give written final acceptance of restoration or define what additional measures are necessary to obtain final acceptance of restoration.

Access Routes. Not all sections of infrastructure corridors can be accessed by routes within the corridors themselves. Some corridors and sites require access routes outside the corridors. The Preserve Land Management Plans and the Coordinating Committee Secretary shall allow access routes to new and existing corridors, for utility employees and designated Contractors, although alternative alignments of similar serviceability may be negotiated to replace existing routes in accordance with the guidelines for new construction and operations and maintenance (see below). Access routes that lie outside infrastructure corridors shall be designated as Secondary B type corridors (see BCCP Appendix B included as **Appendix E**). Preserve Land Management Plans will identify access routes to utility facilities and easements. Applicable security precautions along access routes may be necessary to prevent unauthorized public access to preserve lands from such routes. Changes in access needs for utility activities should be negotiated with the Coordinating Committee Secretary. Non-construction related activities that might threaten preserve integrity shall not be allowed within the access routes.

Operations and Maintenance

Pre-Approved Maintenance

The AWU or their maintenance contractor shall work with the Coordinating Committee Secretary to define and secure pre-approval for operation and maintenance activities that may occur within the planned Transmission Main corridors. Where such maintenance activities are repetitive, mutually agreeable schedules shall be established, and notification shall not be required for every entry. Problems identified during pre-approved operation and maintenance activity shall be scheduled with the Coordinating Committee Secretary for repair. Structural, facility, or equipment problems that threaten reliability or safety must be handled immediately. See "Emergency Maintenance."

Emergency Maintenance

For the purposes of this section, an emergency shall involve an existing condition of, or imminent threat to, public health, safety, property damage, or loss of service. The maintenance contractor may need to perform emergency maintenance within the preserve due to such conditions as equipment failure, pending equipment failure, storm damage, emergency facility repair and maintenance, or other circumstances beyond the service provider's control. The equipment used during the emergency can vary widely and is dependent upon the circumstances surrounding the emergency. Work done under these circumstances may impact endangered species and species of concern; however, it shall be done in such a manner as to minimize disruption. Efforts shall be made to contact the Coordinating Committee Secretary for advice and guidance during emergency maintenance work. However, the service providers must and will move quickly to eliminate the emergency condition. Written notification describing the emergency maintenance work done shall be sent to the Coordinating Committee Secretary within five (5) working days after any such work is completed.

Scheduled Maintenance

The Coordinating Committee Secretary shall be notified in advance of any maintenance activities not covered under "Pre-Approved Maintenance" and "Emergency Maintenance." The planned work and schedule shall be submitted in writing to the Coordinating Committee Secretary for review and comment, and the work shall proceed under the terms negotiated between Coordinating Committee Secretary and service providers. This type of scheduled work could consist of major facility replacement, repair and maintenance, and clearing of right-of-way.

Maintenance of Corridors

Access to all facilities shall be established and maintained. As the management plan for each preserve tract is developed, the Coordinating Committee Secretary shall work closely with the service providers to designate specific access routes to all structures and facilities, consolidating access routes where possible and minimizing impact on endangered species and species of concern. The access routes may require some clearing at the time access is

needed. The maximum width of these access routes shall be twenty feet (20'), except that they may be wider in any curve to allow for clearance of truck booms.

Existing cleared areas near structure sites shall be used where possible to reduce clearing requirements. Existing low-lying vegetation at structure sites shall be preserved to the maximum extent possible. If needed, additional clearing at structure sites shall be limited. The maintenance contractor shall work closely with the Coordinating Committee Secretary whenever manipulation of vegetation is required to minimize impact on endangered species and species of concern. Clearing and trimming along the corridors shall be limited to the following:

- Minimum clearing for surveying purposes (typically a four foot [4'] line of sight.
- Mechanical removal or trimming of vegetation detrimental to the operation and maintenance of facilities. Chemicals for vegetation control may be used only within the guidelines approved by the Coordinating Committee Secretary. Requests to use chemicals may be approved on a case-by-case basis.

All trees and limbs cleared from the corridors shall be shredded, chipped, or hauled from the site. Special handling for oak trees exhibiting oak wilt may be necessary.

Sedimentation control measures will be installed and maintained in accordance with guidelines established by the Coordinating Committee Secretary. Prior to adoption of uniform guidelines by the Coordinating Committee Secretary, such installation shall be made in accordance with the rules and regulations of the COA, Travis County or TCEQ, whichever may apply.

All excavated materials requiring disposal shall be removed from the corridor to an approved dump or fill area. Spoils shall not be stored within BCP.

Any cleared land areas shall be re-vegetated with native grasses, forbs, and/or shrubs, as approved by the Coordinating Committee Secretary and Preservation Management Plan, to re-stabilize vegetative cover within the approved time period.

The Coordinating Committee Secretary and the AWU may develop and agree to clearing guidelines on a site-by-site basis that may modify and/or supplement the guidelines stated in this section.

5.3.2 Avoid, Minimize, and Mitigate Impacts to the Jollyville Plateau Salamander

The Jollyville Plateau salamander (*Eurycea tonkawae*) (JPS) is an aquatic plethodontid that occurs in Travis and Williamson counties. It is considered by USFWS to be a candidate for listing under the Endangered Species Act. USFWS has determined that listing is warranted but precluded. It occurs within the project area in springs, spring runs, and possibly other subsurface karstic features within the aquifer. Potential impacts to this species include siltation, introduction of contaminants, interruption of spring flows from drilling, shaft construction, tunneling, and/or trenching activities, and acute and chronic water quality degradation. The JPS

was not included as a Species of Concern in the BCCP, however the Transmission Mains will be designed as if the species were currently listed.

5.3.2.1 Goals

Habitat protection goals for the JPS are defined in terms of water quality, water quantity, and physical habitat. Through on-site planning, design, and operation of stormwater quality/quantity controls, spill/leak controls, karst feature protection, and other on-site features of the Transmission Main development, contributions will be made to maintaining goals for clean water, natural hydrology, and stable substrate in salamander habitat.

5.3.2.2 Best Management Practices

Preliminary and Final Design

Onsite BMPs for JPS Habitat Protection

BMPs discussed in previous and subsequent sections will contribute to JPS habitat protection. These include stormwater quality/quantity controls (**Section 5.1.2**), groundwater protection (**Section 5.2.2**), spill/leak prevention (**Section 5.4**), and karst feature protection (**Section 5.3.3.2**). The contributions specific to JPS are discussed below in terms of the environmental goal previously stated.

Develop Contingency Plan

A contingency plan will be developed to address potential effects to JPS habitat and JPS populations from the construction of the Transmission Mains and to address potential scenarios regarding imminent danger to surface water and groundwater.

Conduct a Groundwater Assessment

The base flow characteristics of existing springs that could provide potential JPS habitat shall be assessed. The groundwater assessment will provide information on the hydrogeologic system to allow assessment of possible flow paths to spring locations.

Develop a Groundwater Monitoring Plan and Establish Baseline Conditions to Address JPS Protection

A groundwater monitoring plan shall be developed and be designed to identify baseline conditions for hydrology and water quality and set the frequency and parameters for monitoring during the construction phase. Hydrologic and water quality data for groundwater, springs, and streams at historical and new selected locations will be documented to define baseline conditions prior to start of transmission main construction activities.

Construction and Start Up

Implement the Contingency Plan, as necessary

In the event that construction activities are found to have an effect on JPS habitat sites or JPS populations, implement the Contingency Plan developed during the design phase to address the effects.

Conduct Groundwater, Spring, and Stream Monitoring

Groundwater, spring, and stream monitoring shall be conducted according to the plan developed during the design phase. The monitoring should focus on changes to quantity and quality and should note the likely source, whether construction of the transmission mains, some other source, or natural variation. The monitoring should continue until disturbed soils within the project area are stabilized.

Operations and Maintenance

Establish and Implement Standard Maintenance Procedures

A Transmission Main Maintenance Plan will be developed that considers potential JPS impacts, if any.

5.3.3 Avoid, Minimize, and Mitigate for Impacts to the Golden-cheeked Warbler, Black-capped Vireo and Endangered Karst Invertebrates

5.3.3.1 Golden-cheeked Warbler and Black-capped Vireo Protection

The Golden-cheeked Warbler (*Dendroica chrysoparia*) is a neotropical migratory songbird listed by the USFWS as endangered. This species has habitat protected by the BCP and is known to exist throughout the project area in mixed Ashe-juniper and oak woodlands with at least 40 percent cover, primarily in ravines and canyons. Monitoring conducted by BCP Staff indicates the presence of nesting territories within and surrounding the proposed Transmission Main sites. Potential impacts to this species include disturbance, alteration, or removal of occupied and potentially occupied habitat or negative changes in habitat quality due to removal of existing vegetation, increased habitat fragmentation, increased predatory or competing species, and other indirect effects due to above ground construction activities.

The Black-capped Vireo (*Vireo atricapilla*) is a neotropical migratory songbird listed as endangered by the USFWS. This species has habitat protected by the BCP and is known to exist in the study area in semi-open to relatively dense scrubland on steep slopes or flat terrain. Potential impacts to the species as well as buffer recommendations are the same as for Golden-cheeked Warblers (see above). Construction activities shall be limited during the breeding season (March 1 ï September 1). Construction activities planned after September 1 may still encounter Black-capped Vireos and should therefore be coordinated with the Coordinating Committee Secretary.

Goals

- Avoid Take of Individuals and Nesting Habitat
- Avoid Habitat Fragmentation
- Prevent Oak Wilt and Otherwise Protect Oaks

Best Management Practices

Preliminary and Final Design

Monitor for the Presence of Golden-cheeked Warbler and Black-capped Vireo Nesting Activity. Monitoring by a USFWS permitted (Section 10(a)(1)(A) Scientific Permit) biologist affiliated with either the Design Engineer or the Contractor should be of sufficient duration to allow for the determination of whether protected birds are nesting in the vicinity of future construction activity or just migrating through the area.

Develop Strategies to Avoid Habitat Fragmentation. The Transmission Mains shall be designed in such a way as to minimize surface disturbance during construction and operation, to use existing access routes wherever possible, and to minimize habitat disturbance to the maximum extent practicable.

Develop Strategies to Prevent the Spread of Oak Wilt and Otherwise Protect Native Trees. The Transmission Mains shall be designed to minimize the disturbance of oaks and other native vegetation along the routes, both inside and outside of BCP. Conducting oak wilt surveys to identify affected and potentially susceptible areas will aid in avoiding the unnecessary spread of oak wilt.

Construction and Start Up

No clearing of vegetation within the BCP during the nesting season (March 1 to September 1). A case specific variance can be approved by the BCCP Coordinating Committee Secretary. To enhance and maximize protection of Golden-cheeked Warbler and Black-capped Vireo nesting territories in the habitat within and around the Transmission Main routes, only native plants compatible with and common to the surrounding BCP habitat will be used for revegetation of disturbed areas (see City of Austin Standard Specifications 604S and 609S). Design of the Transmission Mains will address the reduction of abiotic influences on the surrounding BCP habitat and wildlife.

Monitor for the Presence of Golden-cheeked Warbler and Black-capped Vireo Nesting Activity. Monitoring should be of sufficient duration to allow for the determination of whether protected birds are nesting in the vicinity of construction activity or just migrating through the area.

Stop work if nests or nesting activity of protected birds are detected within 300 feet of construction activity.

No construction activity shall be conducted within 300 feet of protected nesting birds. Construction activities could resume once nesting activity is no longer occurring within 300 feet.

Implement Strategies to Prevent the Spread of Oak Wilt. Oak wilt suppression on the sites and controlling the potential spread into the surrounding BCP habitat will be achieved by: 1) conducting oak wilt surveys on the easement sites and in the surrounding BCP land prior to vegetation clearing; 2) protecting existing oak trees in the easement sites during vegetation clearing and construction; 3) minimizing soil disturbance in the vicinity of oak trees; 4) treating all wounds to oak trees caused by vegetation clearing or construction activities immediately with approved techniques and equipment; 5) removal of all cut oak wood from the site; 6) limiting access to the BCP land to authorized staff only; and 7) restricting the use of pesticides or herbicides on the easement sites.

To further suppress the spread of oak wilt disease, all non-city staff, City staff not directly involved with monitoring mitigation activities on the BCP land, and all construction activities will be confined to the transmission main limits of construction.

Operations and Maintenance

Establish and Implement Standard Maintenance Procedures and Monitoring Plan. Maintenance and monitoring will be incorporated into the operational and maintenance procedures and will be carried out during the operational phase. Periodic reviews of protected bird habitat and nesting sites will be conducted. Changes relative to the preconstruction and construction phase monitoring data will be noted and analyzed. If necessary, additional BMPs may need to be developed in coordination with the EC Team.

Develop Pre-approved Maintenance Plan for Review by the Coordinating Committee Secretary. Service providers shall work with the Coordinating Committee Secretary to define and secure pre-approval for operation and maintenance activities that may occur within a given corridor. Where such maintenance activities are repetitive, mutually agreeable schedules shall be established, and notification shall not be required for every entry. Problems identified during pre-approved operation and maintenance activity shall be scheduled with the Coordinating Committee Secretary for repair. Structural, facility, or equipment problems that threaten reliability or safety must be handled immediately (RECON, 1996).

5.3.3.2 Karst Invertebrate Protection

Seven karst invertebrate species are listed as endangered by the USFWS in Travis and Williamson counties. Six of these (*Neoleptoneta myopica, Texella reddelli, Texella reyesi, Rhadine persephone, Texamaurops reddelli, and Tartarocreagris texana*) are known to exist in the project area and are protected by the BCCP. There are also 25 Species of Concern that are protected by the BCCP. These species are restricted to caves (defined as voids with entrances

large enough for a human to enter) and mesocavernous voids (not large enough for a human to enter unless modified/enlarged). Detection of these species is done by conducting biological surveys within caves, and in the case of karst features, pedestrian surveys are done to locate potential karst features, which are then excavated, as appropriate, to determine potential habitat, followed by biological surveys.

The proposed project area contains portions of Karst Zones 1, 2, 3, and 4 according to maps produced by Veni and Associates (1992). Karst Zone 1 indicates areas known to contain endangered cave species; Karst Zone 2 indicates areas having a high probability of suitable habitat for endangered cave species or other endemic invertebrate cave fauna; Karst Zone 3 indicates areas that probably do not contain endangered cave species; and Karst Zone 4 indicates areas that do not contain endangered cave species.

During the preliminary design phase, extensive surveys for karst features will be performed once areas of surface disturbance for the Jollyville and Forest Ridge Transmission Mains have been determined. The purpose of the karst feature surveys is to determine the presence or absence of karst geologic features (potential caves and sinkholes) with the potential to support protected species and springs on the proposed construction easements. These features are important because they may be habitat for federally listed endangered or threatened species, or species of concern.

During geotechnical investigations, drilling activities through the Edwards Limestone or other karst geology will utilize casings to prevent drilling fluid loss in the event voids are encountered. Casing will be advanced into deeper geologic formations as needed to maintain circulation.

Goals

- Avoid or minimize disturbance within the drainage area of known caves
- Avoid and preserve significant karst features to the maximum extent practicable
- Maintain the ecological integrity of significant karst features.
- Prevent adverse impacts to water quality for stormwater or groundwater that might enter a karst feature.
- Implement BCP and USFWS guidelines for protection of karst species.

Best Management Practices

To preserve and protect the karst features on the proposed sites, a series of BMPs are proposed to provide assurance of achieving this goal. These BMPs are proposed for both on-site construction and the construction of temporary or permanent access roads to the Transmission Mains. The following paragraphs summarize the proposed BMPs for karst invertebrates and karst features.

Preliminary and Final Design

Establish Baseline Conditions and Conduct Additional Karst and Underground Investigations. Within BCP. additional investigation of underground and karst features on the sites, in the areas surrounding the sites that may have the potential to contribute to the surface and subsurface drainage areas, and along access roads will be performed. Depending on the location of shafts and other areas of disturbance, this may include ground-penetrating radar surveys (similar to the Ullrich WTP project) or alternate geophysical techniques and additional geotechnical borehole work to identify major subsurface features. Comply with the USFWS March 2006 Karst Survey Protocol for the investigation of new karst features discovered throughout project design and construction within BCP. Outside of BCP and outside the presumed drainage basin of a protected cave, karst features will, at a minimum be mitigated according to COA Land Development Code. When possible, karst features will be protected through avoidance

Establish Karst Feature Database. Collect related baseline survey and investigation results and establish a geographic information system (GIS) for the projects including the mapping, related spatial data, and investigation results. The GIS database will be updated throughout the projects to facilitate the data retrieval and pre- and post-development comparisons. This will be used as the tool to monitor the effectiveness of the BMPs. Upon completion of the projects, submit the database to the City for incorporation into the regional database. The project database shall be compatible with city database.

Establish Buffer Zones. The BCCP requires buffers around potential karst features whether within the BCP or within the presumed drainage basin of a protected cave. The extent of the buffer is dependent on the protected status of the cave. Caves protected by BCCP and caves eligible for substitution require a buffer equal to:

- the surface and subsurface hydrogeologic area
- the contour interval representing the bottom of the cave; or
- ¼ mile radius around the cave entrance.

Buffer areas will be kept in a natural state and the quality and quantity of runoff entering the karst features will be maintained. The protection strategy will focus on karst topography. Modification to buffer distance will be reviewed by the EC Team and coordinated with the Coordinating Committee Secretary, including stormwater discharge within the buffer. Buffer areas shall be fenced to limit access.

Develop a Void Mitigation Protocol. City of Austin Land Development Code and BCCP requirements apply but vary along the transmission main easements. Karst features or potential karst features discovered or accidentally disturbed within BCP need to be investigated following the USFWS March 2006 Karst Survey Protocol. If protected species are present as determined by the investigation, consultation with USFWS is required to determine what further action may be necessary.

Kart features or potential karst features discovered or accidentally disturbed outside BCP and not within a ñbuffer zoneò as described previously in this subsection are assumed to be pre-mitigated under the 10(a)(1(B) permit, and do not require investigation.

Establish Maintenance Plan. A long-term maintenance plan for the access shafts and access routes will be developed. This will include an integrated pest management strategy prohibiting the use of pesticides.

Establish Contingency Plan. A contingency plan in compliance with the USFWS March 2006 Karst Survey Protocol will be established for the discovery of unknown karst features within BCP or within the presumed drainage area of a protected cave during the construction phase. Procedures will be established to preserve significant karst features. The City of Austin Environmental Criteria Manual requirements of Section 1.12 Void and Water Flow Mitigation (see **Appendix G**) should also be included in this plan.

Establish Soil Erosion and Sediment Control Plan. A suitable control and mitigation plan for construction activities near the karst features will be developed to include an integrated storm water quality management strategy.

Establish Karst Avoidance Plan. Additional information on potential karst locations and significance will be gathered during Phase II of Preliminary Design and the initial phases of Detailed Design. Based on the information gleaned during these phases of work, proposed facility layouts and locations will be adjusted as feasible to avoid karst features.

Tunnel Routes. Tunnels will be predominately constructed in the Glen Rose limestone. This formation is known to be a fairly uniform and relatively smooth geology, generally below the level of karst development. Access shafts for tunnel construction will be selected to minimize the karst impact, including locating the shafts to avoid areas with potential for karst features or conduits feeding nearby springs. Inside the BCP, tunnel routes will be within Planned Infrastructure Corridors. Outside the BCP, routes will be determined based on engineering practice and public input.

Construction and Start Up

Void Monitoring and Mitigation during Construction. During construction, a qualified geologist will assist the construction inspectors with monitoring of excavation activities for the discovery of previously unknown karst features. The qualified geologist shall be on-site at all times during excavation within karst areas within the BCP. In the event that a potential karst feature is discovered within BCP during construction, work in the area will be halted immediately for an area of 500 feet around the discovery and the Coordinating Committee Secretary will be notified. The feature will be evaluated per the USFWS March 2006 Karst Survey Protocol and if potential for protected species exists, a karst biologist will investigate the feature for protected karst species. The feature will be classified (Class I, II, or III), and specified mitigation measures will be implemented. If the feature is significant or contains protected species, coordination with the City and the USFWS will be initiated as appropriate and mitigation plans

will be followed. The project specifications will include a section on void mitigation that the Contractor will be obligated to follow. These specifications will follow the City of Austin Environmental Criteria Manual requirements of Section 1.12 Void and Water Flow Mitigation (see **Appendix G**).

Cave Gating. If a karst feature proves to be significant, the entrance will be gated to discourage access. The gate design will allow for airflow, inflow of storm water, and the ingress/egress of small mammals. Gating will be evaluated with respect to other security provided on the site that accomplishes equivalent protection.

Implement Erosion, Sedimentation, and Storm Water Quality Control. BMPs for storm water quality management including soil erosion and sedimentation controls will be implemented and checked throughout the construction and operational phases to protect karst and related recharge zones. Strategies such as routing runoff water from roads and parking areas away from karst feature catchment areas, limiting activities that disturb the natural vegetation within catchment areas, and restricting the use of pesticides, herbicides, fertilizers, and other potentially harmful substances should be used to protect recharge features. Details are covered under **Section 5.1**.

Operations and Maintenance

Establish and Implement Standard Maintenance Procedures and Monitoring Plan. Maintenance and monitoring will be incorporated into the operational and maintenance procedures and will be carried out during the operational phase. Periodic reviews of the karst features and established buffer areas will be conducted. If necessary, additional BMPs may need to be developed in coordination with the EC Team.

5.4 Spill and Leak Management

The Jollyville and Forest Ridge Transmission Mains will be constructed with the following features:

- *Bulk Chemical Storage*: No bulk chemicals may be stored on-site, including but not limited to bleach, ammonia, coagulant, fluoride, polymers, or dechlorination agents.
- *Construction Laydown Yards*: Construction equipment, construction materials, and construction debris may be stored in one or more laydown yards near the construction sites.
- *Fueling and Refueling of Equipment*: Fueling and refueling of surface equipment on-site shall be accomplished within lined secondary containment only.

- *Equipment Maintenance and Repair*: For vehicles or equipment normally located at ground-level (not inside the tunnel or shaft bottoms), maintenance and repairs shall not be done on-site unless there is no reasonable alternative (for example, if moving disabled equipment would cause more damage to the environment than repairing in place).

Endangered species and species of concern inhabit the area around the proposed easement sites, including the Jollyville Plateau salamander and numerous karst invertebrates. The sensitivity of karst invertebrates and salamanders to spills or leaks from the Transmission Mains, especially chlorine, dictates that special precautions are adopted for the design, construction, and operation of the facilities to assure that acceptable protection is afforded these species. A series of Best Management Practices (BMPs) are proposed to achieve this goal. Where feasible and to project the potential effects that could be realized through implementation of the BMPs, proposed performance criteria have also been established. The following paragraphs summarize the proposed BMPs and relevant performance criteria.

5.4.1 Goals

The goal for controlling spills and leaks along the Transmission Main construction sites is to eliminate the potential of discharging chlorinated water, chemicals, sediments or other pollutants from the site to the natural waterways. Discharges will need to be treated to meet various parameters (for example, dissolved oxygen, salinity, temperature) to be determined by the Design Team and reviewed by the EC Team.

5.4.2 Proposed BMPs

The following paragraphs summarize BMPs that are proposed for all phases of the project and expected performance from implementing these measures.

5.4.2.1 Preliminary and Final Design

Provisions for a comprehensive spill prevention and containment plan for controlling, treating, and routing spills and leaks will be included in the Contract Documents. **Section 5.4.2.2** summarizes elements of the proposed design and procedures to be more fully developed and described in the spill prevention and containment plan. If required, the Contractor will also develop a Spill Prevention Control, and Countermeasure Plan (SPCC) to cover areas designated for fuel storage. The SPCC should address concerns related to security and the securing of materials and equipment when not in use or during periods of construction inactivity.

5.4.2.2 Construction and Start-up

The Contract Documents will specify requirements for spill and leak prevention and control that the Contractor will be required to follow during execution of the work. City inspectors will be on-site during the entire construction phase to assure that specified procedures are followed. These will include:

Containment for Fueling Equipment on the Surface

BMPs: Fueling of equipment on the surface will occur only within secondary containment approved by the City, such as on a compacted, 12-inch thick soil pad placed over a thick mil poly-liner. The fuel hose must be stored within secondary containment. Rainfall will be excluded from secondary containment areas by covering outside containment areas and/or sizing containment areas to 150 percent of the volume of the largest container. Drains will not be installed within the secondary containment areas. Operations staff will be required to pump liquids out of the area and to an approved container or location that is compatible with the nature of the liquid. All applicable regulations governing secondary containment will be followed.

Performance: Secondary containment areas will be sized to contain the full contents of the largest container within the containment area plus a minimum freeboard of six vertical inches or to hold at least 150 percent of the total volume of the container(s), whichever is greater.

Containment for Fueling Equipment Within Shafts

Fueling for equipment within the shafts must be done via piping fixed to the shaft wall and enclosed within a structure to prevent damage from impact, (e.g. steel cage or sturdy overpipe). The fueling system must have an emergency shutoff at the bottom of the shaft within easy reach of the fueling area. The connection between the storage tank and shaft piping should be via a flexible hose with a leakproof disconnect so that the hose can be stored within a containment area when not in use. Connection points should have secondary containment to catch accidental spills when connecting/disconnecting hose.

Spill and Leak Response

BMPs: If fuels, fluids, or other petroleum products leak from the tunnel boring machine or other equipment during construction within the tunnel, spill response actions should be implemented immediately, even if work stoppage is required to do so. The spilled materials should be cleaned up and disposed of properly without discharging potentially contaminated water to the ground or to surface waters.

Performance: Water with a visible sheen will be considered contaminated and should not be discharged to the ground or surface waters. Contaminated water should be pumped or otherwise carried to a holding tank area if temporary holding is required or pumped into a vacuum truck to be hauled off and disposed of properly.

Perimeter Berming

BMPs: A series of berms and storm channels may be used to assure that all run-off from the site is routed to the appropriate stormwater discharge site. Similarly, a berm system should be used to limit or prevent run-on.

Performance: The berm system will be sized to accommodate run-off from the design storm event for the storm water management system and to minimize run-on for the same size storm. A sampling protocol will be developed for discharge locations in the event of a spill of oils, lubricants, or other pollutant.

Fuel Storage

A maximum of 48 hours worth of fuel can be stored on site. The Contractor must describe and justify the maximum volume in the spill prevention and containment plan. Fuel must be stored in a double walled tank protected by bollards or other structures adequate to prevent construction equipment from hitting tank. The tank must be stored within secondary containment. Rainfall will be excluded from secondary containment areas by covering outside containment areas and/or sizing containment areas to 150 percent of the volume of the largest container. Drains will not be installed within the secondary containment areas. Operations staff will be required to pump liquids out of the area and to an approved container or location that is compatible with the nature of the liquid. All applicable regulations governing secondary containment will be followed

The tank must be stored at least 75 feet from the tunnel access shaft. The tank should not be trailer-mounted (skid-mounted acceptable) and should not be regularly moved to accommodate site operations.

Vehicle and Equipment Maintenance and Repair

For vehicles or equipment normally located and operated at ground-level (not inside the tunnel or shaft bottoms), major maintenance or repairs shall not be done onsite unless there is no reasonable alternative (for example, if moving disabled equipment would cause more damage to the environment than repairing in place). If equipment maintenance that includes lubrication is performed onsite, it shall be performed on a compacted, 12-inch thick soil pad with sorbent pads placed beneath the equipment. Lubricants shall be stored within an enclosed, weatherproof structure placed on a compacted, 12-inch thick soil pad.

Spill Response and Cleanup

BMPs: Provisions will be included in the Contract Documents to govern cleanup and reporting of materials spilled during construction.

Performance: The Contract Documents will specify that the entire affected area must be completely free of all spilled material. The Documents will require removal and disposal of affected material and confirmation sampling to demonstrate that contamination does not exist within potentially affected material left in place. Contaminated soils and other materials may not be stored on-site.

All spills shall be reported to the Environmental Compliance Manager. Minor spills during fueling or maintenance should be completely cleaned up immediately. Spills over one gallon

shall be completely cleaned up immediately, including removal of contaminated soil, even if work stoppage is required to do so. Soil testing to verify cleanup will be performed for spills over one gallon. Soil testing is required to verify cleanup when impacted soils are removed due to spills. The Texas Risk Reduction Program Tier 1 protective concentration levels for residential property shall be used as the threshold. Test results shall be provided to the City immediately upon receipt by the Contractor.

Hydrostatic Pipeline Testing

All water-bearing pressure pipelines will be pressure and/or leak tested for specified durations to verify integrity. The project has a 0 percent leakage goal; however, the hydrostatic leakage rate shall not exceed the rates to be specified in the Contract Documents and reviewed by the EC Process. Only non-chlorinated water will be used for hydrostatic testing. Test water will be analyzed for DO, pH, TSS, TDS, and contaminants that might be contained in pipe coatings or other pipeline construction materials prior to discharge. Discharge of test water will be at a location approved by the EC Team. Flow rate and volume should be limited to prevent negative impacts (e.g. soil erosion, stream bottom scour, significant change in receiving water chemistry, etc.) at the discharge point, downstream areas, and receiving streams.

Cleaning and Disinfection

The Design Team in cooperation with the EC Team shall develop a protocol for cleaning and disinfecting the transmission mains in manner that meets the goals set out in this EC Plan. Discharge water will be analyzed for DO, pH, TSS, TDS, and contaminants that might be contained in pipe coatings or other pipeline construction materials prior to discharge. Discharge of water used for cleaning and disinfection will be at a location approved by the EC Team. Flow rate and volume should be limited to prevent negative impacts (e.g. soil erosion, stream bottom scour, significant change in receiving water chemistry, etc.) at the discharge point, downstream areas, and receiving streams.

Dechlorination

The Contractor shall provide onsite dechlorination for water used during the cleaning and disinfection process and perform verification sampling or provide transportation and disposal of these fluids at an offsite treatment and disposal location. BMPs and performance criteria described in the previous section will be followed as applicable. Water with chlorine or other pollutants at levels less than harmful to sensitive species or receiving waters may be discharged to the surface in a manner that will not cause erosion or other harmful effects. Acceptable discharge levels will be developed during the design phase.

Stormwater Management

A Stormwater Pollution Prevention Plan (SW3P) will be prepared for the Transmission Mains in accordance with local, State and Federal regulations. The SW3P will contain specific provisions for spill control and prevention including requirements for vehicle refueling, checking of vehicles

for leakage, cleanup of spilled materials and storage of chemicals, fuels, and lubricants during construction. The SW3P will also contain provisions for maintenance and inspection of laydown yards and access routes and provisions requiring documentation of maintenance and inspection activities.

5.4.2.3 Operations

BMPs: Standard operating procedures (SOPs) will be developed (prior to the operations phase) for use in responding to spill and leak situations. The SOPs will include removal and disposal of affected materials from spills and confirmation sampling to demonstrate that contamination does not exist within potentially affected material left in place. Conducting water quality sampling of spill or leak discharges to the stormwater management system will be included in the SOPs.

Performance: The SOPs will incorporate proactive measures to reduce and eliminate the potential for accidental spills and leakage and reactive measures to handle events that do occur appropriately to protect the surrounding environment.

5.5 Noise Abatement

Construction and operation activities for the Transmission Mains could result in increased noise levels at the sites and the surrounding area. The proximity of residences and endangered species habitat to active construction areas during the construction phase are primary factors in assessing noise impacts, since sound levels typically decrease as the distance from the source increases. Residential populations can be more sensitive to elevated noise levels after normal working hours and during the summer months. Bird species may also be more sensitive to elevated noise levels during critical times of the year such as breeding season (March-September). These concerns dictate that noise abatement techniques be developed to limit the effect that noise can have on the surrounding environment. A series of BMPs are proposed to achieve noise abatement. The following paragraphs summarize the proposed BMPs and performance expectations.

5.5.1 Goals

The goals for controlling noise levels are to provide a safe working environment for construction personnel and to avoid adverse impacts to wildlife and neighborhood residents surrounding the construction site.

5.5.2 Proposed BMPs

The following paragraphs summarize BMPs that are proposed for all phases of the project and list performance expectations.

5.5.2.1 Preliminary and Final Design

BMPs: A series of BMPs will be incorporated into the design to achieve noise abatement goals. These BMPs will generally include:

- Consider the location of noise producing equipment when evaluating site layout options, attempting to locate noise-producing equipment the greatest distance possible from construction site boundaries.
- Adhere to regulatory guidelines for controlling noise levels including those dictated by the federal Occupational Safety and Health Administration (OSHA).
- Specify that USFWS guidelines be followed during construction to manage activities for avoiding, reducing, and mitigating adverse effects to potential nearby nesting Golden-cheeked Warbler and Black-capped Vireo (see **Section 5.3.3.1** for details.
- Design Engineer will develop a technical memorandum discussing the potential impacts of blasting, including noise effects.
- Contractor(s) will develop a noise abatement plan and submit the plan to the Coordinating Committee Secretary for review and approval.

Performance: The proposed BMPs have been successfully employed on past projects to achieve noise abatement objectives, and their performance will be verified during construction and operation.

5.5.2.2 Construction and Start-Up

The Contract Documents for construction and start-up will specify requirements for noise abatement measures that the Contractor will be required to follow during execution of the work. City inspectors will be on site during the construction phase to assure that specified procedures are followed. These requirements will include:

- Schedule working hours and working days so that noise-producing activities comply with the Cityôs noise ordinance (Code of Ordinances Section 9.2). Weekend and night work may be permitted if the Cityôs noise ordinance requirements are met. Contractor may be required to implement mitigation measures to comply with the Cityôs noise ordinance regardless of working hours.

5.6 Light Control

Excessive and uncontrolled lighting could potentially impact areas surrounding the Transmission Mains. While these impacts are largely aesthetic, excessive lighting could also potentially impact sensitive wildlife in the habitat areas near the sites. Proper planning, design, and control of lighting systems can avoid most of these impacts and result in more efficient energy usage.

A series of BMPs are proposed to govern the design of lighting systems for the Transmission Mains. The following paragraphs summarize the proposed goals and BMPs for light control.

5.6.1 Goals

The goals for lighting systems are to provide adequate lighting for construction while avoiding stray, unnecessary, or misdirected light that can have negative aesthetic impacts as well as consume more energy than necessary. Lighting system design will consider applicable energy conservation options.

5.6.2 Proposed BMPs

The following paragraphs summarize BMPs that are proposed for all phases of the project.

5.6.2.1 Preliminary and Final Design

BMPs will be incorporated into design elements of the project to control lighting at the Transmission Mains. The primary BMP will be:

- Identify the need for and restrictions for using portable, temporary lighting during construction. Develop plans or guidelines for using lighting to minimize impacts, strategies that limit where such lighting may be used, and strategies for directional deployment of construction lighting to minimize negative impacts.

5.6.2.2 Construction and Start-Up

The following procedures and provisions will be in effect during the construction and start-up phases to aid in the control of excessive lighting:

- The contract documents will specify requirements for lighting systems that the Contractor must follow during execution of the work. The Contractor will be required to submit product literature for lighting system components to the Design Engineer and City to verify compliance with contract requirements. The Contractor will be required to follow restrictions and guidelines on lighting that are developed in the design phase.

- City inspectors will be on site during the construction phase to verify that specified equipment is properly installed and oriented. Additionally, inspectors will review plans for use of construction lighting to verify compliance with specified guidelines.

- When feasible, working hours will be scheduled so that advance notice can be provided to nearby residents prior to nighttime operations.

5.7 Security

The Transmission Mains are a critical component of the WTP 4 facility whose secure operation is important for providing customers with a safe and reliable water supply. In response to the

possibility of a terrorist or related attack or activities, multiple security measures have been implemented at existing AWU facilities. The WTP 4 site will be required to achieve the same levels of protection, at a minimum, and the measures will extend to cover the Transmission Mains as appropriate.

Implementing security measures for the Transmission Mains requires careful planning and design to achieve appropriate levels of protection while minimizing impacts to the nearby environment. BMPs will be incorporated into the design to minimize effects on surrounding environmental features and species in a manner that does not compromise the security of the facilities. The proposed security measures developed during this process will be reviewed and discussed with the EC team.

5.8 Traffic

The Transmission Main facilities must be accessible for operations personnel, approved visitors, deliveries, and hauling and removal of construction materials. Traffic generated by operations personnel and visitors will be most significant during regular business hours and at shift change times on normal working days. Deliveries to the sites will primarily occur during regular business hours on normal business days. Materials hauling from the sites will also primarily occur during these times, however, some traffic may occur on non-business days depending upon construction operations. Construction can generate substantial traffic to and from the sites due to workers, construction material and equipment delivery, and hauling of excess material and debris from the site.

Important considerations for traffic control include:

- Proximity of the shaft locations to major highway thoroughfares and BCCP infrastructure corridors.
- Proximity to protected habitat.
- Gradient, curve radius, and sight distance of roadways leading to the construction sites, and on-site roadways must be adequate for large vehicles hauling equipment and materials and must also comply with BCCP 10(a)(1)(B) permit.
- On-site roadways must be provided that facilitate efficient movement of truck traffic to and from delivery and pick-up locations, and passenger vehicle traffic to and from designated parking areas.
- Non-paved roads should be armored and maintained sufficiently to carry expected loads without severe rutting and erosion.
- Separation of truck and passenger vehicle traffic to the extent possible generally results in more efficient and safer traffic flow.

- Adequate parking must be provided for construction personnel and visitors at the construction sites or designated parking areas.
- Safe and controlled deliveries must be achieved.

5.8.1 Goals

The goals for controlling traffic are to minimize negative impacts on the surrounding environment and community and to provide safe and efficient access to the site for operations personnel, visitors, deliveries, and materials removal.

5.8.2 Proposed BMPs

The following paragraphs summarize traffic related BMPs that are proposed for all phases of the project.

5.8.2.1 Preliminary and Final Design

BMPs will be incorporated into design elements of the project to control traffic at the Transmission Main construction sites. These BMPs will generally include:

- An evaluation of roadways leading to the sites to determine a route to the construction sites that minimizes impacts to the community, whether these roadways are adequate for the anticipated vehicle traffic generated by the construction of the Transmission Mains, whether these roadways impose considerable constraints on construction traffic, and whether modifications to these roadways should be considered.
- In the development of the site plans and roadway layouts, consideration will be given to equipment off-loading and excavated spoils loading locations with the goal of minimizing visual and noise impacts.
- Speed limits appropriate for the roadway design and anticipated traffic will be designated for all on-site roadways.

5.8.2.2 Construction and Start-up

The following procedures and provisions are proposed for the construction and start-up phases to aid in reducing traffic impacts:

- Working hours would be scheduled so that construction traffic during nighttime hours can be properly controlled.
- The stormwater pollution prevention plan prepared for construction will require the Contractor to implement provisions to limit dirt migrating from the site on vehicles. Measures may include vehicle washing, rock access pads (temporary construction exits), and others as appropriate.

- Temporary stormwater controls should be placed down gradient and immediately adjacent to non-paved roads.
- Parking during construction will be planned to minimize environmental impacts, including air pollution and erosion. The use of offsite parking will be considered.

5.9 Critical Environmental Features (CEFs) Protection

5.9.1 Goal

The goals for protecting Critical Environmental Features (CEFs) consist of preserving significant features, avoiding negative impacts, and maintaining the ecological integrity of the critical features.

5.9.2 BMPs

The following steps will be used to protect CEFs around the proposed development areas.

- *Delineate CEFs:* The following CEF surveys will be conducted on the sites:
    - Hydrogeologic reports and karst feature surveys.
    - Site investigations to be performed by environmental professionals working for the Design Engineers during the environmental assessment phase.
- *Establish Buffer Zones and Setbacks:* Setbacks will be established for the CEFs and, at a minimum, will comply with the COA Land Development Code and BCCP requirements. Enhanced buffers and setbacks will be considered if necessary to meet the stated goals contained in this EC Plan. Facilities will be constructed outside of the established setback areas. Temporary chain link fencing will be installed around the majority of CEFs prior to construction. CEF buffers will be left undisturbed in their natural state. Re-vegetation in accordance with COA Standard Specifications 604S and 609S may be considered on a case-by-case basis.
- *Establish Maintenance Plans:* Long-term maintenance plans for the buffer areas will be developed for permanent facilities. This will include integrated pest management strategies, prohibiting the use of pesticides and herbicides in buffer areas, as appropriate for Edwards Plateau eco-region.
- *Tunnel Construction:* The tunnels to and from the WTP will be constructed below the Edwards Formation and other karst formations. Access shafts at the end of each tunnel and at intermediate locations will be used to vertically connect the tunnels with the surface level. The number of intermediate shafts will be minimized to the maximum extent practicable. Voids encountered during excavation of the shafts will be evaluated relative to their groundwater flow potential. The voids will be reviewed through the EC

process and procedures to seal voids to prevent unanticipated vertical flow migration through the access shaft will be developed and implemented as needed and required by applicable regulations.

- *Void Mitigation:* The City void and water flow mitigation strategies (Section 1.12.0 of the Environmental Criteria Manual, City of Austin Standard Specification Item No. 658S, and Standard Details 658 S-1 through S-7) will be specified for construction. These strategies describe the criteria for notification requirements and guidance for furnishing and installing mitigation measures for voids and water flow anomalies discovered during excavation.

  The measures require a geologist or geologist representative to inspect excavation operations within the Edwards Aquifer Recharge Zone (as defined by the City of Austin) or within 500 feet of a spring or seep. Upon observance of a void or water feature, excavation activities will be stopped within 25 feet of the outer edge of the void until the appropriate mitigation strategies are approved. In addition, the applicable USFWS 10(a)(1)(B) permit conditions for void mitigation will be complied with on the portions of the sites under the jurisdiction of the permit.

  The selection of the appropriate void and water flow mitigation measure will be dependent upon:

  - The size of the void
  - The amount of water flowing and known or potential hydrological connections
  - The biological characteristics observed
  - The location of the void relative to the location of the facility to be constructed
  - The location of the void relative to known karst features

  Temporary and permanent mitigation measures are used to protect the void during and after construction. The Class I temporary protection measures and Class II to V permanent void mitigation measures are described in detail in the City standards (COA ECM, Section 1.12) (**Appendix G**). The measures will preserve the voids and groundwater flow patterns while maintaining utility integrity and preventing pollution. In general, these techniques require the void to be filled with gravel-type media and sealed in a manner by which the natural hydrologic regimes remain intact. A structural engineer will review larger void mitigation measures to confirm suitability and integrity.

  Temporary or permanent void closures must be planned, designed, and constructed to protect habitat for cave dwelling biology. These should consider at a minimum cave atmosphere and nutrient flow.

5.9.2.1 Construction and Start-Up

The following will be implemented:

1. *Blasting:* Blasting activities will be reviewed as part of the EC process to protect neighborhoods, surface wildlife, water quality, and karst geology and biology from blast effects.
2. *Implement Erosion, Sedimentation, and Storm Water Quality Control*: BMPs for storm water quality management including soil erosion and sedimentation controls will be implemented and checked throughout the construction and operational phases to protect karst features, groundwater and surface water. Strategies should be used including but not limited to routing runoff water from roads and parking areas away from karst feature catchment areas, groundwater recharge features, and creeks and streams. Additionally, natural runoff from protected areas should be maintained in a manner at least equivalent to the preconstruction natural condition, activities that disturb the natural vegetation within a catchment area should be limited, and the use of pesticides, herbicides, fertilizers, and other potentially harmful substances should be restricted.

6.0 ADAPTIVE MANAGEMENT

The BMPs and mitigation strategies discussed herein were developed based on the best information available at the date this document was prepared. As the project proceeds through design, construction, and operation, and more information becomes available, modifications to the BMPs and mitigation strategies may become necessary to achieve the project environmental goals and project requirements. The process of adaptive management will be used to implement changes to the EC Plan if required. Despite the best efforts, if the EC goals are not being met, alternative measures shall be implemented to achieve those goals. Changes will be discussed and cooperatively developed through the EC process. The general framework that will be used for the adaptive management process includes the following steps:

1. Establish environmental goals and project requirements;
2. Document baseline conditions;
3. Establish BMPs and mitigation measures;
4. Obtain permits and necessary approvals;
5. Implement BMPs and mitigation measures;
6. Monitor, review, and evaluate effectiveness of BMPs and mitigation measures in meeting established environmental goals;
7. Modify and improve monitoring plans, BMPs, and mitigation measures as necessary; and,
8. Refine goals and project requirements, if required.

7.0 EDUCATION AND TRAINING

Constructing the Transmission Mains will require the implementation of several BMPs and other strategies developed through a collaborative process between AWU and WPD, as well as other EC Team members. Ensuring that the design team, Contractors, subcontractors, operators, and all others involved with the project understand and implement these requirements is essential to achieving the goals of environmental protection. The following subsections summarize the training, education, and enforcement to be provided throughout all phases of the project.

7.1 Goals

Develop and implement an effective education and training program so that personnel involved with the project are aware of and implement BMPs and other specified measures for protecting the environment.

7.2 Proposed BMPs

The following paragraphs summarize training BMPs that are proposed for all phases of the project and expected performance from implementing these measures.

7.2.1 Preliminary and Final Design

During the design of the transmission mains, project personnel responsible for various aspects of the project design will be required to become familiar with the BMPs and other protection techniques, specific requirements contained within environmental permits and approvals, and specific regulatory requirements for this project that may affect design activities. Specific education and training elements during this phase of the project could include the following:

7.2.1.1 Review of BMP and Environmental Protection Strategies

After completion of the Preliminary Engineering Report, the Project Management (PM) Team and EC Team will review the environmental concerns, the need for protection, the protection goals, and the specific protection measures to be implemented. All design team members will be required to read and understand the documentation.

7.2.1.2 Regulatory and Permit Process

Various permits and environmental related approvals will be required for construction and operation of the facility. The process of obtaining the majority of necessary permits and approvals will be performed during the design phase. All permits and approvals along with specific criteria and standards, timelines, and submittal requirements will be summarized during the preliminary design phase. It will then become the responsibility of the lead discipline engineers to verify that their project team members are aware of and are implementing the

specific requirements. The PM Team will regularly meet and review the status of the Project Design Teamôs compliance with these requirements.

7.2.1.3 Environmental Commitments

Design Team members will check design work against the environmental goals, BMP requirements, regulatory and permit requirements, and other strategies for environmental protection contained in this EC Plan.

7.2.1.4 Environmental Meetings and Presentations

Regular meetings will be conducted with the design team to review environmental goals, regulatory requirements, progress of work, and conformance with environmental BMPs. Meeting agendas and minutes will be prepared for all meetings.

7.2.1.5 Design Team Environmental Oversight

The PM Team and EC Team will regularly review progress relative to the environmental goals, BMP requirements, regulatory and permit requirements, and other strategies for environmental protection and communicate any issues to the Project Design Team.

7.2.1.6 Environmental Commissioning (EC) Process

The EC Team will be used to reinforce the education and training of the design team through regular meetings, correspondence, and other communications. The PM Team will also meet and coordinate regularly with the EC Team to verify environmental goals are being met.

7.2.2 Construction and Start-up

Education and training during the construction phase should include the following elements:

7.2.2.1 Contract Provisions

The Contract Documents will specify the protection and control measures that the Contractor will be responsible for throughout the duration of construction. By submission of their bid, the Contractor will be accepting responsibility that they have read and understand the environmental provisions of the contract and that they will adhere to the specified requirements. All BMP and other protection measures developed during the preliminary and final phases of design will be included in the documents.

7.2.2.2 Pre-Bid and Pre-Construction Meetings

Environmental protection, goals, BMPs, and monitoring will be thoroughly reviewed and affirmed at each of these meetings.

7.2.2.3 Weekly Environmental Meetings

The Contractor will be required to conduct weekly environmental meetings to discuss environmental controls, reinforce goals, upcoming activities that have the potential to impact the environment, the condition of on-site controls, upcoming weather, and other issues. Attendance at these meetings will include the Contractor, Engineering Team, EC staff (as needed), the City Environmental Compliance Manager, and City project team members. Minutes will be prepared.

7.2.2.4 Ongoing Communications with Inspection Team

The inspection team will review the condition of on-site controls and mitigation, and regularly communicate to the Contractor and PM Team issues and preventive measures that need to be taken.

7.2.2.5 Orientation of New Personnel

All personnel will be required to attend an initial training session to review environmental protection goals, requirements, and enforcement.

7.2.2.6 Enforcement

Strict enforcement measures will be implemented. These could include dismissal of personnel that fail to conform to the environmental requirements.

7.2.2.7 Environmental Commissioning (EC) Process

Similar to the design phase, the EC Team will be used to evaluate the effectiveness of the education and training of the Contractors, engineering, and City teams through regular meetings, correspondence, and other communications. Should deficiencies be noted, the EC Team will notify the PM Team of required adjustments.

7.2.2.8 Adaptive Management

As new performance information is revealed during construction of the transmission mains, training and educational materials will be updated to reflect new techniques and methods for protecting the environment. This will include designating appropriate communications channels for staff to submit concerns regarding the ability of the project to achieve environmental goals.

7.2.3 Operations

Education and training during the operational phase could include the following elements:

7.2.3.1 Training

Personnel will be trained in all aspects of operating the Transmission Mains. One component of this training will be environmental protection, particularly BCCP requirements. The environmental training component will include workshops conducted by appropriately trained environmental personnel. Initial training will be conducted for all new hires, and regular, on-going training will be performed.

7.2.3.2 Design Documentation

The environmental goals, BMPs, and techniques developed during the preliminary and final design phases will be available on-site to operations personnel.

7.2.3.3 Standard Operating Procedures (SOP)

A series of SOPs will be prepared to guide operations staff in the ongoing operations of the Transmission Mains. Each SOP will include an associated environmental component to educate operators on environmental goals and commitments.

7.2.3.4 Adaptive Management

As ongoing operations reveal new performance information on system effects, training and educational materials will be updated to reflect new techniques and methods for protecting the environment. This will include designating appropriate communications channels for operational staff to submit concerns for improving the ability to achieve environmental goals.

7.2.3.5 Environmental Commissioning (EC) Process

The EC process is anticipated to continue at a more intensive level through initial operations for a pre-determined amount of time or until specific operations/environmental goals are met. Further EC processes will be led by City staff at a less intensive level throughout the operational life of the Transmission Mains. This process will be used to provide ongoing training via workshops and publications for operations staff.

8.0 ENVIRONMENTAL COMMITMENTS AND RECOMMENDATIONS

Environmental commitments and recommendations specific to the Transmission Mains are listed throughout this EC Plan as a resource to help guide the Project Design Team and EC Team through the EC process. Design products should be reviewed against this EC Plan to verify that the commitments and recommendations made herein are taken into account in the engineering phase and carried forward as appropriate into the construction and operation phases. A summary of these commitments and recommendations will be generated as part of the design process and once completed will be included as **Appendix H** to this EC Plan.

9.0 REFERENCES

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