

aquatic vegetation planting. Once native aquatic vegetation is established in an area, monitoring will be conducted on a less frequent basis.

As noted in the HCP (Section 5.2.2.3), following natural disturbances such as floods, periods of limited recharge, and/or herbivory, as well as anthropogenic disturbances such as recreation or vandalism, the monitoring/maintenance schedule will be adjusted temporarily in order to provide stability for the re-establishment of native vegetation. Monitoring will include aerial coverage mapping of native and non-native vegetation within previously restored areas. Any reestablished non-native vegetation will be removed during each monitoring visit, and if deemed necessary, additional native vegetation will be planted. Removal of non-native vegetation will follow the same protocols as the original removal methodology. Removed vegetation will be disposed of properly according to TPWD Invasive Species Removal permit requirements.

Allocated funds for 2016 (from Table 7.1): \$125,000

Estimated Budget: \$125,000

5.2.2/5.2.3 Comal River Aquatic Vegetation Restoration and Maintenance

The City of New Braunfels will continue native aquatic vegetation restoration in Landa Lake and within targeted, sustainable reaches of the Comal River by replacing non-native aquatic vegetation with native aquatic species to enhance Covered Species habitat. Proposed work for 2016 includes removal of non-native aquatic plant species and planting of native aquatic vegetation in the Upper Spring Run area, assessment of potential restoration areas in the New Channel of the Comal River, and continued maintenance/ gardening of previously restored areas. Native vegetation planting and non-native removal will be based on coverage targets identified in Table 4-5 and 4-6 of the HCP.

Native Aquatic Vegetation Restoration

Long-term Objective: To decrease density of invasive, non-native aquatic vegetation and establish favorable native aquatic vegetation, to the maximum extent practicable, within Landa Lake and select portions of the Comal River to enhance Covered Species habitat.

Assumptions: Native vegetation restoration will continue in areas of Landa Lake and the Comal River. Restoration efforts include continued removal of non-native aquatic vegetation throughout Landa Lake, while establishing additional *Cabomba* along the eastern shoreline of Landa Lake and along the New Braunfels' golf course property; establishing additional *Sagittaria* in shallower portions of Landa Lake; and

Long-term Objective: Establish a healthy, functioning riparian area along Spring Run 3 and the western shoreline of Landa Lake to benefit the Comal Springs Riffle Beetle. Establish native riparian vegetation species that will increase the amount of usable habitat and food sources. Riparian vegetation will also be established to promote bank stabilization and minimize slope erosion and sedimentation in Riffle Beetle habitat areas.

Assumptions: It is assumed this effort will continue to focus on the identification of target native riparian species most beneficial for the Comal Springs Riffle Beetle that also meet erosion control requirements. The target area for subsequent removal and establishment of native vegetation is the upstream 100 meters of Landa Lake and Spring Run 3 and proceeding north into private property lots (along the waters edge). It is assumed the effort will be split between the bluff and Spring Run 3 given the different characteristics in these locations and therefore differences in approaches are anticipated. Restoration of the remaining area will be accomplished in segments during future years and incorporate revisions based on monitoring of work that was undertaken in 2013, 2014, and 2015.

Target 2016/Performance Measure: Continue riparian restoration efforts based on monitoring and success of previous work. Continue to monitor recently restored areas for stability and established vegetative growth. Establish native riparian vegetation within the riparian zone of private lots located along the western shoreline of Landa Lake.

Methods: Continue the removal of non-native, invasive plant species within the riparian zone. Plant deer-resistant, native plant species in Spring and Fall in areas where vegetation is sparse or not present. Plantings will be focused immediately along the waters' edge and in areas immediately up gradient of the shoreline. Utilize native plant species which have been observed in the immediate area and have proven successful in previous planting efforts. Install erosion/ sediment control devices, as needed in areas lacking sufficient vegetation and stability, to control hillside erosion and resulting sedimentation to riffle beetle habitat areas. Install fencing around young plants, as needed, to control foraging and damage by wildlife. Irrigation lines were installed in previous years and will be utilized and maintained, as necessary, to increase the survivability of plantings. Private landowners will be approached to determine interest in expanding restoration efforts on to private lots located along the western shoreline of Landa Lake.

Monitoring: Monitoring will occur on a regular basis to assess the survivability of plantings and the presence of non-native vegetation. Planting plots have been mapped and are utilized to track the success of plantings in specific locations. Methods will be revised, as needed, based on results of monitoring. In the event of heavy rainfall, the erosion and sedimentation will be assessed in the following week. Sediment control devices will be monitored to assess effectiveness and stability. Sediment captured behind the control devices will continue to be measured and total volume quantified. The HCP

Bio-monitoring program will track riffle beetle populations within Spring Run 3 and along the western shoreline of Landa Lake. Data collected as part of the bio-monitoring program will be utilized to determine locations for focusing riparian zone restoration activities.

Allocated funds for 2016 (from Table 7.1): \$25,000

Estimated Budget: \$25,000

5.2.10 Litter and Floating Vegetation Control

The City of New Braunfels will continue ongoing activities to manage floating vegetation and litter removal to enhance Covered Species and to prevent accumulations above and within aquatic vegetation restoration areas. Management activities will include dislodging of vegetation mats, to allow continued movement downstream, that form on top of the water surface and removal of litter for the littoral zone and stream bottom. The City of New Braunfels will manage aquatic vegetation in Landa Lake by dislodging floating vegetation entrained on the flow control structures, fishing piers, Landa Park Drive Bridge and other locations within Landa Lake where vegetation mats and litter accumulate.

Long-term Objective: Minimize impacts of floating vegetation and litter on the overall aquatic community within the Comal River system.

Assumptions: Litter removal and dislodging floating vegetation will follow existing protocols and schedules currently employed by the City of New Braunfels as described below.

Methods: Currently the City of New Braunfels contracts with a private contractor for removal of litter and dislodging of floating vegetation from Landa Lake, the Comal River and the Guadalupe River. Those contracts are renewed annually and in 2012 were set at a cost not to exceed \$160,000 and include numerous mechanisms to reduce cost and scope mid season. SCUBA collections on the Comal River were added in 2007 as a pilot program and in 2008 as part of the contracts. SCUBA was added to protect the underwater habitat in the Comal River. Also in 2008, litter collection in Landa Lake was added to specifically protect species habitat. The City of New Braunfels cooperated with the USFWS to implement litter collections in Landa Lake. These additional expenditures have been voluntary on the part of the City of New Braunfels in past years, but now are mandatory based on requirements in the HCP Section 5.2.10. It is possible that without funding from the HCP, this mitigation action would be unfunded in 2016.

All litter removal and vegetation dislodging in Landa Lake is associated with protection of Covered Species habitat, as there is no tubing recreation in Landa Lake. Underwater

collection (SCUBA) in the Comal River is associated with resource protection (species habitat), however above water collection on the Comal River is a direct result of tubing activities. Collections on the Guadalupe River have no relevance to the HCP or species protection. Therefore only costs associated with Landa Lake and underwater Comal River collections will be included in HCP activities and budgets.

Target 2016/Performance Measure: Continue efforts to remove litter and dislodge floating vegetation mats from applicable portions of the Comal River system to prevent negative impacts to flow control structures, aquatic restoration areas, and Covered Species habitat.

Methods:

Landa Lake - (Jan 1st to December 31st). Routine vegetation maintenance and litter removal will occur from Jan 1st to December 31st. Vegetation maintenance and litter removal will occur on a scheduled basis between March and September and on an as-needed basis during the remainder of the year. Floating vegetation mats will be dislodged from flow control structures, the Three Islands area, fishing pier and other locations where vegetation mats accumulate.

Comal River – (April 1st to October 30th). Vegetation maintenance and litter pickup from May 1st to September 30th is on a scheduled basis. Floating vegetation will be dislodged and inorganic litter will be picked up from the substrate, surface and littoral zone of the Old Channel. Underwater litter in the New Channel from the NBU Hydroelectric dam downstream to below the last tubers exit will be removed utilizing SCUBA.

Monitoring: City of New Braunfels staff will monitor litter and floating vegetation mats in applicable areas. City staff will monitor contractor efforts and coordinate additional efforts when deemed necessary.

Allocated funds for 2016 (from Table 7.1): \$ 0

Estimated Budget: \$30,000

\$20,000 Floating Vegetation Clearing (52 weeks)

\$5,000 Underwater Litter Collection (32 weeks, Comal River and Landa Lake)

\$5,000 Litter Removal within Old Channel of Comal River (16 weeks, Landa Lake to Elizabeth Street and from confluence of New and Old Channels to 100 ft up-stream of Hinmann Island Dr)

5.2.11 Golf Course Management and Planning

The City of New Braunfels will implement their existing Integrated Pest Management Plan (IPMP) for Landa Park Golf Course. This process will incorporate public input and

the Golf Course Advisory Board. The golf course IPMP will incorporate environmentally sensitive techniques to minimize chemical application, continue to improve water quality, and reduce negative effects to the ecosystem. Expanded water quality sampling targeted at Golf Course operations will be conducted as described in Section of 5.7.2 of the HCP.

Long-term Objective: Management of the golf course and grounds to minimize and reduce negative effects to aquatic ecosystem in Landa Lake and the Comal River.

Assumptions: The Landa Park Golf Course will continue to implement their existing IPMP and make adjustments to the plan as needed.

Target 2016/Performance Measure: Continue to implement and update the existing IPMP.

Methods: The golf course and grounds will be maintained in an aesthetically pleasing, yet environmentally sensitive manner. It is the responsibility of the Golf Course Manager to maintain the course and grounds in accordance with the new IPMP. The IPMP describes activities and materials to be used to control pests (i.e. insects, weeds, and other living organisms requiring control) on the golf course in a way that minimally impacts the environment.

Monitoring: Each year the City of New Braunfels Watershed Manger, in cooperation with the Golf Course Manager, will report to the HCP information on annual activities.

Allocated funds for 2016 (from Table 7.1): \$0

Estimated Budget: \$0

5.7.1 Native Riparian Habitat Restoration

The City of New Braunfels will continue efforts to provide further stabilization of the large eroding bluff along the Old Channel in the vicinity of the former sediment island. In addition to the completion of the bank stabilization project, native riparian vegetation will be established along select areas of the Old Channel to provide further bank stabilization and to compliment in-stream aquatic vegetation restoration efforts. The City of New Braunfels will also implement a program to increase the coverage area and density of the riparian zone along the Old Channel, golf course, and in the vicinity of Clemens Dam. As long term plans continue to take shape for the reestablishment of the riparian zone, private and public landowners will be asked to participate in the plan. Reimbursement for the price of native plants will be provided to private and public landowners. Criteria to qualify for reimbursement will be established along with a list of preferred natives to replant will developed in consultation with the City of New Braunfels forester.

Long-term Objective: Increase native riparian vegetation, reduce non-native invasive riparian vegetation, and prevent streambank erosion in areas along the Old Channel of the Comal River that will compliment aquatic vegetation restoration efforts.

Assumptions: Sequencing will start with the completion of the bank stabilization project and continue with riparian vegetation restoration along the north bluff of the Old Channel. Construction of the bank stabilization project will be contingent upon adequate springflow rates (>130 cfs) for a 6-8 month period to allow for continuous work efforts. Native riparian vegetation restoration will be conducted to maximize the interactions of shading and light with native aquatic vegetation efforts being conducted in this reach to create direct habitat for fountain darters.

Target 2016/Performance Measure: The first step is the completion of bank stabilization and riparian restoration in the Old Channel adjacent to where the sediment island was removed. Subsequent riparian restoration along the Comal River and Landa Lake will occur in targeted areas following the completion of the bank stabilization project. Further riparian restoration will be conducted in areas of the Old Channel to increase the density of native riparian species, compliment in-stream aquatic vegetation restoration efforts (by increasing solar exposure in the channel) and further enhance fountain darter habitat.

Methods: Complete construction of the Old Channel bank stabilization project according to specifications provided in the “Comal River Bank Reclamation and Riparian Zone Restoration Construction Plans” prepared by Freese and Nichols. Riparian restoration efforts associated with the project will be implemented per construction plan specifications. Riparian restoration efforts along the Old Channel in areas not associated with the Bank Stabilization project will include removal of invasive species, installation of erosion control devices (as needed), and establishment of native riparian plantings. Temporary erosion and sediment control BMPs will be installed following the removal of non-native vegetation and will remain in place until native vegetation becomes established and/ or the riparian zone is stabilized. Coordination with the Old Channel aquatic vegetation restoration project will occur to maximize solar exposure to select portions of the channel where aquatic restoration is feasible.

Monitoring: The effectiveness of establishing native vegetation will be assessed near the end of 2016 with sufficient lead time to influence work plan development for 2017.

Allocated funds for 2016 (from Table 7.1): \$100,000

Estimated Budget: \$100,000

5.7.5 Management of Household Hazardous Wastes

The City of New Braunfels will continue the hazardous household waste (HHW) program that includes accepting prescription drugs and Freon, through the TCEQ and/or the waste disposal division of the City of New Braunfels. The City of New Braunfels anticipates establishment of a three-times-a-year program.

Long-term Objective: Reduction in the improper disposal of hazardous wastes and incorporation of prescription drug and Freon drop off.

Assumptions: None

Target 2016/Performance Measure: Continue the existing hazardous household waste program and increase associated public outreach and education efforts.

Methods: Conduct three HHW collection events which incorporate an education and outreach component.

Monitoring: The volume of hazardous waste material collected during the HHW collection events will be noted and compared to previous efforts.

Allocated funds for 2016 (from Table 7.1): \$ 30,000

Estimated Budget: \$ 30,000

\$2,000 Outreach

\$28,000 Additional Collection Events

5.7.6 Impervious Cover/Water Quality Protection/LID

The City of New Braunfels will expand criteria related to desired impervious cover, provide incentives to reduce existing impervious cover on public and private property in New Braunfels, and implement stormwater BMP's in the area of Landa Lake and the Springruns. The City of New Braunfels will implement a program based upon the low impact development (LID)/Water Quality Work Group Final Report recommendations for Implementation Strategies and best management practices (BMPs). The 2016 Work Plan includes implementation of an incentive program and directly supports the reduction of impervious cover at the Comal Springs Conservation Center.

Long-term Objective: Reduction and control of non-point source pollutant discharges to Landa Lake and the Comal River system. To increase public awareness of LID concepts and stormwater BMPs utilized to control pollutant discharges.

Assumptions: Efforts will focus on the implementation of a rebate program designed to offer incentives for residents and businesses to install LID BMPs. It is assumed residents and businesses in the Comal River watershed will take advantage of the rebates for the installation of LID BMPs on their property.

Planning discussions with New Braunfels Utilities (NBU) staff occurred in 2015 regarding the proposed Comal Springs Conservation Center and potential collaboration with the City of New Braunfels and the EAHCP. NBU anticipates beginning Phase I construction of the Comal Springs Conservation Center project in 2016.

Target 2016/Performance Measure: Implement a LID and impervious cover reduction rebate/incentive program targeted at residential and commercial properties contributing stormwater runoff to endangered species habitat within the Comal River system. BMP's developed as part of this program will include measures directly benefiting the Comal River system that are well above and beyond the features of the City's standard MS4 program. Efforts in 2016 will include collaboration with NBU to fund the removal of impervious cover immediately adjacent to Landa Lake at the proposed Comal Springs Conservation Center. The removal of impervious cover and subsequent native plant restoration will increase infiltration, minimize stormwater runoff and decrease the volume of sediment and pollutants entering Landa Lake.

Methods: The City of New Braunfels will implement a program to issue rebates to residents and businesses for installation of LID projects on their properties. Rebates will be provided for the LID BMPs such as removal of impervious cover, rainwater harvesting barrels, rain gardens, pervious pavement, and native landscaping within areas contributing stormwater runoff to Landa Lake.

The City will collaborate with NBU to decrease the amount of impervious cover at the Comal Springs Conservation Center. Native plant restoration will occur in areas where impervious cover was removed. Phase I of the Comal Springs Conservation Center project is scheduled to begin in 2016. The Comal Springs Conservation Center includes educational components to inform residents, developers, and construction contractors of LID treatment concepts, stormwater pollution mitigation and information on the endangered species.

Summary of the Comal Springs Conservation Center Project: The property designated for the Comal Springs Conservation Center consists of approximately 16 acres located at the headwaters of Landa Lake at the mouth of Blieders Creek. The existing site is owned by NBU and consists of asphalt parking areas and aging warehouse structures formerly

utilized for NBU operations. Phase I of the project is expected to begin in 2016 and involves removal of 85% of the existing impervious cover, native plant restoration, restoration of Spring Run #4, and construction of LID features, such as bioswales and rain gardens, designed to treat stormwater runoff prior to entering Landa Lake. The project will provide direct water quality benefits to Landa Lake and the Comal River system by increasing infiltration and treating stormwater runoff. Phase I of the project also includes trails, an observation area, and an outdoor classroom intended to educate residents, students, and developers about LID concepts. Design plans for the project have been completed by NBU and are available for review. The estimated total cost for Phase I is \$6 million with \$95,000 being proposed for EAHCP funding through the 2016 City of New Braunfels Work Plan. In 2016 it is anticipated the EAHCP program can fund the removal of impervious cover and native plant restoration. In subsequent years EAHCP funding could help support the restoration of Blieders Creek along the project site and construction of a spring trail for observation of riparian habitat and facilitating water quality sampling.

Monitoring: None

Allocated funds for 2016 (from Table 7.1): \$100,000 (for LID program development and implementation) + \$50,000 (for stormwater BMPs)

Estimated Budget: \$150,000

\$55,000 LID Rebate/ Incentive Program Implementation & Community Outreach
\$95,000 Removal of impervious cover at Comal Springs Conservation Center

City of New Braunfels – 2016 HCP Budget

HCP Section	Mitigation Action	2016 HCP Budget (From Table 7.1)	2015 HCP Budget	Estimated FY2016
5.2.1	Flow Split Management	30,000	5,000	43,500
5.2.2.1	Old Channel Restoration	125,000	225,000	125,000
5.2.2/5.2.3	Comal River Aquatic Vegetation Restoration	100,000	275,000	100,000
5.2.3	Management of Public Recreation	0	0	0
5.2.4	Decaying Vegetation Removal and Dissolved Oxygen Management	15,000	105,000	20,000
5.2.5/5.2.9	Non-native Animal Species Control	75,000	75,000	75,000
5.2.6/6.3.6	Monitoring and Reduction of Gill Parasites	75,000	75,000	75,000
5.2.7	Prohibition of Hazardous Material Transport Routes	0	3,000	3,000
5.2.8	Native Riparian Habitat Restoration (Riffle Beetle)	25,000	50,000	25,000
5.2.10	Litter and Floating Vegetation Management	0	40,000	30,000
5.2.11	Golf Course Management	0	1000	0
5.7.1	Native Riparian Habitat Restoration	100,000	430,000	100,000
5.7.5	Management of Household Hazardous Waste	30,000	30,000	30,000
5.7.6	Impervious Cover/ Water Quality/ LID Program	150,000	100,000	150,000
Totals		\$725,000	\$1,414,000	\$776,500