MEMO

Date	**September 29, 2022**
To	**Nevada Environmental Response Trust**
From	**Daniel Petersen, Chris Ritchie, Randy Mandel, and Mia Sosa**
Copy to	**Nevada Division of Environmental Protection** **United States Environmental Protection**
Subject	**Greener Cleanup Best Management Practices: Long-Term BMPs**

TASK PROGRESS UPDATE

Ramboll US Consulting, Inc. (Ramboll) has prepared this technical memorandum on behalf of the Nevada Environmental Response Trust (NERT or the "Trust") which summarizes the Trust's implementation of the Greener Cleanup Best Management Practices (BMP) Work Plan, Revision 2, dated February 10, 2020, prepared at the direction of the U.S. Environmental Protection Agency (USEPA) and approved by the Nevada Division of Environmental Protection (NDEP) on August 4, 2020 (the "Work Plan"). This memorandum focuses specifically on summarizing the evaluation of the long-term BMPs identified in the Work Plan. Consistent with the Work Plan, this evaluation follows the American Society for Testing Materials (ASTM) Standard Guide for Greener Cleanups and is limited to the operation of the NERT Groundwater Extraction and Treatment System (GWETS) and the associated groundwater monitoring program.

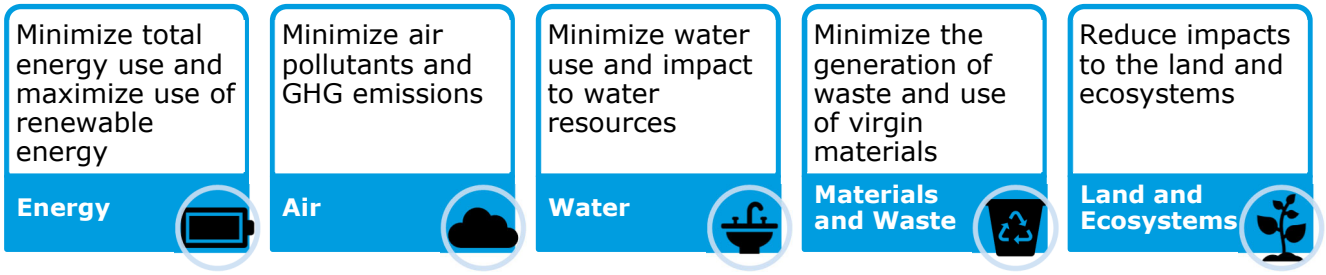
A separate memorandum has been prepared to summarize the evaluation of the short-term BMPs identified in the Work Plan. A Renewable Energy Assessment (REA) was submitted to NDEP on February 27, 2020, as one of the BMPs selected for evaluation. Greener Cleanup BMPs related to the implementation and operation of the NERT final remedy will be evaluated and implemented as appropriate in the future.

BACKGROUND

The NERT GWETS has been in operation since 1987 with the initial installation of the Interceptor Well Field (IFW) and the Groundwater Treatment Plan (GWTP) in 1987 resulting from a 1986 Consent Order between NDEP and Kerr-McGee Chemical. The GWETS was expanded between 2001 and 2004 in accordance with a 2001 Administrative Order on Consent resulting in the installation of the OU-1 barrier wall, the Athens Road Well Field (AWF), the Seep Well Field (SWF), and the design and installation of a treatment process to remove chromium and perchlorate from extracted groundwater prior to discharge under a NPDES permit. Upon inception of the Trust in 2011, NERT assumed operation of the GWETS and it has been operating continuously since that time. It is assumed that the NERT GWETS will remain in operation largely

as-is until NERT's final remedy is selected, at which point it is anticipated the GWETS will be materially modified or potentially replaced as part of implementing the final remedy. Since 2013, data has been compiled on the overall environmental footprint of the GWETS and the associated performance monitoring program. At the direction of NDEP and USEPA, environmental footprint data have been reported in the Annual Groundwater Monitoring and GWETS Performance Report and Semi-Annual Groundwater Monitoring and GWETS Performance Memorandums since 2014. Consistent with the Work Plan, the environmental footprint of the GWETS and the associated groundwater monitoring program were to be quantified using USEPA's Spreadsheets for Environmental Footprint Analysis (SEFA) Excel workbooks. Additionally, an evaluation of alternatives was to be conducted to reduce the overall environmental footprint in accordance with the ASTM Standard Guide for Greener Cleanups (E2893-16).[1]

ASTM E2893-16 (the "ASTM standard") defines five core elements to be considered in the BMP process to reduce the environmental footprint of a cleanup phase, as described in the diagram below. These core elements generally align with the environmental contributions quantified as part of the environmental footprint analyses performed for the NERT GWETS and the associated groundwater monitoring program. The recent environmental footprint results are therefore used to identify major environmental footprint contributors as they relate to the core elements and to prioritize BMPs accordingly.



The ASTM standard further establishes a BMP process which includes five steps: (1) BMP Opportunity Assessment; (2) BMP Prioritization; (3) BMP Selection; (4) BMP Implementation; and (5) BMP Documentation. With regard to the long-term BMPs that have been prioritized, this evaluation will address the third step in the process (selection) and will consider the requirements for the fourth step (implementation) upon selection of the long-term BMPs recommended herein. During the selection step, the potential environmental footprint reductions should be considered relative to other key factors including implementability, effectiveness, cost, and other potential environmental trade-offs. More specifically, BMPs should only be selected if they reduce or have no effect on the project cost unless another factor would justify it, or the investment is otherwise beneficial to the overall project goals. BMPs evaluated

[1] ASTM, 2016. ASTM E2893-16e1, Standard Guide for Greener Cleanups, ASTM International, West Conshohocken, PA, www.astm.org.

herein will also be considered with respect to the timeline of the project, as the ongoing RI/FS progresses and the selection of the final remedy is anticipated.

LONG-TERM BMP SELECTION AND FEASIBILITY ANALYSES

In an effort to reduce the environmental footprint of the NERT GWETS and the associated groundwater monitoring program, the Trust initially selected thirty long-term BMPs for consideration in the Work Plan. As requested by NDEP in its comments on the Work Plan, five of those thirty BMPs were evaluated first: **(a) BMP #1** – Water efficient plumbing, **(b) BMP #4** – Energy efficient heating, ventilation and air-conditioning (HVAC) systems, **(c) BMP #6** – "Greener" treatment process chemicals, **(d) BMP #33** – Reuse of treated groundwater, and **(e) BMP #39** – Native planting and pollinator habitat. Evaluation of these long-term BMPs is summarized below.

WATER EFFICIENT PLUMBING, BMP #1

The water footprint comprises the extracted groundwater that is treated and discharged to the Las Vegas Wash (LVW) through operation of the NERT GWETS, the water evaporated from the GW-11 pond, and the site water that is supplied to the treatment facility to support ongoing operations and the NERT site office trailers. Prior to July 2022, water supplied to the NERT site was Stabilized Lake Mead Water (SLMW) and it was provided by Basic Water Company (BWC). As a result of declining water level conditions in Lake Mead in early July 2022, the water supplied to NERT from BWC was replaced by potable water provided by the City of Henderson (COH). However, the same infrastructure is used to convey the water to the various end-users throughout the Black Mountain Industrial (BMI) Complex. As of the date of this Technical Memorandum, the Trust is evaluating options to replace its dependency on externally provided water in favor of reusing effluent flows from the GWETS, as further described within the subsequent BMP for reuse of treated groundwater (BMP #33).

The groundwater use and water evaporation result directly from the extraction and treatment operations, which are being operated to maximize mass capture and removal and are therefore limited in terms of reducing water usage.[2] In a baseline year (July 2019 – June 2020), the groundwater extracted accounts for approximately 93 percent of the water footprint; evaporation from GW-11 accounts for approximately 5 percent; and the use of site water accounts for approximately 2 percent. The majority of site water use is for maintaining pump seals, backwashing the granular activated carbon (GAC) treatment vessels, and other GWETS operations including a network of eye wash stations and safety showers.

The use of water efficient plumbing fixtures is a long-term BMP in the buildings category that addresses the core element of water. The USEPA has partnered with WaterSense® ("WaterSense") in a voluntary program that seeks to protect the national water supply for future generations (USEPA 2012b). The program specifically works to manage the increasing demand for water by helping to improve water infrastructure at the municipal level and to manage the resource more efficiently,

[2] The extraction system flowrates and well spacings were designed to minimize extraction while maintaining maximum contaminant capture and removal.

including through the independent certification and labeling of products that reduce water use. The WaterSense program has established BMPs for commercial and institutional facilities and products that are labeled by WaterSense are expected to use "at least 20 percent less water" while having improved or comparable performance to standard products that are available (USEPA 2012b). If achieving 20 percent less water at the NERT site were feasible through implementation of BMP #1, the calculated changes to the environmental footprint[3] would show a proportional decrease of 20 percent to the site water used; however, there would be no expected impact to the groundwater extraction or evaporation from GW-11, which together account for approximately 98 percent of the total water footprint. As a result of groundwater extraction being nearly forty times as large as the use of site water (and evaporation being twice as large), the overall impact to the water footprint considering a 20 percent water savings through efficient plumbing shows only a 0.5 percent decrease to the total water footprint.

Unlike the limited water savings opportunities afforded by water efficient plumbing fixtures, the Trust reviewed GWETS water usage points and found that the backflushing of the GAC vessels used approximately 500,000 to 600,000 gallons per month. A study was conducted by ETI in 2021 to evaluate the alternative of eliminating the GAC vessels. The GAC was originally intended to remove pesticides from the extracted groundwater prior to treatment for perchlorate. The study found there were no pesticides at a concentration of concernin the influent to the biological treatment plant. Further a review of the previous five years of effluent sampling from the plant did not show any pesticides. In late May 2022 ETI began bypassing the GAC vessels while continuing to monitor influent and effluent parameters. If there continues to be no issues with pesticides in the influent to the biological treatment plant, the Trust will discontinue use of the GAC permanently save 500,000-600,000 gallons per month, which will result in significant and lasting reductions to the water footprint.

As discussed above, the majority use of site water is for essential GWETS operations. The GWETS treatment facility currently operates three toilets within the office trailers, which are all relatively new and low-flow[4]. There are no water heaters or shower facilities. Because of the small requirement for site water at the trailers and the relative contribution of the use of site water to support ongoing operations and GW-11 pond evaporation, reductions to water use at these facilities will not yield substantial benefits to the environmental footprint through the implementation of BMP #1; therefore; continued evaluation of this BMP is not recommended at this time. This BMP will be reconsidered during final remedy selection and design.

ENERGY EFFICIENT HVAC SYSTEMS, BMP #4

As described in the Renewable Energy Assessment, the electricity supplied for on-site processes and off-site processes is provided by separate sources (Ramboll 2020a). The electricity used by the on-site groundwater extraction wells, on-site groundwater treatment systems, and on-site office trailers for both ETI and the Trust comes from

[3] The calculated footprint is estimated using SEFA workbooks and the 2020 Annual Report values were used as the baseline values for comparison.
[4] According to a conversation had between Ramboll and ETI on March 25, 2021.

the Colorado River Commission (CRC), which supplies hydro-electric power from the Hoover Dam, a renewable energy source. Therefore, there are little-to-no contributions to the greenhouse gas (GHG) footprint from these on-site operations and this analysis focuses on off-site operations (the primary contributor to the GHG footprint). The off-site extraction processes (operating groundwater extraction wells and the conveyance of extracted groundwater via three off-site lift stations) are supplied electricity by NV Energy, which reports that its southern Nevada operations obtain approximately 23 percent of their energy from renewable sources and approximately 77 percent of the power supplied by natural gas and coal (NV Energy 2022).

The use of energy efficient HVAC systems is a long-term BMP in the buildings category that primarily addresses the core element of energy and to some degree materials and waste. According to ETI[5], the GWETS treatment facility is currently limited to *de minimus* contributors to the footprint through HVAC systems that consist of six small panel-mounted units among the three off-site lift stations for electrical equipment cooling (addressed in the REA).

Because the HVAC systems at the Site are already powered by renewable energy and the off-site panel-mounted units are very small (and are critical to the GWETS control equipment), reductions to energy use at these facilities will not yield measurable benefits to the environmental footprint through the implementation of BMP #4; therefore, continued evaluation of this BMP is not recommended at this time. This BMP will be reconsidered during final remedy selection and design.

GREENER PROCESS CHEMICALS, BMP #6

The effort to periodically review alternative "greener" chemicals is a long-term BMP used to determine whether changing process chemicals would enhance performance, reduce energy use and/or maintain performance with a lower GHG footprint. This BMP is in the materials category and it addresses the core elements of energy, materials, and waste.

In 2017, the Trust and ETI evaluated the source of process chemicals used for the GWETS system as part of an evaluation for local vendors to reduce the transportation associated with treatment materials. The decision to use aluminum chlorohydrate (ACH) was made to improve system performance, especially iron fouling of the effluent pipeline and reduce effluent iron. As a result, ETI began to use ACH in place of ferric chloride as a coagulant (used at the end of the biological treatment process) during the July 2018 – December 2018 semi-annual reporting period. Switching to the ACH coagulant resulted in a footprint reduction of approximately 10% for refined materials used on-site (Ramboll 2019b). Subsequently, the decision was made to return to using ferric chloride instead of ACH in February 2020, to prevent solids from accumulating in the effluent pipeline and causing pressure buildup (Ramboll 2021a). It is important to note that the performance of the GWETS system is prioritized ahead of any possible implications to the footprint.

[5] According to an email from ETI dated March 9, 2021.

In February 2018, the Trust and ETI met to discuss electron donors and ex-situ treatment processes for NERT (ETI 2018). Based on the experience that ETI has with large-scale treatment of perchlorate using FBRs, the system has been optimized to use the most efficient electron donor, ethanol. Alternative electron donors such as acetic acid, MicroC4100 (a complex carbohydrate), and MicroC4200 (a glycerin-based carbon source) have been evaluated along with ethanol, and according to ETI, these alternative electron donors did not perform as well when considering the required chemical oxygen demand (COD), electron donor consumption, electron donor cost, and solids generation (ETI 2018). Other process chemicals have been previously reviewed for footprint efficiency and the existing list of chemicals has been determined to be the most economical and environmentally friendly according to the treatment plant operator[6]. There is no current alternative process chemical identified that would improve the environmental footprint while maintaining the treatment and cost efficiencies of the existing list of chemicals; therefore, continued evaluation of this BMP is not recommended at this time. This BMP will be reconsidered during final remedy selection and design.

REUSE TREATED GROUNDWATER, BMP #33

The long-term BMP to reuse or reinject treated/uncontaminated groundwater to the subsurface for recharge (rather than discharge to the LVW) is a BMP in the residual solid and liquid waste category and it addresses the core element of water. The potential methods of reuse/reinjection include flushing, irrigation, dust control, wetland amendment, and groundwater recharge. Options for reuse need to be considered on a case-by-case basis as they are largely dependent on the overall water quality of the treated groundwater.

Groundwater extraction accounts for nearly 700 million gallons (M gal) of water in a baseline year (July 2019 – June 2020). Among the potential reuse options to consider, the Trust has estimated that approximately 13 M gallons[7] (annually) of site water could be offset if treated effluent could be reused. The offset water would equal approximately two percent of the total water used, inclusive of groundwater extraction, in the baseline year. The total water footprint would be reduced by less than one percent by offsetting 13 M gal of site water used, because extraction processes represent a much larger portion of the total water footprint (along with evaporation from GW-11). If NERT were to pursue reuse options such as irrigation and dust control, these methods would be expected to similarly account for only approximately two percent or less of the total water used, resulting in impacts of less than one percent reduction to the total water footprint.

Although there are limited gains to the environmental footprint from offsetting effluent through reuse, the Trust has begun an initiative to eliminate its dependency on site water provided by COH (as earlier described) in favor of reusing extracted groundwater

[6] According to a conversation had between Ramboll and ETI on January 13, 2021.
[7] Since the baseline year, ETI has begun bypassing the GAC system thus eliminating the need for backflushing of the GAC. Doing so reduces the water demand for reuse by approximately 60 percent, to less than six M gallons annually. As described earlier, the decision to discontinue the use of GAC permanently is pending continued monitoring to ensure there are no issues with pesticide contamination.

treated using nano filtration membrane technology. Effluent reuse treatment is currently being studied in pilot-scale system designed to handle maximum flows of 60 gpm, filtered through two membrane units. The treated water produced is expected to have a quality similar to the former water supply from SLMW and would be stored in holding tanks. Once a permanent system is online, it is estimated that the 13 M gal of site water currently used could be offset. In addition, further evaluation of this BMP will be completed during final remedy selection and design.

The potential for reinjection offers a means of returning the extracted and treated groundwater to the aquifer for hydraulic control (as had been done historically with the operation of the former recharge trenches downgradient of the on-site barrier wall) or for other remedial activities, such as vadose-zone soil flushing or artificial recharge; however, these options would need to be developed during remedy selection and design following the NERT FS. Although reinjection has been conducted at the site previously, some forms of reinjection would likely require further treatment and additional energy inputs. Further testing and evaluation would need to be conducted to determine the water quality parameters for post-treated groundwater, along with the other factors that need to be considered, such as energy requirements, costs associated, and any remaining TDS concentrations expected in the treated water – which might constrain reuse purposes and/or outweigh potential benefits to the water footprint. Such factors should be evaluated upon the design of the final remedy, when there is an opportunity to reconfigure the Site for project objectives.

Treated groundwater could also potentially be used for wetland amendment, however the current site configuration is not designed to accommodate wetlands, meaning the water would either need to be moved off-site, or the site would need to be reconfigured to accommodate constructed wetlands. Either of these reuse options are likely to incur additional project costs that are expected to outweigh the potential benefits to the water footprint through this reuse option.

NATIVE PLANTING AND POLLINATOR HABITAT, BMP #39

Adding native plants to create habitat and forage for pollinators is a long-term BMP that addresses the core element of land and ecosystems. The SEFA workbooks do not include an analysis of impacts to land and ecosystems as these are not easily quantifiable; therefore, footprint results are not discussed for this core element. USEPA encourages qualitatively describing ecosystem services that are affected during cleanup, but does not have established footprint metrics for land and ecosystems (USEPA 2012a).

It is important to note that BMP #39 is only being considered for the NERT-owned property and not off-site project areas that would be difficult to access for this purpose. Because of this, potential implementation of BMP #39 would be subject to the requirements of the Site Management Plan (SMP) (Ramboll 2022), which describes the risk management measures and procedures to be implemented during soil-disturbing activities to mitigate risks to human health and the environment from exposure to chemicals of potential concern (COPCs).

The NERT Site and surrounding area are primarily comprised of disturbed urban land and the regional ecosystem type is Mojave desert scrub (CCDCP 2000). As such, the site has limited existing vegetation, with only a few small, scattered mixed scrub vegetation communities. The United States Fish and Wildlife Service and NDEP are the federal and state agencies, respectively, responsible for monitoring and managing at-risk and protected species. Species with threatened or endangered listing status in Clark County were assembled as part of the Screening-Level Ecological Risk Assessment (SLERA) process (Ramboll Environ 2015). However, based on field reconnaissance performed in December 2014 and April 2018, no critical habitat was observed for any of the listed species on or in the immediate vicinity surrounding the Site (Ramboll Environ 2015; Ramboll 2018). A formal list of species commonly found in the Mojave desert scrub ecosystem of southern Nevada that are known to be susceptible to contamination-related food web exposures has been assembled as part of the NERT Refined Screening-Level Ecological Risk Assessments (SLERAs) for OU-1 and OU-2 (Ramboll 2021c,d). Site personnel have not observed signs of wildlife or biodiversity near the Site facilities, there is no irrigation system, and any existing vegetation is not currently maintained on a routine basis.

Introduction on Pollinator-Friendly Habitat Restoration

In 2015, the United States Department of Agriculture (USDA) and United States Department of Interior (USDOI) issued a document titled *Pollinator-Friendly Best Management Practices for Federal Lands*, which identifies the services provided by native plants for pollinators including various types of food and shelter (USDA and USDOI 2015). The report describes the need for a variety of plants available with overlapping blooming times that are adapted to local soil and climates, to support an abundant and diverse population of pollinators. Flowering plants can provide food in the form of nectar or pollen and many pollinators have morphological features that allow them to reach food within specific flower types. Shelter for nesting and overwintering for pollinators is equally significant to food sources and therefore the native plant site(s) should remain undisturbed to the extent possible.

The USDA and USDOI document on pollinator-friendly BMPs for federal lands further identified key considerations when developing BMPs for pollinator habitat, including identifying important pollinator reproduction, nesting and/or overwintering sites; identifying pollinator species that are sensitive or at-risk; identifying and removing invasive plant species; and implementing adaptive management (a flexible decision process as outcomes and other events progress) (2015). The USDA and USDOI document further describes the implementation actions for restoration of arid and semiarid western shrublands (specific to plant selection and planting techniques[8]), including:

- Selecting short-lived flowering perennials that will bloom in the first year;
- Planting several species with various flower colors and shapes;

[8] The USDOA and USDOI specifies seeding techniques; however, planting containerized plants is recommended for the Site, as the more developed plants will more easily establish themselves with less maintenance required.

- Planting flowering plants in patches so that the pollinators can find them; and
- Staggering (physically and temporally) the plantings of different species that might compete with each other as they establish themselves.

The key considerations and implementation actions outlined by USDA and USDOI provide a framework with which an implementation plan could be developed, should BMP #39 be selected for further consideration.

Site-specific Plant and Pollinator Relationships

Site-specific parameters will play a role in determining which plants can be selected to attract the widest variety of pollinator types (including many diverse insects, hummingbirds, and bats). Plants that are native to the region are naturally adapted to tolerate the arid/semi-arid conditions of Southern Nevada and are suitable for the soil types associated with the desert conditions. In general, insect pollinators have very similar habitat requirements in comparison to other fauna: shelter, nesting habitat, and availability of food and water. Most species of bumble bees nest underground, often within abandoned holes, tunnels, burrows, tree cavities, hollow logs, or under rocks (Moisset and Buchmann 2011; Hatfield et al. 2012; Koch et al. 2012; Tilley et al. 2013). Native bunchgrasses also provide refugia, nesting, and overwintering sites that are beneficial for bumble bees (Hatfield et al. 2012; Tilley et al. 2013). Many solitary species also nest underground, either excavating their own burrows or utilizing pre-existing tunnels, cracks, or abandoned rodent sites and a lesser number are cavity nesters. These species tend to use the inside of pithy-twigs, abandoned beetle hollows, or abandoned wasp nests (Scott et al. 2011).

Nesting habitat is important for land management practices, as it influences the necessary landforms and surface features (e.g., remaining coarse woody debris) necessary to facilitate bee habitat. Insects that overwinter and nest at ground level are especially sensitive to ground disturbance.

In general, pollinator habitat at the NERT site would be benefited by the following:

- Removing invasive plant species (where encountered) by hand without the use of pesticides, especially those herbicides that are systemic;
- Retaining snags, leaves, and litter for nesting and overwintering sites;
- The presence of clean surface water;
- A lack of surface disturbance (avoidance tilling, plowing, etc.); and
- Planting of native shrub hedgerows, windbreaks, or shelterbelts that feature species with pithy twigs.

Specific to butterflies, pollinator habitat is benefited by the following types of plants:

- Formed in clusters of flowers (small or large) that provide landing platforms;
- Are planted in groups with a minimum of five to nine different species which have a variety of bloom times ranging from early spring to late fall;

- Represent the site-specific flora of the target area, given the coevolutionary relationships between the host plant and the targeted native pollinators;
- Are brightly colored with red, yellow, and orange often being preferred colors (unlike bees, butterflies can see red);
- Are open during the day, when butterflies are active; and
- Are ample nectar producers.

Table 1 presents a list of 30 flowering plant species that are specifically recommended for planting to attract pollinators at the NERT site. Each of the 30 recommended species are native to the region, drought-tolerant, and suitable for the arid/semi-arid climate in Southern Nevada. Of the 30 plant species recommended, nearly all species are perennial and a few are biennial or short-lived perennial species (none are annual). There are a wide variety of flower colors and plant growth forms to create a diverse garden to attract a range of pollinator types and all but one of the 30 species listed provides both habitat and forage. Additionally, one species – datil yucca (*Yucca baccata*) – is specific to the co-evolutionary needs of the nocturnal pronuba moth (*Noctua pronuba*) and thus serves to further attract native bats that feed on these moths. The overlapping bloom periods among the recommended species span from March through September and there are many species that attract multiple pollinator types.

Recommended woody species include curleaf mountain mahogany (*Cercocarpus ledifolius*), which is drought tolerant, requires low maintenance, has shown relationships with many lepidoptera species, and offers habitat through its bark and base for numerous native bees. Members of the saltbush family (*Atriplex* spp.) are other drought-tolerant and low-maintenance woody species recommended for their relationships with numerous lepidoptera and bee species pollinators. The recommended subshrub and flowering species include two milkvetch species – crescent mikvetch (*Astragalus amphioxys*) and scarlet milkvetch (*Astragalus coccineus*), along with native buckwheats such as sulfur-flowered buckwheat (Eriogonum umbellatum) and cushion buckwheat (Eriogonum ovalifolium). Flowering species such as white globemallow/desert globemallow (*Sphaeralcea ambigua)* and gooseberry globemallow (*Sphaeralcea grossularifolia*) will provide long bloom periods and extensive pollinator relationships. Several grass species are recommended to help create habitat diversity, such as Indian ricegrass (*Achnatherum hymenoides*) and blue grama (*Bouteloua gracilis*), which both attract multiple lepidoptera species.

Planning and Implementation

Implementation of BMP #39 could result in improved habitat and additional food sources for multiple pollinators, helping to foster improved biodiversity and land restoration. Drought-tolerant plantings should not require extensive maintenance (only periodic irrigation and removal of weeds once established). Upon selection of BMP #39, an implementation plan could be developed, to include a site walk and a phased approach to implementation (beginning with a field test plot that can be scaled-up if shown to be effective). Any planting areas selected as part of the implementation

plan would need to be further evaluated to determine any risks of soil contamination, nutrient availability, and the ability to provide a source of clean water, which could be evaluated as part of the field test plot. In the case that the soil is found to be unsuitable for direct planting in the ground, the non-woody species and species without long tap-roots could instead be planted within raised beds.

Should BMP #39 be selected for implementation, the qualitative benefit to the environmental footprint would be described as part of NERT's ongoing environmental footprint reporting and the qualitative metric could be improved upon over time through the use of field surveys, as well as the establishment of additional individuals and/or species diversity. The implementation plan should identify metrics for determining the success of the BMP in attracting pollinators, restoring the land, and improving the biodiversity present at the Site. It is important to note that plantings alongside the southern, eastern, and western walls of the on-site trailers might offer a secondary benefit of lowering the temperature and perhaps reducing the amount of on-site energy required.

Additional evaluation of BMP #39 is recommended, due to the ability to improve the environmental footprint qualitatively and because it would likely be implementable at least on a limited scale. However, as with BMP #33, further evaluation should be conducted during remedy selection and design, when there is an opportunity to reconfigure the Site with final remedy in mind. Furthermore, it is likely that soils present throughout the site today will be removed, replaced, and/or relocated. Activities such as a field test plot and determination of soil quality for planting can be conducted as part of the remedial design process. In addition to soil quality, the field test plot can provide insight into the water supply, costs, and general maintenance requirements.

If selected upon future evaluation, the implementation plan should indicate metrics that can be used to determine the effectiveness of the BMP and which of those metrics would need to be satisfied prior to scaling-up at each planned phase. The implementation plan would also need to consider and address applicable requirements of the SMP or a future soil management plan prepared in connection with final remedy while also accounting for potential future Excavation Control Areas (ECAs) as identified in the SMP. It is also important to note that if BMP #33 (the reuse/reinjection of treated groundwater) is also selected upon future evaluation, the irrigation water supply for the implementation of BMP #39 could be provided through the reuse of treated groundwater (if the quality of the effluent permits). These BMPs are therefore complementary and impacts to the water footprint could be offset through the reuse of treated groundwater. Further, the amount of water that could be reused for irrigation (among the other reuse options presented earlier) could be maximized through the addition of irrigable land, which could further optimize the water footprint.

REMAINING LONG-TERM BMPS TO CONSIDER

Table 2 presents all long-term BMPs identified in the Work Plan, including those identified as priority (and evaluated herein) and the remaining long-term BMPs for future consideration. Through the process of evaluating the five prioritized long-term

BMPs, there are ten of the remaining BMPs that are expected to show similar, limited impacts on the footprint as the BMPs evaluated herein. The following BMP is expected to have similar results to BMP #1 (the use of water-efficient plumbing), because it has similar characteristics and the potential water savings is limited:

- *BMP #36B:* to maximize the use of real-time measurement technologies such as sensors, probes, and meters, to monitor processing conditions, and use program alarms to notify operators of system or component failure.

The following BMPs are expected to have similar results to BMP #4 (improvements to the HVAC systems), because they have similar limitations to the potential energy savings relative to the total energy demands:

- *BMP #2:* the orientation of new buildings or trailers to optimize energy efficient heating and cooling;

- *BMP #17:* the use of biodiesel produced from waste or cellulose-based products to power equipment;

- *BMP #20:* to operate pumping equipment in pulsed (or other reduced pumping) mode when nearing asymptotic conditions and/or when continuous operating is not needed to contain the plume and/or reach clean-up objectives;

- *BMP #23:* to automate mechanical and electrical equipment as much as practical and implement telemetry systems to reduce frequency of site visits and reduce night/weekend trips responding to alarms;

- *BMP #24:* to employ an electronics stewardship plan that recommends purchases of EPEAT and EnergyStar products, power management for data centers, and recycling or reuse of expended electronic equipment or media; and

- *BMP #40:* to implement an idle reduction plan.

Further, the following BMPs are expected to have similar results to BMP #6 (the use of green process chemicals), because the majority of the products and/or materials used for the project are the process chemicals, which have already been optimized:

- *BMP #8:* to select products that are environmentally preferable with respect to raw materials consumption, manufacturing processes and locations, packaging, distribution, recycled content and recycling capability, maintenance needs, and disposal procedures;

- *BMP #9:* the use of by-products, waste, or less refined materials in place of refined chemicals or materials; and

- *BMP #10:* the use of materials with recycled content.

As they are expected to have similar results to the BMPs evaluated herein, the ten remaining BMPs listed above are not recommended for further evaluation at this time, but should be reconsidered during design of the final remedial action(s).

As stated earlier and discussed in the REA, the on-site energy is supplied by renewable energy sources and there are limited gains to be achieved for on-site electricity usage (and no gains to the GHG footprint) as a result. Five of the remaining long-term BMPs are generally addressed by the REA and as such, would not warrant additional evaluation beyond the scope and potential implementation of the REA (or upon subsequent selection of the final remedy). The BMPs generally addressed by the REA include:

- *BMP #5:* the use of energy efficient lighting systems by incorporating elements such as LED lights or motion sensors;
- *BMP #15:* to purchase renewable energy via local utility and Green Energy Programs or renewable energy credits/certificates (RECs or Green Tags) to power cleanup activities;
- *BMP #16:* the use of a flexible on-site renewable energy system to meet energy demands of multiple activities or consumption needs beyond the lifespan of the cleanup;
- *BMP #18:* the use of on-site generated renewable energy such as solar photovoltaic, wind turbines, landfill gas, geothermal, and biomass combustion, to fully or partially provide power otherwise generated through on-site fuel consumption or use of grid electricity; and
- *BMP #19:* the use of a solar power pack system for low-power system demands (for example, security lighting, system telemetry).

Additionally, there are five BMPs that are considered to be already implemented for the site, including BMP #11: the use of reconstituted reactive media or regenerate ionic adsorption material whenever feasible. According to ETI, the site purchased recycled GAC from between July 2018 and May 2022[9], only replacing it periodically when breakthrough was observed. The Site also already utilizes local waste and recycling facilities (as practical), which addresses BMPs #27, #29, and #32, and local laboratories cannot be used without adding costs and other concerns for the project, which addresses BMP #30 (see Table 2). Short-term BMPs that are already

[9] As of May 11, 2022, the GAC system has been bypassed, which has yielded a significant savings in the amount of site water required for the associated backflushing activities (approximately 500,000 gallons per month). The resulting effects on the environmental footprint will be documented in the future Annual Groundwater Monitoring and GWETS Performance Report and/or Semi-Annual Groundwater Monitoring and GWETS Performance Memoranda.

implemented at the Site have previously been evaluated and are described in the Draft Short-Term BMP Report (Ramboll 2020b).

Lastly, as noted in Table 2 there are five remaining BMPs that should be considered for their potential impact on the environmental footprint upon the future selection of the final remedy and its design, including:

- *BMP #3:* the reuse of existing structures for treatment system, storage, sample management, etc.;
- *BMP #7:* to maximize the reuse of existing wells for sampling, injections, or extractions, where appropriate, and/or design wells for future reuse;
- *BMP #12:* to operate GWETS to optimize capture of plume rather than maximize mass removal to reduce overall extraction rates and treatment process flows;
- *BMP #14:* to treat hexavalent chromium from IWF via batch process, operating this portion of the treatment train during off-peak utility periods; and
- *BMP #41:* to use equipment to increase automation such as electronic pressure transducers, thermo-couples, and water quality monitoring devices coupled with an automatic data logger to optimize operation and minimize transportation of staff to the site.

The BMPs above are either not applicable at this time, generally offer limited benefits to the environmental footprint given the existing GWETS system, or implementation would be particularly challenging (and/or cost prohibitive) considering the current project configuration and cleanup objectives. All BMPs listed should be reconsidered during remedy selection and design.

CONCLUSIONS

This technical memorandum provides a summary of the five prioritized long-term BMPs selected by NDEP and USEPA and evaluated by the Trust. One of the five BMPs, BMP #33, is currently being implemented in part by the Trust. Each of the remaining four BMPs evaluated herein, in addition of BMP #33, are recommended for further evaluation upon selection and design of the final remedy. The remaining 25 long-term BMPs are also recommended to be considered again upon the selection of the final remedy.

As described in the Work Plan and previously agreed upon with NDEP and USEPA, the BMP evaluation conducted was solely applied to the operations, maintenance, and monitoring of the existing GWETS and the associated groundwater monitoring program. Short-term BMPs identified in the Work Plan have been evaluated separately from the long-term BMPs and are described under separate cover. The NERT RI Study Area is currently the subject of an ongoing RI/FS, the results of which will be used to develop and implement a final remedy. As such, the Trust anticipates conducting the

BMP process for short-term and long-term BMPs subsequent to applicable cleanup phases in the future as the final remedy is developed and implemented.

ATTACHMENTS

Table 1: Site-specific Plant Species and Pollinator Relationships Identified
Table 2: Long-term Greener Cleanup BMPs Selected for Further Evaluation – Current GWETS and Performance Monitoring Program

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Greener Cleanup Best Management Practices: Long-Term BMPs

Nevada Environmental Response Trust
Site (Former Tronox LLC Site)
Henderson, Nevada

Nevada Environmental Response Trust (NERT) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the system(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Signature: Not Individually, but Solely as President of the Trustee

Name: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 9/29/22

Greener Cleanup Best Management Practices: Long-Term BMPs

Nevada Environmental Response Trust Site (Former Tronox LLC Site) Henderson, Nevada

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

Kimberly Kuwabara

_____

Kimberly Kuwabara
Senior Managing Consultant

September 29, 2022

_____

Date

Certified Environmental Manager
Ramboll US Consulting, Inc.
CEM Certificate Number: 2353
CEM Expiration Date: March 20, 2023

Table 1: Site-specific Plant Species and Pollinator Relationships Identified
Nevada Environmental Response Trust Site
Henderson, Nevada

Scientific Name, Synonyms	Common Name, Cultivar	Life Cycle	Season	Plant Structure	Bloom Period	Flower Color	Pollinator Relationship	Known Native Lepidoptera Associations	Known Native Bee Associations
Achnatherum hymenoides synonym: *Orhyzopsis hymenoides*	Indian ricegrass cultivar: Paloma, Star Lake	perennial	cool	grass	June - July	light green	habitat and forage	Uncas skipper (*Hesperia uncas*), western branded skipper (*Hesperia colorado*), Nevada skipper (*Hesperia nevadensis*), Canyonland satyr (*Cyllopsis pertepida*), Great Basin wood-nymph (*Cercyonis sthenele*), small wood-nymph (*Cercyonis oetus*)	
Achillea millefolium var. occidentalis	western yarrow	perennial	cool	flowering plant	March - September	white to pink	habitat and forage	northern scurvey quaker (*Homorthodes furfurata*), olive arches (*Lacinipolia olivacea*), yarrow plum moth (*Gillmeria pallidactyla*), Smaethmann's aethes moth (*Aethes smeathmanniana*), *Sparganthothis senecionana*, wavy lined emerald (*Synchlora aerata*), spotted straw sun moth (*Heliothis phloxiphaga*), western branded skipper (*Hesperia colorado*), Rocky Mountain parnassian (*Parnassius smintheus*), cabbage white *(Pieris rapae*), checkered white (*Pontia protodice*), dainty sulfur (*Nathalis iole*), banded hairstreak (*Satyrium calanus*), striped hairstreak (*Satyrium liparops*), gray hairstreak (*Satyrium melinus*), spring azure (*Celastrina ladon*), Boisduval's blue (*Plebejus icariodes*), variegated fritillary (*Euptoieta claudia*), dotted checkerspot (*Poladryas minutae*), northern checkerspot (*Chlosyne palla*), pale crescent (*Phyciodes pallida*), northern cresent (*Phycoides cocyta*), tawny crescent (*Phyciodes batesii*)	high country bumble bee (*Bombus balteatus*), two-form bumble bee (*Bombus bifarius*), Fernald's bumble bee (*Bombus fernaldae*), indiscriminate cuckoo bumble bee (*Bombus insularis*), red belted bumble bee (*Bombus rufocinctus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), sunflower bee (*Diadasia enavata*), frigid bumble bee (*Bombus frigidus*), *Andrena* spp., *Colletus* spp., *Halictus* spp.
Asclepias subverticillata synonym: *A. galioides*	horsetail milkweed	perennial	cool	flowering plant	June - September	white to greenish-white	habitat and forage	monarch butterflies (*Danaus plexippus*), northern cloudywing (*Thorybes pylades*), common sootywing (*Pholisora catullus*), dun skipper (*Euphyes vestris*), two-tailed swallowtail (*Papilo multicaudata*), orange sulphur (*Colias eurytheme*), juniper hairstreak (*Callophrys gryneus*), California hairstreak (*Satyrium californica*), Sylvan hairstreak (*Satyrium sylvinus*), branded hairstreak (*Satyrium calanus*), gulf fritillary (*Agraulis vanillae*), variegated fritillary (*Euptoieta claudia*), great spagled fritillary (*Speyeria cybele*), Aphrodite fritillary (*Speyeria aphrodite*)	*Agapostemon* spp., *Anthophora* spp., *Bombus* spp., *Centris* spp., *Diadasia* spp., *Halictus* spp., *Lasioglossum* spp., *Megachile* spp., *Melissodes* spp., *Xylocopa* spp.
Astragalus amphioxys	crescent milkvetch	perennial	warm	sub-shrub	March - June	fuscia	habitat and forage	painted lady (*Vanessa cardui*), acmon blue (*Icaricia acmon*), orange sulphur (*Colias euytheme*), silvery blue (*Glaucopsyche lygdamus*), silver spotted skipper (*Epargyreus clarus*), melissa blue (*Plebejus melissa*), Persius duskywing (*Erynnis persius*), Afranius duskwing (*Erynnis afranius*), Queen Alexandra's sulphur (*Colias alexandra*), Mead's sulphur (*Colias meadii*), western tailed blue (*Cupido amyntula*), arrowhead blue (*Glaucopsyche piasus*), Reakirt's blue (*Echinargus isola*), Shasta blue (*Plebejus shasta*), *Arachnis citra*, *Grammia nevadensis*	*Agapostemon* ssp., *Andrena* spp., *Anthidium* spp., *Anthophora* spp. *Ashmeadiella* spp., *Bomus bifarius*, *Bomus californicus*, *Bombus centralis*, *Bombus fervidus*, *Bombus huntii*, *Bombus insularis*, *Bombus nevadensis*, *Bomus rufocinctus*, *Eucera acuosa, Eucera edwardsii, Eucera frater, Eucera fulvitarsis*, *Habropoda* spp., *Halictus* spp., *Hoplitis* spp., *Lasioglossum* spp., *Megachile* spp., *Melecta* spp., *Nomada* spp., *Osmia* spp., *Perdita* spp.
Astragalus coccineus	scarlet milkvetch	perennial	warm	flowering plant	March - June	red	habitat and forage		
Atriplex canescens	fourwing saltbush cultivar: Rincon, Marana, Santa Rita	perennial	warm	shrub	July - September	yellow-green	habitat and forage	western pygmy blue (*Brephidium exilis*), Mohave sootywing (*Hesperopsis Iibya*), San Emigdio blue (*Plebejus emigdionis*), Meske's moth (*Pero meskaria*), *Glaucina ochrofuscaria*, saltbush sootywing (*Hesperopsis alpheu* s), common sootywing (*Pholisora catullus*)	California bumble bee (Bombus californicus), Nevada bumble bee (*Bombus nevadensis*)
Atriplex confertifolia	shadscale	perennial	warm	shrub	July - September	yellow-green	habitat and forage		
Atriplex tridentata synonyms: *A. gardneri var. tridentata, A. nuttallii ssp. tridentata*	basin saltbush	perennial	warm	shrub	July - September	yellow-green	habitat and forage		
Bouteloua gracilis	blue grama cultivar: Hachita. Lovington, Alma	perennial	warm	grass	June - July	light green	habitat and forage	common sootywing (*Pholisora catullus*), alfalfa looper moth (*Autographa californica*), russet skipperling (*Piruna pirus*), Garita skipperling (*Oarisma garita*), Uncas skipper (*Hesperia uncas*), Pahaska skipper (*Hesperia pahaska*), green skipper (*Hesperia viridis*), Canyonland satyr (*Cyllopsis pertepida*), Great Basin wood-nymph (*Cercyonis sthenele*), small wood-nymph (*Cercyonis oetus*)	

Table 1: Site-specific Plant Species and Pollinator Relationships Identified
Nevada Environmental Response Trust Site
Henderson, Nevada

Scientific Name, Synonyms	Common Name, Cultivar	Life Cycle	Season	Plant Structure	Bloom Period	Flower Color	Pollinator Relationship	Known Native Lepidoptera Associations	Known Native Bee Associations
Cercocarpus ledifolius	curl-leaf mountain mahogany	perennial	cool	shrub to small tree	July - August	beige	habitat and forage	mountain mahogany moth (*Ethmia discostrigella*), western tent caterpillar (*Malacosoma californica*), *Ethmia semitenebrella*, *Aceleris foliana*, California hairstreak (*Satyrium californica*), mountain mahogany hairstreak (*Satyrium tetra*), Behr's hairstreak (*Satyrium behrii*), western sheepmoth (*Hemileuca eglanterina*), elegant sphinx (*Sphinx perelegans*), *Bertholdia trigona*	
Dalea searlsiae synonym: *Petalostemon searlsiae*	Searls' prairieclover cultivar: Fanny germplasm, Carmel germplasm, Bonneville germplasm	perennial	cool	flowering plant	May - June	pink to purple	habitat and forage	southern dogface sulphur butterfly (*Zerene cesonia*)	*Agapostemon* spp., *Andrena* spp., *Anthidium* spp., *Anthophora* spp., *Bombus bifarius*, *Bombus centralis*, *Bombus fervidus*, *Bombus griseocollis*, *Bombus huntii*, *Bombus morrisoni*, *Bombus nevadensis*, *Colletes* spp., *Bombus* spp., *Eucera edwardii*, *Halictus* spp., *Hoplitus* spp., *Lasioglossum* spp., *Megachile* spp., *Melissodes* spp., plasterer bee (*Caupolicana yarrow*)
Erigeron eatonii	Eaton's daisy	perennial	cool	flowering plant	May - August	white with yellow center	habitat and forage	northern checkerspot *(Chlosyne palla)*, pearl crescent (*Phycoides tharos*), Sierra Nevada checkerspot (*Chlosyne whitneyi*), white-lined sphinx (*Hyles lineata*) wavy lined emerald (*Synchlora aerata*), common eupithacia (*Eupithecia miserulata*), mousy plume moth (*Lioptilodes albistriolatus*), western branded skipper (*Hesperia colorado*), Rocky Mountain parnassian (*Parnassius smintheus*), cabbage white (*Pieris rapae*), checkered white (*Pontia protodice*), dainty sulfur (*Nathalis iole*), Boisduval's blue (*Plebejus icariodes*), variegated fritillary (*Euptoieta claudia*), dotted checkerspot (*Poladryas minutae*), northern checkerspot (*Chlosyne palla*), pale crescent (*Phyciodes pallida*), northern cresent (*Phycoides cocyta*), tawny crescent (*Phyciodes batesii*)	high country bumble bee (*Bombus balteatus*), two-form bumble bee (*Bombus bifarius*), Fernald's bumble bee (*Bombus fernaldae*), indiscriminate cuckoo bumble bee (*Bombus insularis*), red belted bumble bee (*Bombus rufocinctus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), sunflower bee (*Diadasia enavata*)
Eriogonum ovalifolium	cushion buckwheat	perennial	cool	flowering plant	June - July	white to yellow to pink	habitat and forage	square spotted blue (*Euphilotes battoides*), Bauer's dotted blue (*Euphilotes baueri*), Glaucon blue (*Euphilotes glaucon*), gray hairstreak (*Strymon melinus*), acmon blue (*Icaricia acmon*), the brown elfin (*Callophrys augustinus*), blue copper (*Lycaena heteronea*), Edith's copper (*Lycaena editha*), Ruddy's copper (*Lycaena rubidus*), purplish copper (*Lycaena helloides*), lilac-bordered copper (*Lycaena nivalis*), western green hairstreak (*Callophrys affinis*), Sheridan's green hairstreak (*Callophrys sheridanii*), desert green hairstreak (*Callophrys sheridanii comstocki*), coral hairstreak (*Satyrium titus*), California hairstreak (*Satyrium californica*), Ellis' dotted blue (*Euphilotes ellisi*), Rocky Mountain dotted blue (*Euphilotes ancilla*), Rita's dotted blue (*Euphilotes rita*), Boisduval's blue (*Plebejus icarioides*), lupine blue (*Plebejus lupini*)	western bumble bee (*Bombus occidentalis*)
Eriogonum umbellatum	sulfur-flowered buckwheat	perennial	cool	flowering plant	June - July	yellow to orange	habitat and forage	cythera metalmark butterfly (*Apodemia mormo cythera*), Rocky Mountain dotted-blue (*Euphilotes ancilla*), acmon blue (*Icaricia acmon*), Melissa blue (*Plebejus melissa*), blue copper (*Lycaena heteronea*), Morman metalmark (*Apodemia mormo*), square-spotted blue (*Euphilotes battoides*), dotted blue (*Euphilotes enoptes*) lupine blue (*Icaricia lupini*), blue copper (*Lycaena heteronea*), Edith's copper (*Lycaena editha*), Ruddy's copper (*Lycaena rubidus*), purplish copper (*Lycaena helloides*), lilac-bordered copper (*Lycaena nivalis*), western green hairstreak (*Callophrys affinis*), Sheridan's green hairstreak (*Callophrys sheridanii*), desert green hairstreak (*Callophrys sheridanii comstocki*), coral hairstreak (*Satyrium titus*), California hairstreak (*Satyrium californica*), Ellis' dotted blue (*Euphilotes ellisi*), Rocky Mountain dotted blue (*Euphilotes ancilla*), Rita's dotted blue (*Euphilotes rita*), Boisduval's blue (*Plebejus icarioides*), lupine blue (*Plebejus lupini*)	

Table 1: Site-specific Plant Species and Pollinator Relationships Identified
Nevada Environmental Response Trust Site
Henderson, Nevada

Scientific Name, Synonyms	Common Name, Cultivar	Life Cycle	Season	Plant Structure	Bloom Period	Flower Color	Pollinator Relationship	Known Native Lepidoptera Associations	Known Native Bee Associations
Heterotheca villosa	hairy goldenaster, hairy false goldenaster	perennial	cool	flowering plant	July - August	yellow	habitat and forage	Gabb's checkerspot (*Chlosyne gabbii*), common eupithacia (*Eupithecia miserulata*), tobacco budworm moth (*Chloridea virescens*), snakeweed borer (*Pelochrista ridingsana*), western branded skipper (*Hesperia colorado*), Rocky Mountain parnassian (*Parnassius smintheus*), pine white (*Neophasia menapia*), abbage white (*Pieris rapae*), checkered white (*Pontia protodice*), dainty sulfur (*Nathalis iole*), Boisduval's blue (*Plebejus icariodes*), morman metalmark (*Apodemia mormo*), dotted checkerspot (*Poladryas minutae*), northern checkerspot (*Chlosyne palla*), pale crescent (*Phyciodes pallida*), northern cresent (*Phycoides cocyta*), tawny crescent (*Phyciodes batesii*), *Schinia megarena*	high country bumble bee (*Bombus balteatus*), two-form bumble bee (*Bombus bifarius*), Fernald's bumble bee (*Bombus fernaldae*), indiscriminate cuckoo bumble bee (*Bombus insularis*), red belted bumble bee (*Bombus rufocinctus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), sunflower bee (*Diadasia enavata*), cellophane bee (*Colletes* spp.)
Ipomopsis aggregata	scarlet bugler, scarlet gilia, skyrocket	biennial to short-lived perennial	cool	flowering plant	June - July	scarlet red	habitat and forage	spotted straw sun moth (*Heliothis phloxiphaga*), as well as hawk moths and sphinx moths	bumble bees (*Bombus* spp.) and other native bee species
Ipomopsis arizonica	Arizona gilia	biennial to short-lived perennial	cool	flowering plant	June - July	scarlet red	habitat and forage	hawkmoths and sphinx moths	bumble bees (Bombus spp.) and other native bee species
Krascheninnikovia lanata synonyms: *Ceratoides lanata, Eurotia lanata*	winterfat cultivar: Hatch	perennial	warm	shrub	July - September	white	habitat only		
Linum lewisii	Lewis flax cultivar: Maple Grove germplasm	short-lived perennial	cool	flowering plant	June - July	blue	habitat and forage	variegated fritillary (*Euptoieta claudia*), alfalfa looper moth (*Autographa californica*), armyworm moth (*Mythimna unipuncta*), corn earworm moth (*Helicoverpa zea*), tobacco budworm moth (*Chloridea virescens*), the nutmeg (*Anarta trifolii*), Tesselate dart (*Euxoa tessellata*)	*Agapostemon* spp., *Andrena* spp., *Bombus* spp., *Ceratina* spp., *Eucera fulvitarsis*, *Halictus* spp., *Hylaeus* spp., *Melecta* spp., *Melissodes* spp., *Osmia* spp.
Mahonia repens snyonyms: *Berberis repens, B. aquifolium var. repens*	creeping mahonia, Oregon grape	perennial	cool	shrub	July - August	yellow	habitat and forage	tissue moth (*Triphosa haesitata*), barberry geometer (*Coryphysta meadii*), fall webworm (*Hyphantria cunea*), orange tortrix moth (*Argyrotania franciscana*), *Mesogona olivata*	Important forage and habitat for multiple species of native bees
Mirabilis multiflora	Colorado four o'clock, giant four o'clock	perennial	cool	flowering plant	June - July	reddish-pink	habitat and forage	*Lithariapteryx abroniaeella*, *Lithariapteryx jubarella*, white-lined sphinx (*Hyles lineata*), Hawaiian beet webworm (*Spoladea recurvalis*), somber carpet (*Disclisioprocta stellata*), *Archirhoe neomexicana*, *Embola powelli*	Important forage and habitat for multiple species of native bees
Penstemon eatonii	firecracker penstemon cultivar: Richfield Selection	perennial	cool	flowering plant	May - June	red	habitat and forage	common buckeye (*Junonia coenia*), variable checkerspot (*Euphydryas chalceona*), Edith's checkerspot (*Euphydryas editha*), Arachne checkerspot (*Poladryas arachne*), purple lined sallow (*Pyrrhia exprimens*), *Archirhoe neomexicana,* dotted checkerspot *(Poladryas minutae)*, Chalcedon checkerspot (*Euphydryas chalcedona*)	digger bees (*Anthophora terminalis*), leaf-cutter bees (*Atoposmia* spp.), white shouldered bumble bee (*Bombus appositus*), high country bumble bee (*Bombus balteatus*), two-form bumble bee *(Bombus bifarius*), California bumble bee (*Bombus californicus*), Great Basin bumble bee (*Bombus centralis*), yellow bumble bee (*Bombus fervidus*), yellow-headed bumble bee (*Bombus flavifrons*), Hunt's bumble bee (*Bombus huntii*), black-tailed bumble bee (*Bombus malanopygus*)
Penstemon utahensis	Utahensis penstemon	perennial	cool	flowering plant	June - July	red	habitat and forage	variable checkerspot (*Euphydryas chalcedona*),*Archirhoe neomexicana*, dotted checkerspot (*Poladryas minutae*), Edith's checkerspot (*Euphydryas editha*), Chalcedon checkerspot (*Euphydryas chalcedona*)	digger bees (*Anthophora terminalis*), leaf-cutter bees (*Atoposmia* spp.), white shouldered bumble bee (*Bombus appositus*), high country bumble bee (*Bombus balteatus*), two-form bumble bee *(Bombus bifarius*), California bumble bee (*Bombus californicus*), Great Basin bumble bee (*Bombus centralis*), yellow bumble bee (*Bombus fervidus*), yellow-headed bumble bee (*Bombus flavifrons*), *Bombus griseocollis*, Hunt's bumble bee (*Bombus huntii*), black-tailed bumble bee (*Bombus malanopygus*), *Bombus rufocinctus*

Table 1: Site-specific Plant Species and Pollinator Relationships Identified
Nevada Environmental Response Trust Site
Henderson, Nevada

Scientific Name, Synonyms	Common Name, Cultivar	Life Cycle	Season	Plant Structure	Bloom Period	Flower Color	Pollinator Relationship	Known Native Lepidoptera Associations	Known Native Bee Associations
Phacelia hastata	silverleaf phacelia cultivar: Stuckey Ridge germplasm	perennial	cool	flowering plant	May - September	white to lavendar	habitat and forage	bilobed looper moth (*Megalographa biloba*), geranium plume moth (*Amblyptilia pica*), orange tortix moth (*Argyrotaenia franciscana*), *Annaphila ida*, *Stamnodes albiapicatata*	*Agopostemon* spp., *Andrena* spp., *Anthipidum* spp., *Anthophora* spp., Great basin bumble bee (*Bombus centralis*), yellow bumble bee (*Bombus fervidus*), brown-belted bumble bee (*Bombus griseocollis*), Hunt's bumble bee (*Bombus huntii*), *Ceratina* spp., *Colletes* spp., *Diadasia* spp., *Epeolus* spp., *Eucera actinosa, Eucera edwardsii*, *Halictus* spp., *Lasioglossum* spp., *Megachile* spp., *Melecta* spp., *Nomada* spp., *Osmia* spp.
Phlox hoodii	spiny phlox, Hood's phlox	perennial	cool	flowering plant	April - July	white to pale blue, pink, purple	habitat and forage	corn earworm moth (*Helicoverpa zea*), spotted straw moth (*Heliothis phlytoxiphaga*), purple lined sallow (*Pyrrhia exprimens*), olive arches (*Lacinipolia olivacea*), *Euxoa extranea*, *Euxoa infausta,* desert marble (*Euchloe lotta*), apple sphinx (*Sphinx gordius*)	attracts long-tongued bees
Pleuraphis jamesii synonym: *Hilaria jamesii*	James' galleta grass cultivar: Viva	perennial	warm	grass	May - June	yellow-green	habitat and forage	Canyonland satyr (*Cyllopsis pertepida*), Great Basin wood-nymph (*Cercyonis sthenele*), small wood-nymph (*Cercyonis oetus*)	
Sphaeralcea ambigua	white globemallow, desert globemallow	perennial	warm	flowering plant	March - July *(additonal flowering with precipitation)*	apricot to orange	habitat and forage	checkered skipper (*Pyrgus communis*), painted lady (*Vanessa cardui*), gray hairstreak (*Strymon melinus*), northern white skipper (*Heliopetes ericetorum*), west coast lady (*Vanessa annabella*), small checkered skipper (*Pyrgus scriptura*), *Chionodes petro*, west coast lady (*Vanessa annabella*)	*Agapostemon* spp., *Andrena* spp., *Anthidium* spp., *Anthophora* spp., *Bombus fervidus*, *Bombus huntii, Ceratina* spp., mason bee (*Calliopsis subalpine, Calliopsis* spp.), *Colletus* spp., globemallow bee (*Diadasia dimunata, Diadasia* spp.), *Epeolus* spp., *Eucera* actinosa, *Eucera edwardii*, *Eucera lutziana*, *Halictus* spp., *Lasioglossum* ssp., *Megachile* spp., *Melecta* spp., *Melissodes* spp., *Nomada* spp., *Osmia* spp., miner bee (*Perdita xanthochroa*, *Perdita* spp.)
Sphaeralcea grossulariifolia	gooseberryleaf globemallow	perennial	cool	flowering plant	March - July	red	habitat and forage	northern white skipper (*Heliopetes ericetorum*), painted lady (*Vanessa cardui*), common checkered skipper (*Pyrgus communis*), west coast lady (*Vanessa annabella*), *Tarache major*, *Chionodes popa*	
Symphyotrichum laeve var. geyeri synonym: *Aster geyeri*	Geyer's aster	perennial	cool	flowering plant	July - September	blue to purple with yellow centers	habitat and forage	Gabb's checkerspot (*Chlosyne gabbii*), common eupithacia (*Eupithecia miserulata*), tobacco budworm moth (*Chloridea virescens*), snakeweed borer (*Pelochrista ridingsana*), western branded skipper (*Hesperia colorado*), Rocky Mountain parnassian (*Parnassius smintheus*), pine white (*Neophasia menapia*), abbage white (*Pieris rapae*), checkered white (*Pontia protodice*), dainty sulfur (*Nathalis iole*), Boisduval's blue (*Plebejus icariodes*), variegated fritillary (*Euptoieta claudia*), , northern checkerspot (*Chlosyne palla*), pale crescent (*Phyciodes pallida*), northern cresent (*Phycoides cocyta*), tawny crescent (*Phyciodes batesii*)	high country bumble bee (*Bombus balteatus*), two-form bumble bee (*Bombus bifarius*), Fernald's bumble bee (*Bombus fernaldae*), indiscriminate cuckoo bumble bee (*Bombus insularis*), red belted bumble bee (*Bombus rufocinctus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), sunflower bee (*Diadasia enavata*)
Yucca baccata	banana yucca, datil yucca	perennial	hybrid	shrub	April - July	white with red-purple tinge	habitat and forage	pollinated by the nocturnal pronuba moth (*Noctua pronuba*). Moths specific to banana yucca can remain in diapause for up to 30 years, emerging when climatic cues are optimal for development. These moths may be responsible for the creation of *Y. baccata x Y.* schidigera hybrids. Additional associated lepidoptera include yucca giant skipper (*Megathymus yuccae*), yellostriped armyworm moth (*Spodoptera ornithogalli*), yucca moth (*Tegeticula yuccasella*), *Holcocera iceryaeella*	

Note: the list of Site-specific species presented in this table was generated using an internally developed and maintained database that reflects a variety of source reference materials.

Table 2: Long-term Greener Cleanup BMPs Selected for Further Evaluation - Current GWETS and Performance Monitoring Program
Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
						Already in Place	Priority	
1	Buildings	Choose water efficient plumbing fixtures (for example, low flow fixtures, tankless water heaters)		Low water footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.		X	Evaluated herein, not recommended for further consideration given the existing GWETS system.
2	Buildings	Orient new buildings or trailers (for example, south facing or with prevailing wind directions) to optimize energy efficient heating and cooling		Low energy footprint reductions, but relatively easy to implement	For new buildings/trailers, orientation of structures will be evaluated to optimize heating and cooling efficiency. No new structures are planned at this time.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.
3	Buildings	Reuse existing structures for treatment system, storage, sample management, etc.		Low energy and materials/waste footprint reductions, but relatively easy to implement	Should future GWETS/GWM program storage needs change, existing structures will be used when possible rather than building additional structures.			Might be applicable upon the selection and design of the final remedy, recommend considering this BMP again at that time.
4	Buildings	Use energy efficient HVAC systems (for example, programmable heating and cooling systems) and/or establish separate heating/cooling zones		Low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.		X	Evaluated herein, not recommended for further consideration given the existing GWETS system.
5	Buildings	Use energy efficient lighting systems by incorporating elements such as LED lights or motion sensors		Low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.			Generally addressed by the Renewable Energy Assessment.
6	Materials	Use “greener” chemicals (electron donor, nutrients, coagulants) in treatment processes to enhance performance, reduce energy use, and/or maintain performance with a lower GHG footprint	X	Potentially high materials and waste footprint reductions and moderate energy footprint reductions; implementation may be difficult	Systematic evaluation process required consisting of 1) additional research to identify potential alternative chemicals, 2) evaluation of alternative chemicals with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) bench-scale testing of alternative chemicals if promising alternatives are identified.		X	Evaluated herein, not recommended for further consideration given the existing GWETS system.
7	Materials	Maximize the reuse of existing wells for sampling, injections, or extractions, where appropriate, and/or design wells for future reuse		Low energy and materials/waste footprint reductions, but relatively easy to implement	When the GWM program is revised/reviewed (e.g. in support of the monitoring optimization program), existing monitoring wells from other programs (Remedial Investigation, Treatability Studies, etc.) will be considered for addition to the GWM program to fill data gaps. Similarly, existing extraction wells will be considered for addition to the GWETS where appropriate.			Might be applicable upon the selection and design of the final remedy, recommend considering this BMP again at that time.

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Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
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8	Materials	Select products that are environmentally preferable (when compared to other products serving the same purpose) with respect to raw materials consumption, manufacturing processes and locations, packaging, distribution, recycled content and recycling capability, maintenance needs, and disposal procedures. Explore the GSA Sustainable Facilities tool at https://sftool.gov/ for a list of greener options		Potentially high materials and waste footprint reductions; implementation may be difficult	Systematic evaluation process required consisting of 1) additional research to identify applicable environmentally preferable products, 2) evaluation of products with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) selection of alternative products for use if promising alternatives are identified.			The products associated with the GWETS are generally the process chemicals used, which have already been optimized for efficiency, as determined in the evaluation of BMP #6.
9	Materials	Use by-products, waste, or less refined materials in place of refined chemicals or materials (for example, cheese whey, molasses, compost, or off-spec food products for inducing anaerobic conditions; limestone in place of concentrated sodium hydroxide for neutralization; fly ash or slag as a component in concrete)		Potentially high materials and waste footprint reductions; implementation may be difficult	Systematic evaluation process required consisting of 1) additional research to identify applicable alternative treatment materials, 2) evaluation of materials with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) selection of alternative materials for use if promising alternatives are identified.			The products associated with the GWETS are generally the process chemicals used, which have already been optimized for efficiency, as determined in the evaluation of BMP #6.
10	Materials	Use materials with recycled content (for example, concrete and/or asphalt from recycled crushed concrete and/or asphalt; plastic made from recycled plastic; geotextile fabrics/tarps made with recycled contents)		Potentially moderate materials and waste footprint reductions; footprint reductions would be higher if there were planned construction related to GWETS/GWM	The use of materials with recycled content will be researched, evaluated, and considered for any proposed future construction activities associated with the GWETS/GWM program following quantification of potential footprint reductions and a cost-benefit analysis. There are no construction activities associated with the GWETS/GWM program planned at this time.			The products associated with the GWETS are generally the process chemicals used, which have already been optimized for efficiency, as determined in the evaluation of BMP #6.
11	Materials	Use reconstituted reactive media or regenerate ionic adsorption material whenever feasible. For example, use regenerated GAC in carbon treatment beds or canisters rather than virgin GAC		Potentially moderate materials and waste footprint reductions	Once GAC shows signs of needing replacement, regeneration of GAC will be considered in consultation with the GWETS operator. GAC has not shown signs of breakthrough and therefore has not been replaced recently.	X		The Site has used renewable GAC since July 2018 and only replace as needed, when breakthrough is observed.
12	Power and Fuel	Operate GWETS to optimize capture of plume rather than maximize mass removal to reduce overall extraction rates and treatment process flows	X	Potentially high energy, water, and materials and waste footprint reductions; may be difficult to implement due to stakeholder concerns	GWETS is currently operated to meet mass removal goals as directed by NDEP and USEPA; optimization of GWETS for plume capture will be further evaluated in the future as cleanup objectives are modified.			The potential benefits associated would likely be limited by the larger demands of the project, consider further evaluation upon the selection and design of the final remedy.

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Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
						Already in Place	Priority	
14	Power and Fuel	Treat hexavalent chromium from IWF via batch process, operating this portion of the treatment train during off-peak utility periods	X	Potentially moderate energy footprint reductions; may be difficult to implement	Systematic evaluation process required consisting of 1) additional research to determine applicability of batch process, 2) evaluation of batch process with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) implementation of batch process treatment if results of evaluation are positive.			Implementation would be challenging, consider further evaluation upon the selection and design of the final remedy.
15	Power and Fuel	Purchase renewable energy via local utility and Green Energy Programs or renewable energy credits/certificates (RECs or Green Tags) to power cleanup activities		Potentially high energy footprint reductions; may be difficult to implement	Information from NV Energy will be periodically reviewed to identify renewable energy offerings available for purchase; NV Energy currently does not offer an option for southern Nevada customers to purchase renewable energy.			Generally addressed by the Renewable Energy Assessment.
16	Power and Fuel	Use a flexible on-site renewable energy system to meet energy demands of multiple activities or consumption needs beyond the lifespan of the cleanup		Potentially high energy footprint reductions; may be difficult to implement	Options will be further evaluated following development of a renewable energy plan for the GWETS/GWM program. Future evaluations will include 1) research to identify applicable renewable energy systems, 2) evaluation of potential systems with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) implementation of renewable energy systems if promising options are identified.			Generally addressed by the Renewable Energy Assessment.
17	Power and Fuel	Use biodiesel produced from waste or cellulose-based products to power equipment		Potentially high energy footprint reductions; may be difficult to implement	Additional research needed to identify biodiesel equipment available and to quantify potential footprint reductions for cost-benefit analysis. Systematic evaluation process required consisting of 1) additional research to identify applicable equipment, 2) evaluation with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) implementation of use of biodiesel if results of evaluation are positive.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.

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Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
						Already in Place	Priority	
18	Power and Fuel	Use on-site generated renewable energy such as solar photovoltaic, wind turbines, landfill gas, geothermal, and biomass combustion to fully or partially provide power otherwise generated through on-site fuel consumption or use of grid electricity		Potentially high energy footprint reductions; may be difficult to implement	Options will be further evaluated following development of a renewable energy plan for the GWETS/GWM program. Future evaluations will include 1) research to identify applicable renewable energy options, 2) evaluation of renewable energy sources with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analyses, and 4) implementation of on-site renewable energy generation if promising options are identified.			Generally addressed by the Renewable Energy Assessment.
19	Power and Fuel	Use solar power pack system for low-power system demands (for example, security lighting, system telemetry)		Potentially low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.			Generally addressed by the Renewable Energy Assessment.
20	Power and Fuel	When nearing asymptotic conditions and/or when continuous operating is not needed to contain the plume and/or reach clean-up objectives, operate pumping equipment in pulsed (or other reduced pumping) mode		Potentially high energy footprint reductions; may be difficult to implement	GWETS is currently operated continuously to meet mass removal objectives; alterative operations will be further evaluated to determine if objectives can be met with reduced energy use.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.
23	Project Planning and Team Mgmt	Automate mechanical and electrical equipment as much as practical and implement telemetry systems to reduce frequency of site visits and reduce night/weekend trips responding to alarms	X	Low to moderate energy footprint reductions; implementation may be difficult	Systematic evaluation process required consisting of 1) additional research to identify potential opportunities for automation, 2) evaluation of potential automation with input from GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) automation of select mechanical/electrical equipment if results of evaluation are positive.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.
24	Project Planning and Team Mgmt	Employ an electronics stewardship plan that recommends purchases of EPEAT and EnergyStar products, power management for data centers, and recycling or reuse of expended electronic equipment or media	X	Low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.
27	Project Planning and Team Mgmt	Designate collection points for compostable materials and routine recycling of single-use items such as metal, plastic, and glass containers; paper and cardboard; and other items that may be recycled locally		Low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.	X		Recyclables are separated and recycled locally. There are minimal volumes of compostable materials generated at the Site and the sludge (which accounts for the majority of the wastes shipped off-site) is not accepted at local composting facilities.

Table 2: Long-term Greener Cleanup BMPs Selected for Further Evaluation - Current GWETS and Performance Monitoring Program
Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
						Already in Place	Priority	
29	Project Planning and Team Mgmt	Select local waste disposal and recycling facilities to minimize transportation impacts		Low to moderate energy footprint reductions depending on availability of suitable facilities	To be determined; additional evaluation required to quantify potential footprint reductions for cost-benefit analysis.	X		Local waste disposal and recycling facilities are currently utilized.
30	Project Planning and Team Mgmt	Use a local laboratory to minimize transportation impacts		Low to moderate energy footprint reductions depending on availability of suitable facilities	To be determined; additional evaluation required to quantify potential footprint reductions for cost-benefit analysis.			Local laboratories cannot individually cover the complete laboratory analysis required for the program and dividing the samples would incur additional costs to the project, in addition to complicating the sampling and reporting processes for the program.
32	Residual Solid and Liquid Waste	When possible, dispose of wastes at waste-to-energy plants or other reuse/recycling facilities rather than at landfills	X	Low to moderate energy footprint and moderate materials and waste footprint reductions depending on availability of suitable facilities	To be determined; additional evaluation required to quantify potential footprint reductions for cost-benefit analysis.			The majority of the waste material shipped off-site is sludge, which is not accepted at waste-to-energy plants.
33	Residual Solid and Liquid Waste	Reuse or reinject treated or uncontaminated groundwater to the subsurface to recharge an aquifer rather than discharging (for example, NPDES or POTW) as permissible. For example, use water for flushing, irrigation, dust control, or to amend wetlands		Moderate water footprint reductions; implementation could be difficult	Systematic evaluation process required consisting of 1) additional research to determine applicability of reinjection or reuse, 2) evaluation with input from the GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) implementation of reinjection or reuse if results of evaluation are positive.		X	Evaluated herein, recommended for continued evaluation for implementation.
36B	Sampling and Analysis	Maximize use of real-time measurement technologies such as sensors, probes, and meters, to monitor processing conditions, and use program alarms to notify operators of system or component failure	X	Moderate energy, water, and materials and waste footprint reductions	Systematic evaluation process required consisting of 1) identification of potential applicable real-time measurement technologies, 2) evaluation of potential technologies with input from GWETS operator to determine ability to implement and associated costs, 3) quantification of potential footprint reductions in order to conduct cost-benefit analysis, and 4) deployment of selected technologies during future GWETS upgrades based on results of evaluation.			The water efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #1, not recommended for futher evaluation given the existing GWETS system.

Table 2: Long-term Greener Cleanup BMPs Selected for Further Evaluation - Current GWETS and Performance Monitoring Program
Nevada Environmental Response Trust Site
Henderson, Nevada

Ref. # [a]	Category	Best Management Practice	Site-Specific BMP	Reasons for Selecting	Description of Potential Implementation	BMP Status		Note for Future Consideration
						Already in Place	Priority	
39	Site Preparation and Land Restoration	Use native plants for shade and pollinator habitat		Low water footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.		X	Evaluated herein, recommended for continued evaluation for implementation.
40	Vehicles and Equipment	Implement an idle reduction plan		Low energy footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.			The energy efficiencies expected to be gained would likely have a smaller impact on the footprint than that associated with BMP #4, not recommended for futher evaluation given the existing GWETS system.
41	Vehicles and Equipment	Use equipment to increase automation such as electronic pressure transducers, thermo-couples, and water quality monitoring devices coupled with an automatic data logger to optimize operation and minimize transportation of staff to the site		Low energy and water footprint reductions, but relatively easy to implement	To be determined; additional evaluation required to quantify potential footprint reductions and conduct cost-benefit analysis.			Implementation would be challenging, consider further evaluation upon the selection and design of the final remedy.

Notes:
[a] The reference numbers listed here are non-consecutive because the original reference list in the Work Plan included short-term BMPs (evaluated separately).

BMP = best management practice
EPEAT = Electronic Product Environmental Assessment Tool
GAC = granular activated carbon
GHG = greenhouse gas
GSA = General Services Administration
GWETS = groundwater extraction and treatment system
HVAC = heating, ventilating and air conditioning
IWF = Interceptor Well Field
LED = light-emitting diode
NPDES = National Pollutant Discharge Elimination System
NDEP = Nevada Division of Environmental Protection
POTW = publically owned treatment works
USEPA = United States Environmental Protection Agency