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Via FedEx

October 14, 2010
In reply refer to SHEA-110460

Ms. Cassandra Owens
Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: Best Management Practices (BMP) Plan, Outfalls 008 and 009 Watersheds, The Boeing Company, Santa Susana Field Laboratory, Canoga Park, California (Order No. R4-2010-0090; NPDES No. CA0001309, CI No. 6027)

Dear Ms. Owens:

Per the requirements of The Boeing Company's (Boeing) National Pollutant Discharge Elimination System (NPDES) Permit, Boeing is providing the attached Best Management Practices (BMP) Plan for the Outfalls 008 and 009 Watersheds. This plan has been developed with input and in accordance with recommendations from the Santa Susana Storm Water Expert Panel and prepared for Boeing and the National Aeronautics and Space Administration (NASA).

If you have any questions or require anything further, please contact Lori Blair at 818-466-8741.

Sincerely,

Tom Gallacher
Director, Santa Susana Field Laboratory
Environment, Health, and Safety

Attachment: Best Management Practices (BMP) Plan, Outfalls 008 and 009 Watersheds

cc: Mr. Buck King, DTSC
Mr. Allen Elliott, NASA

BEST MANAGEMENT PRACTICES (BMP) PLAN
OUTFALLS 008 AND 009 WATERSHEDS
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

October 2010

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and
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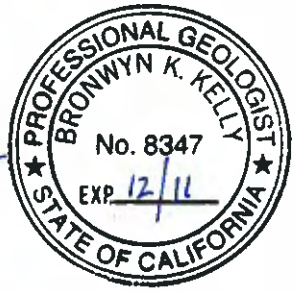

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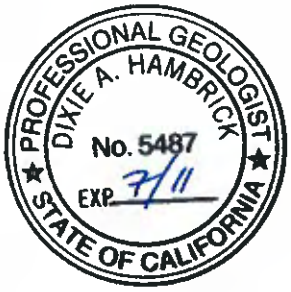

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ABBREVIATIONS AND ACRONYMS

A2LF	Area II Landfill
BBC	Brandeis Bardin Campus
B(a)P TEQ	benzo(a)pyrene toxicity equivalent
BMP	Best Management Practice
Boeing	The Boeing Company
Cal-EPA	California Environmental Protection Agency
CAO	Cleanup and Abatement Order
CDFG	California Department of Fish and Game
CDO	Cease and Desist Order
CM	Culvert Modifications
COC	constituents of concern
cy	cubic yards
DTSC	Department of Toxic Substances Control
ELV	Expendable Launch Vehicle
ENTS	Engineered Natural Treatment Systems
Expert Panel	SSFL Stormwater Expert Panel
GETS	Groundwater Extraction and Treatment System
Geosyntec	Geosyntec Consultants
H&A	Haley & Aldrich, Inc.
HVIM	Happy Valley Interim Measure
HVS	Happy Valley South
IEL	Instrument and Equipment Laboratories
ISE/RA Order	Imminent and Substantial Endangerment Determination and Order and Remedial Action Order
ISRA	Interim Source Removal Action
LID	Low Impact Development
LOX	liquid oxygen
MRCA	Mountains Recreation Conservancy Authority
msl	mean sea level
MWH	MWH Americas, Inc.
NPDES	National Pollutant Discharge Elimination System
NASA	National Aeronautics and Space Administration
PAH	polycyclic aromatic hydrocarbon

ABBREVIATIONS AND ACRONYMS (Continued)

PCB	polychlorinated biphenyl
PEA	preliminary evaluation area
PSD	particle size distribution
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RWQCB	Los Angeles Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SMMC	Santa Monica Mountains Conservancy
SRG	soil remediation goal
SSFL	Santa Susana Field Laboratory
Santa Susana	Santa Susana Field Laboratory
TSS	total suspended solids
USACE	United States Army Corp of Engineers

EXPERT PANEL'S PREAMBLE AND RATIONALE FOR PROPOSED APPROACH

The purpose of this Best Management Practices (BMP) Plan is to identify and describe stormwater controls for the Outfalls 008 and 009 watersheds, including Interim Source Removal Action (ISRA) and Engineered Natural Treatment Systems (ENTS) to improve stormwater quality and minimize future National Pollutant Discharge Elimination System (NPDES) exceedances at these outfalls (RWQCB, 2010).

The Santa Susana Field Laboratory (SSFL) Stormwater Expert Panel (Expert Panel) was formed in late 2007 as required by the Los Angeles Regional Water Quality Control Board's (RWQCB's) 2007 Cease and Desist Order (CDO) and with concurrence of the RWQCB staff. The CDO required the assembly of an Expert Panel to review site conditions, model surface water flows, examine constituents of concern (COC), and evaluate natural BMPs (or ENTS) capable of providing the required treatment to meet the final effluent limits. In 2008, the Expert Panel prepared documents in which an overall plan for the Outfalls 008 and 009 watersheds that included a number of "natural" stormwater treatment controls, or ENTS, was proposed (Expert Panel, 2008b). The Expert Panel also recommended a site specific design storm for use in sizing the ENTS, and for limiting the applicability of the permit effluent limits when flows exceeded the design storm (Expert Panel, 2008a). However, the RWQCB has to date not adopted the Expert Panel's recommended design storm.

Since the Expert Panel's original recommendations, several changes to the Outfalls 008 and 009 watersheds have occurred that significantly affect the basis for the recommendations. A summary of these changes are provided below, which explain the Expert Panel's rationale for recommending the current approach described in this BMP Plan.

1. Removal of debris and contaminated soils from the Northern Drainage is being performed in response to the Department of Toxic Substance Control's (DTSC's) Imminent and Substantial Endangerment Determination and Order and Remedial Action Order (ISE/RA Order) (DTSC, 2007), and the RWQCB issued Cleanup and Abatement Order (CAO) (RWQCB, 2007). In addition, ISRAs are being performed within the Outfalls 008 and 009 watersheds as a means to reduce pollutant loading from known source areas to downstream outfalls in response to the RWQCB issued CAO (RWQCB, 2008). These source removal activities are fulfilling one of the purposes of the previously-recommended ENTS, that is to accelerate cleanup of known source areas (i.e., some ENTS were specifically sited to overlap with these areas where possible, which would have resulted in significant source removal).
2. Reports on dioxins and metals were completed by the Expert Panel. The reports concluded that naturally occurring soils in uncontaminated areas contain these constituents, which although they are at low levels, are partially responsible for NPDES stormwater exceedances at the outfalls (Expert Panel, 2010a).

3. New erosion and sediment controls have been deployed (e.g., hydromulch, straw wattles, and plantings at ISRA construction areas) or are being planned (e.g., channel stabilization measures within the Northern Drainage) throughout the Outfalls 008 and 009 watersheds, and are expected to lead to improved runoff quality. These measures, however, are not expected to completely replace the need for strategically-sited stormwater treatment controls (i.e., natural systems that capture and treat stormwater).
4. New NPDES monitoring data obtained with Expert Panel-recommended composite sampling methods (augmented by ISRA performance monitoring data and particle size distribution [PSD] data) and we now have a better understanding of stormwater quality in these watersheds. These results initially confirm previous assessments that dioxin and metal concentrations in stormwater and on suspended solids, as measured at the outfalls, are comparable with typical natural background levels[1] for stormwater as described in the Expert Panel's background reports (Expert Panel, 2010a). Future NPDES compliance monitoring data will also be reviewed to further evaluate this assessment.
5. The Outfall 009 watershed includes Federal property, administered by the National Aeronautics and Space Administration (NASA), private property owned by The Boeing Company (Boeing), as well as property owned or administered by non-profit organizations (the Mountains Recreation Conservancy Authority [MRCA] at Sage Ranch, and the American Jewish University / Brandeis-Bardin Campus [BBC]). As such, decisions relating to BMPs and ENTS are under differing federal, non-profit organization, and corporate policies which make overall planning for the site difficult. While the Expert Panel has observed that cooperation amongst the parties has improved since the initiation of ISRA, the different ownership and policy issues can affect timing and implementation of stormwater controls.

As a result of the changes listed above, the Expert Panel's primary recommendation is to target treatment systems to areas where either existing data and/or new data generated as part of this plan indicate that treatment may be required. This will be accomplished via review of existing outfall data, recently collected ISRA stormwater data, and other available data along with conducting additional subarea[2] runoff sampling at potential BMP/ENTS locations within the Outfalls 008 and 009 watersheds to identify where treatment may be appropriate. *It is the Panel's*

[1] One exception to this general finding was for total lead in stormwater discharges at Outfall 009, which was based on an assessment of older NPDES monitoring data that represents conditions prior to the debris removal efforts and completed and ongoing ISRA activities. As part of future work plan tasks, the Expert Panel will update this assessment through an evaluation of the latest NPDES and ISRA metal data. Similarly, for dioxins, while the Expert Panel previously found that the 2,3,7,8-TCDD congener was a better indicator of anthropogenic dioxin contamination than TCDD toxicity equivalent (TEQ), which is used in the NPDES permit, it is noted here that only two 2,3,7,8-TCDD detections have been historically at Outfall 009. As part of the future work plan tasks, the Expert Panel will evaluate more recent NPDES and ISRA dioxin results as well with respect to their previous dioxin background report conclusions.

[2] The term "subarea" being used here to define smaller drainage areas, roughly in the 2 to 25 acre size range, that are within the larger outfall watershed.

recommendation that stormwater treatment controls be sited at those subareas where runoff concentrations are found to be above levels, to be established, that will be selected to differentiate between anthropogenic and natural sources. This recommendation will be made based on review and consideration of the Dioxins and Metals Reports that were prepared to identify stormwater concentrations that are indicative of anthropogenic or natural sources. In the Expert Panel's opinion, exceedances of NPDES effluent limits at the outfalls will likely persist due to the presence of some pollutants (mostly metals and dioxins) within natural soils that enter the drainages through erosion and runoff processes, and because treatment systems cannot be permitted and built to capture the volumes and/or flow rates for all storms. However under the approach outlined in this BMP Plan, effective stormwater treatment controls will be implemented where appropriate (i.e., at locations where runoff concentrations are observed to be above stormwater concentrations that are indicative of natural sources), stormwater quality has and will continue to be improved via the source controls summarized above, and environmental impacts with construction of unnecessary treatment systems will be avoided. The Expert Panel views this strategy as appropriate given the changed conditions in the watershed.

Finally, the success of this approach will require the participation of all property owners in both watersheds. As a result of these changing site conditions and new information, the Expert Panel now recommends a revised stormwater quality control strategy for the Outfalls 008 and 009 watersheds, as summarized above and described below in this BMP Plan.

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1.0 INTRODUCTION

This Best Management Practices (BMP) Plan (BMP Plan) describes the process for improving stormwater runoff quality and minimizing National Pollutant Discharge Elimination System (NPDES) Permit exceedances in the Outfalls 008 and 009 watersheds at the Santa Susana Field Laboratory (SSFL or Santa Susana) (Los Angeles Regional Water Quality Control Board [RWQCB], 2010). It presents the refined strategy for the subject outfall drainages based on ongoing source removal actions (e.g., Northern Drainage cleanup, Interim Source Removal Actions [ISRAs], and demolition activities), and recently obtained data/information (e.g., NPDES data, performance monitoring data, dioxin and metals stormwater background studies). The Plan summarizes BMP installations and related activities that may be performed, are underway, or have been completed in the Outfalls 008 and 009 watersheds, additional BMP activities planned for implementation, and describes potential data gaps that need to be filled for future BMP planning and implementation. As such, this BMP Plan will be supplemented with BMP Plan Addenda to present the additional data and evaluation results, and the subsequent BMP recommendations. Short- and long-term BMP milestones are included as a "roadmap" and as a metric to evaluate the effectiveness of the proposed activities.

This BMP Plan was prepared for The Boeing Company (Boeing) and National Aeronautics and Space Administration (NASA), with input and in accordance with the recommendations from the SSFL Stormwater Expert Panel (the "Expert Panel"), Geosyntec Consultants (Geosyntec), Haley & Aldrich, Inc. (H&A), CH2M HILL, and MWH Americas, Inc. (MWH) to satisfy the requirements of the current SSFL NPDES Permit (RWQCB, 2010).

1.1 SANTA SUSANA FACILITY INFORMATION

The Santa Susana site is located approximately 29 miles northwest of downtown Los Angeles, California, in the southeast corner of Ventura County. The Santa Susana site occupies approximately 2,850 acres of hilly terrain, with approximately 1,100 feet of topographic relief, and is located near the crest of the Simi Hills. Figure 1-1 shows the geographic location and property boundaries of the site, and surrounding communities. Land surrounding Santa Susana is generally open space or rural residential, as shown in Figure 1-1. Santa Susana facility information is provided in the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Program Report (MWH, 2004).

Currently, surface water discharges at the site are exclusively the result of stormwater runoff, although the discharge of treated groundwater is permitted at a single location. Historically, both stormwater and industrial wastewater discharges occurred. All industrial wastewater discharges have ceased, with the exception of purged water and extracted groundwater, which are currently being contained and disposed of offsite under the appropriate regulatory requirements. Once the discharge line piping and energy dissipater at Outfall 019 are installed for the new Groundwater Extraction and Treatment System (GETS) in late 2010, extracted groundwater and monitoring

well purge water will be discharged to Outfall 019 and monitored under the NPDES Permit. Surface water discharges at Santa Susana are intermittent following rain events and are conveyed into the primary drainages shown on Figure 1-2.

Although those items discussed below highlight recent activities associated with the ISRA and Northern Drainage, Boeing continues to implement the site-wide Stormwater Pollution Prevention Plan (SWPPP) throughout the site. This includes, but is not limited to, maintenance of BMPs, maintenance and upgrades of access roads, and demolition of facilities.

Regional surface water drainage patterns and the overall locations of Outfalls 008 and 009 are shown in Figure 1-3, and a detailed view of the Outfalls 008 and 009 watersheds is shown in Figure 1-4. The majority of the surface water (estimated at greater than 60%) from Santa Susana drains through the southern property boundary through Bell Canyon and into Bell Creek, which subsequently discharges into the Los Angeles River. The eastern portion of the facility, including runoff from the SMMC, drains through Dayton Canyon into Dayton Creek, and then combines with Bell Creek downstream before joining the Los Angeles River. The northwestern perimeter of the site drains northward into Meier Canyon, which subsequently discharges into Arroyo Simi. The northeastern and north-central portions of Santa Susana drain into an east-west trending drainage, herein called the 'Northern Drainage', which connects to the Meier Canyon Drainage north of Santa Susana on property owned by American Jewish University/Brandeis Bardin Campus (BBC). Stormwater runoff from three other small parcels of Santa Susana where no operations have occurred is conveyed through three other drainages (i.e., Runkle Canyon, Woolsey Canyon, and Eastern drainages).

1.2 OUTFALL 008

This section presents the physical description, NPDES monitoring results, and a summary of work performed or in progress within the Outfall 008 watershed.

1.2.1 Physical Setting

The Outfall 008 watershed encompasses approximately 62 acres and is primarily open space with no anthropogenic impervious surfaces (Figure 1-4). There are gravel and dirt roads transversing parts of the watershed which serve primarily for fire suppression, SWPPP implementation, ISRA activities and outfall monitoring access. The watershed is characterized by chaparral and grassland vegetation, bedrock outcrops, and steep to moderate slopes (Boeing, 2008b). Generally, the soils in the watershed are characterized as sedimentary rock land (88 percent of the watershed area) and Gaviota rocky sandy loam (12 percent). In addition, the soils can be predominantly classified as being in hydrologic soil group D (highest runoff potential) (Boeing, 2008b). Elevations in the watershed range from 1,740 feet to 2,060 feet above mean sea level (msl). Soils within the area are generally thin (less than 5 feet thick), although they extend up to over 10 feet thick in the upper portion of the watershed in the former operational

area (MWH, 2009a). Shallow groundwater occurs south of the former operational area, north of Outfall 008.

Stormwater from Outfall 008 flows through an unnamed ephemeral drainage to Dayton Canyon Creek. Dayton Canyon Creek merges with Chatsworth Creek and flows south to Bell Creek, southwest of the intersection of Shoup Avenue and Sherman Way in West Hills. Bell Creek subsequently flows east and merges with Calabasas Creek at the Los Angeles River near the intersection of Vanowen Street and Owensmouth Avenue in Canoga Park. Dayton Canyon Creek downgradient of Valley Circle Boulevard, Bell Creek, and the Los Angeles River are concrete-lined channels with highly urbanized watersheds. The regional drainage pattern is shown on Figure 1-3.

1.2.2 NPDES Permitting History

The NPDES Permit established monitoring in Happy Valley as Outfall 008 in August 2004 with permit limits established in 2006. Permit limits and benchmark limits are provided and discussed in the annual and quarterly Reports (Boeing, 2005, 2006, 2007, 2008, 2009, and 2010).

1.2.3 Summary of Work Performed/In Progress

Recent work performed or in progress within the Outfall 008 watershed to improve stormwater quality includes source removal as part of the ISRA program and installation of containerized plants. Completed and ongoing activities associated with these projects are summarized below. In addition to the BMP activities described below, measures were taken as part of the overall program to mitigate soil erosion. These structures (i.e., rock crib) are in-place and maintained identified on Figure 1-5.

1.2.3.1 ISRA

The RWQCB issued a Cleanup and Abatement Order (CAO) to Boeing on December 3, 2008 (RWQCB, 2008). Per the RWQCB CAO, ISRA activities were conducted within Outfall 008 watershed under oversight of the RWQCB. These activities included the identification of soils containing constituents that exceeded NPDES permit limits and benchmarks within the Outfall 008 watershed (copper, lead, and dioxins) at concentrations above Department of Toxic Substance Control (DTSC)-approved background comparison concentrations (MWH, 2005). A total of 10 ISRA areas were identified within the Outfall 008 watershed, and the locations are shown on Figure 1-5. During 2009, remedial actions were conducted at these 10 ISRA areas. The 2009 ISRA activities are presented in detail in the ISRA Phase I Implementation Report (MWH, 2010b). A summary of the completed and planned activities is presented below, with a focus on the activities performed that affect surface water quality and surface water sampling.

Between August and October 2009, soil was removed from 10 ISRA areas and post-soil removal confirmation sampling was performed. Soil remediation goals (SRGs) are consistent with soil background concentrations. The total volume of soil excavated from Outfall 008 ISRA areas

was approximately 5,200 cubic yards (cy) (*ex situ* estimate)[3]. Excavated soil was properly transported to and disposed of at an appropriate offsite facility based on the results of waste profile and classification.

Erosion control BMPs were installed at the 10 ISRA areas prior to the start of remedial activities and BMP inspections were performed throughout construction activities, per the ISRA SWPPP (MWH, 2009b). In anticipation of and prior to rain events, all in-progress ISRA area excavations were covered with plastic tarps to limit the contact of exposed soils to precipitation and control soil migration. SWPPP samples were collected during the October 13-14, 2009 rain event downgradient of ISRA areas Happy Valley South (HVS)-2B-2 and HVS-2C, per the ISRA SWPPP. SWPPP sample results are presented in the ISRA Phase I Implementation Report (MWH, 2010b).

Site restoration activities at the 10 ISRA areas were completed on December 4, 2009. Restoration activities included backfilling excavations with soil from the soil borrow area adjacent to HVS-2A, which is shown in Figure 1-5, and/or recontouring with adjacent soils. Restored excavations approximately matched the previously existing topographic grade and were sloped to ensure there were no areas where water might pond or concentrate flows that could cause erosion. Erosion control BMPs including fiber rolls, hay bales, silt fences, and hydroseed mulch were installed on and near the restored excavations. The extent of hydroseed mulch application is shown in Figure 1-5. BMP inspections were conducted during the 2009/2010 rainy season, and will continue through the 2010/2011 rainy season. A post-restoration aerial topographic survey of the Outfall 008 watershed was conducted by Sage Consultants, Inc., on December 18, 2009, after Outfall 008 excavation backfill and recontouring activities were completed.

In addition, plants were installed as natural BMPs on November 4 and 5, 2009 following the plan developed by the Expert Panel (Josselyn, 2009). To prevent soil erosion in the Outfall 008 watershed, containerized plants were planted in several topographic lows within and adjacent to the drainages from the HVS RFI Site and the Canyon RFI Site, and near the ISRA areas; and mulefat wattles were constructed and placed at several points within the drainage from HVS RFI Site. The plants and wattles installation locations are shown in Figure 1-5.

The performance monitoring program was implemented at the 10 ISRA areas on December 4, 2009, following completion of site recontouring and BMP installation (MWH, 2010a). The performance monitoring program is designed to collect engineering performance data to assess whether ISRA COCs continue to be detected at elecated concentrations in surface water runoff following completion of remedial activities at ISRA areas. The performance monitoring program activities involved the collection of surface water runoff samples both up- and downgradient of the 10 ISRA areas, and have been conducted during the 2009/2010 rainy

season, and are planned to continue through the 2010/2011 rainy season. Results from the 2009/2010 rainy season are presented in a memorandum (MWH, 2010d).

To supplement both the ISRA performance and the NPDES monitoring programs, particle size distribution (PSD) data in surface water was collected beginning in February 2010. PSD analysis was performed on ISRA performance monitoring samples as well as on samples collected at additional locations within the Outfall 008 watershed. PSD data are being evaluated to assess current BMP performance and will continue to be evaluated to assess future BMP performance within the Outfall 008 watershed. Modifications to the hydroseed mixture and the use of new hydromulch (Flexterra) material, were recommended by the Expert Panel and are being implemented within the Outfall 008 watershed. These recommendations are included in Appendix A.

1.2.3.2 Planned Demolition Activities

Most structures within the Outfall 008 watershed were removed prior to 2000. Planned demolition activities include the removal of the asphalt road in HVS in 2011. The Expert Panel is preparing a memorandum with BMP installation recommendations for dirt roads, which will be implemented once the road asphalt is removed (Expert Panel, 2010b).

1.2.4 Regulatory Framework

Several regulatory agencies, with various potential requirements, provide project and field activities' oversight in the Outfall 008 watershed. Depending on the scope of work and its potential affects, the following agencies may require authorizations or permits, and compliance requirements with specified compliance periods:

- DTSC
- State and/or RWQCB
- California Department of Fish and Game (CDFG)
- United States Army Corps of Engineers (USACE)
- County of Ventura

During the conceptual planning stages of BMP implementation, potential authorizations and necessary permits will be evaluated. For example, BMPs placed in Waters of the United States may require an USACE permit(s) and Clean Water Act Section 401 Certification may be required by the RWQCB. Field activities performed in streambeds or those affecting some species of trees may require CDFG and/or Ventura County authorizations.

Based on specific authorizations or permits, a matrix including activity, implementation dates, and permit requirements will be prepared. The matrix will be used by the project team to ensure compliance dates and permit requirements are achieved.

1.3 OUTFALL 009

This section presents the physical description, NPDES monitoring results, and a summary of work performed or in progress within the Outfall 009 watershed.

1.3.1 Physical Setting

The Outfall 009 watershed encompasses approximately 536 acres and is primarily (90 percent) open space (Figure 1-4). The watershed is characterized by chaparral and grassland vegetation, bedrock outcrops, developed areas (approximately 55 acres of buildings, asphalt roads, and other impervious surfaces), dirt roadways (for fire and security access), and steep to moderate slopes (Boeing, 2008b). Generally, the soils in the watershed are characterized as sedimentary rock land (61 percent of the watershed area), Gaviota rocky sandy loam (32 percent), and Saugus sandy loam (7 percent). In addition, the soils can be predominantly classified as being in hydrologic soil group D (highest runoff potential) (Boeing, 2008b). Elevations in the watershed range from 1,620 to 2,140 feet above msl. Most soils within undeveloped areas are generally thin (less than 5 feet thick), although soil thickness in the eastern developed areas of the watershed extend up to over 30 feet thick (MWH, 2009).

The Outfall 009 drainage (the "Northern Drainage" as described above) begins near the Santa Susana site entrance and collects stormwater runoff from the operational and former operational areas in Areas I and II, and in the former Liquid Oxygen (LOX) Plant area (located on federal government property administered by NASA in Area I). In addition, the Northern Drainage picks up stormwater runoff from Sage Ranch, which is currently a park with hiking trails, and a small area of open space owned by the American Jewish University/BBC. Stormwater from Outfall 009 flows through an unnamed intermittent drainage tributary to Meier Canyon and subsequently to the Arroyo Simi, Arroyo Las Posas, and Calleguas Creek. Regional surface water patterns are shown on Figure 1-3.

1.3.2 NPDES Permitting History

The NPDES Permit established monitoring in the Northern Drainage at Outfall 009 in August 2004 with permit limits established in 2006. Permit limits and benchmark limits are provided and discussed in the annual and quarterly Reports (Boeing, 2005, 2006, 2007, 2008, 2009, and 2010).

1.3.3 Summary of Work Performed/In Progress

Recent work performed or in progress within the Outfall 009 watershed to improve stormwater quality includes source removal as part of the ISRA program, culvert upgrades as part of the surface water maintenance program, Northern Drainage cleanup and site restoration activities, and demolition activities. Completed and ongoing activities associated with these projects are summarized below.

1.3.3.1 ISRA

Per the RWQCB CAO (RWQCB, 2008), ISRA activities were conducted within the Outfall 009 watershed under the oversight of the RWQCB. Activities included the identification of soils containing constituents that exceeded NPDES permit limits and benchmarks within the Outfall 009 watershed (cadmium, copper, lead, mercury, and dioxins) at concentrations above current DTSC-approved background comparison concentrations (MWH, 2005). A total of 34 ISRA areas have been identified within the Outfall 009 watershed, the locations are shown in Figures 1-7 and 1-8. During 2009, remedial actions were conducted at two ISRA areas, A2LF-1 and A2LF-3. Of the remaining 32 ISRA areas, remedial actions are planned to occur at 18 areas in 2010 and 11 areas in 2011. Three of the ISRA areas identified, Expendable Launch Vehicle (ELV)-1C, ELV-1D, and Instrument and Equipment Laboratories (IEL)-3, do not have a remedial action scheduled. Remedial actions at ELV-1C and ELV-1D were initially planned for 2009, but were postponed pending finalization of a soil disposal plan. ISRA area IEL-3 is currently covered by asphalt and implementation of the remedial action at this location is postponed until the asphalt is removed, a date for which has not been identified. The date of planned remedial action at each ISRA area is identified on Figures 1-7 and 1-8. The 2009 ISRA activities are presented in detail in the ISRA Phase I Implementation Report (MWH, 2010b). A summary of the completed ISRA activities and the planned activities for the completed ISRAs is presented below, with a focus on the activities performed that affect surface water quality and surface water sampling. Post-2009 ISRA remedial activities are not described below since they are not completed; they will be documented in future ISRA and BMP summary reports.

During November 2009, soil was removed from two ISRA areas and post-soil removal confirmation sampling was performed. Soil remediation goals (SRGs) are consistent with or near background concentrations for soil. The locations of the two ISRA areas are shown on Figure 1-8. The total volume of soil excavated from Outfall 009 ISRA areas was approximately 180 cy (*ex situ* estimate). Excavated soil was properly transported to and disposed of at an appropriate offsite facility based on the results of waste profiling and classification.

Erosion control BMPs were installed at the two ISRA areas prior to the start of remedial activities and BMP inspections were performed throughout construction activities, per the ISRA SWPPP (MWH, 2009b). In anticipation of and prior to rain events, all in-progress ISRA area excavations were covered with plastic tarps to control soil migration. SWPPP samples were collected during the December 7-12, 2009 rain event downgradient of the ISRA Area II Landfill (A2LF-3) area, per the ISRA SWPPP. SWPPP sample results are presented in the ISRA Phase I Implementation Report (MWH, 2010b).

Site restoration activities at the two ISRA areas were completed on January 15, 2010. Site restoration at A2LF-1 consisted of recontouring adjacent soils and installation of erosion control BMPs (fiber rolls and hydroseed mulch). Site restoration at A2LF-3 consisted of recontouring

adjacent soils and installing a new culvert headwall, followed by erosion control BMPs (rip-rap, fiber rolls, plastic tarp, sandbags, and hydroseed mulch). The extent of hydroseed mulch application is shown in Figure 1-8. Restored excavations were sloped to ensure there were no areas where water might pond or where flow would be concentrated. BMP inspections were conducted during the 2009/2010 rainy season, and will continue through the 2010/2011 rainy season. A post-restoration aerial topographic survey was not conducted for Outfall 009 Phase I ISRA areas since these excavations were relatively small.

As part of the Santa Susana surface water maintenance program, culvert upgrades were performed at 12 culverts within the Outfall 009 watershed in early 2009. These culvert modification (CM) actions were originally recommended by the Expert Panel as part of the ENTS program. The culvert modifications included installation of culvert headwalls and filtration media to reduce sediment loads in stormwater discharging into the primary Outfall 009 drainage. The design of the culvert modification actions was completed by Geosyntec under direction of the Expert Panel. Although these CMs were not installed specifically to address potential ISRA areas, some of them occurred within ISRA preliminary evaluation areas (PEAs) identified in the ISRA work plans. As such, these CM actions have been included as part of the ISRA Performance Monitoring Plan (MWH, 2010a).

The performance monitoring program was initiated at four of the CMs on December 4, 2009, and at the two ISRA areas on January 15, 2010, following completion of site recontouring and BMP installation (MWH, 2010a). The performance monitoring program is designed to collect engineering performance data to assess whether ISRA COCs continue to be detected at elevated concentrations in surface water runoff after the completion of remedial activities at ISRA areas. The performance monitoring program activities involved the collection of surface water runoff samples both up- and downgradient of the two ISRA areas and four of the CMs, and have been conducted during the 2009/2010 rainy season, and are planned to continue through the 2010/2011 rainy season. Results from the 2009/2010 rainy season are presented in a memorandum (MWH, 2010d).

To supplement both the ISRA performance and the NPDES monitoring programs, PSD data in surface water were collected in the Outfall 009 watershed beginning in February 2010. PSD analyses were performed on ISRA performance monitoring samples as well as on samples collected at additional locations within the Outfall 009 watershed. PSD data have been reviewed by the Expert Panel and are being evaluated to assess current and future BMP performance within the Outfall 009 watershed.

1.3.3.2 Northern Drainage Clean-up Activities

The DTSC Imminent and Substantial Endangerment Determination and Order and Remedial Action Order (ISE/RA Order) and the RWQCB Cleanup and Abatement Order (CAO) required removal actions from two specific project areas: a debris field in the drainage east of the former

LOX Plant and the Rocketdyne–Atomics International Rifle and Pistol Club, Inc. shooting range (former shooting range)/Northern Drainage.

Asbestos concerns associated with the debris area in the drainage east of the former LOX Plant were addressed in 2007 and documented in the report titled *Northern Drainage Former Liquid Oxygen (LOX) Plant, Debris/Asbestos Removal Action Report, Santa Susana Field Laboratory, Ventura County, California* (MWH, 2008). Results from that effort showed LOX debris containing asbestos and antimony was removed. Laboratory analytical results of confirmation samples indicated that asbestos was not detected greater than the California Environmental Protection Agency (Cal-EPA) definition of asbestos containing materials as 1 percent or greater (Title 22, California Code of Regulations, section 66261.24), and antimony was not detected greater than the current DTSC-approved soil background concentration of 8.7 milligrams per kilogram (mg/kg).

Buried debris (non-clay target related) discovered in the former shooting range area during clay target removal activities was removed between August and November 2008. Areas where post-removal confirmation soil sample results were above the polycyclic aromatic hydrocarbon (PAH) interim cleanup goals outlined in the DTSC ISE/RA Order were also excavated unless the soil was excavated to bedrock. Several areas within the former shooting range were excavated down to approximately 8 feet below previous grade in the initial phase and up to 3 feet deeper in the second phase. Detailed information concerning this portion of the removal effort is provided in *Report on Former Shooting Range Debris Removal Action, Santa Susana Field Laboratory, Ventura County, California* (H&A, 2009).

Between November 2007 and May 2010, the total quantity of clay target debris and incidental and impacted soil removed from the Northern Drainage and disposed offsite is approximately 10,500 cy. This includes approximately 2,500 cy of material removed from the drainage east of the former LOX Plant in 2007, 7,400 cy of material removed from the former shooting range and the shooting range debris field in 2008, approximately 552 cy of clay target debris and soil removed from the Northern Drainage in 2009 and approximately 11 cy of clay target debris and soil removed in 2010.

Soil confirmation sample analytical results confirm the reduction of antimony in soil to below the California Human Health Screening Level of 30 mg/kg (deemed an acceptable interim cleanup level in the ISE/RA Order), and the significant reduction of PAHs in soil (which have not been detected surface water runoff at Outfall 009). Clay target removal activities in the Northern Drainage will be summarized in a report scheduled for submittal to the DTSC in late 2010.

During the clay target debris removal actions in 2008, 2009, and 2010, sections of the Northern Drainage and upland areas were significantly disturbed. In accordance with the Streambed Alteration Agreement (SAA) approved by the CDFG, stormwater BMPs were deployed as

erosion and sediment control measures in the streambed work areas prior to commencement of removal activities, and upon completion of each removal action prior to the winter rainy seasons. Inspections and upgrades were conducted prior to and after each storm event of the erosion and sediment control BMPs employed in these areas. In addition, a restoration plan for soils within the drainage disturbed during the removal activities described above is being developed for the Northern Drainage with the support of the Expert Panel.

1.3.3.3 Planned Demolition Activities

Various inactive facilities across Santa Susana have been and continue to be demolished as part of the site closure. Demolition activities within the Outfall 009 watershed that were performed prior to June 2010 are identified on Figure 1-7 and 1-8. Planned demolition activities include the removal of Building 1300 and its immediate surrounding asphalt in Fall 2012, and the removal of Buildings 1436 and 1319, the Fire Station and their immediate surrounding asphalt in the fall of 2013. Removal of impervious surfaces has been a recommendation of the Expert Panel and is expected to result in lower peak flows, runoff volumes, downstream channel erosion, and pollutant loads.

In areas where soil has been or will be disturbed due to demolition activities, sediment and erosion control BMPs have been and will continue to be implemented and consistently evaluated for effectiveness. When necessary, individual construction-site SWPPPs are prepared and implemented on-site for areas greater than one acre and will remain open until a uniform vegetative coverage with 70 percent coverage has been established, or equivalent stabilization measures have been employed.

1.3.4 Regulatory Framework

Similar to field activities within Outfall 008, several regulatory agencies, with various potential requirements, provide project and field activities oversight in the Outfall 009 Watershed. Depending on the work scope and its potential affects, the following agencies may require authorizations or permits, and compliance requirements with specified compliance periods.

- DTSC
- State and/or RWQCB
- CDFG
- USACE
- County of Ventura

During the conceptual planning stages of BMP implementation, potential authorizations and necessary permits will be evaluated and project information will be used by the project team to ensure compliance dates and permit requirements are achieved where applicable.

2.0 GUIDING PRINCIPLES

Due to the ongoing source removal actions (e.g., Northern Drainage cleanup, ISRAs, and demolition activities) and recently obtained data/information (e.g., NPDES data, performance monitoring data, dioxin and metals background studies in stormwater), a reassessment of the conditions within the Outfalls 008 and 009 watersheds is needed prior to identifying and implementing additional treatment controls. During the reassessment process, the following guiding principles will be used for the planning, evaluation, and selection of the appropriate treatment controls for the Outfalls 008 and 009 watersheds. These principles are identified for specific objectives of ENTS and other treatment controls and take into consideration the ongoing/planned activities within the Outfalls 008 and 009 watersheds and the constraints of the site. These principles are intended to be a reference during the treatment controls planning process. The guiding principles include:

- Protecting public health, safety and welfare, including potential downstream effects of water quality control measures.
- Utilizing applicable portions of earlier work of the Expert Panel, Geosyntec, Boeing, NASA, other consultants and state agencies regarding ENTS, ISRA, stormwater background evaluation of metals and dioxin, and related topics.
- Obtaining public and RWQCB staff input throughout the process of planning, designing and implementing stormwater controls in the Outfalls 008 and 009 watersheds. Historically, the public and RWQCB staff involvement in the BMP planning process has been significant and a positive experience, and should be continued in the future. In addition, all applicable regulations need to be defined, identified and complied with as BMP planning proceeds.
- Improving stormwater quality and minimizing future NPDES exceedances at Outfalls 008 and 009 (beyond those attributable to natural soils, or storm event severity) by adopting a multifaceted strategy consisting of:
    a. Erosion and sediment controls, including establishment of vegetation.
    b. Source controls, including removal and stabilization of roads, parking lots, buildings and other man-made features that increase runoff and contribute sediments and pollutants.
    c. Removal of soils as part of the ISRA activities that are known to contain elevated levels of those compounds for which there are NPDES permit exceedances.
    d. Stabilization of natural drainage channels following removal activities (such as the northern drainage channel stabilization effort).
    e. Where the need is identified (where runoff concentrations are found to be above levels arising from natural soils; see section 4;), utilizing of a broad array of natural, passive structural treatment controls, such as vegetated swales, detention basins,

wetlands, and bioretention cells or other treatment BMPs as appropriate in selected sub-areas.

- Mitigating construction impacts (e.g., during ISRA activities or building/pavement demolition) through careful selection, implementation, and maintenance of erosion and sediment control measures, as described in project-specific and site-wide SWPPPs.
- Utilizing an *adaptive, phased* approach to stormwater management. For example, in the near term, take steps that are readily implementable, such as the installation of erosion and sediment control measures, selected source controls and establishment of vegetation ("short term" activities), followed by activities would require before implementing additional subarea sampling, more carefully planned hydrologic and/or hydraulic analysis, and/or detailed design and construction. These activities include such measures as stream channel stabilization measures and structural treatment BMPs ("long term" activities"). A key component of this adaptive, phased approach is that water quality data need to be collected from key subareas to develop a better understanding of where and what kinds of stormwater treatment controls are required and are effective.
- There are currently no NPDES-required treatment system sizing criteria available for the site, however, as general guidance, a one-year return period, 24-hour duration storm (equivalent to 2.5 inches) has been applied at other Santa Susana outfalls for design of advanced stormwater treatment systems there, based on a site-specific design storm recommendation previously developed by the Expert Panel for the ENTS project. This one-year sizing criteria is generally much greater than criteria typically used for urban stormwater treatment system design. However, since their design storm recommendation in 2008, the Expert Panel has completed dioxins and metals stormwater background reports that have concluded that Santa Susana stormwater pollutant concentrations at Outfalls 008 and 009 are generally below levels typical of urban runoff[3]; therefore a smaller sizing criteria (e.g., perhaps one more consistent with typical urban runoff BMP sizing guidance) may be appropriate for this project. Alternatively, if elevated stormwater concentrations are observed at a particular subarea during the subarea monitoring effort, larger sizing criteria may be needed. As a result, development of adaptable project specific sizing criteria is recommended as a first step for the long term implementation phase of this project.

[3] One exception to this general finding was for total lead in stormwater discharges at Outfall 009, which was based on an assessment of older NPDES monitoring data that represents conditions prior to recent debris removal efforts and completed and ongoing ISRA activities. As part of the future work plan tasks, the Expert Panel will update this assessment through an evaluation of the latest NPDES and ISRA metal data. Similarly, for dioxins, while the Expert Panel previously found that the 2,3,7,8-TCDD congener was a better indicator of anthropogenic dioxin contamination than TCDD toxicity equivalent (TEQ), which is used in the NPDES permit, it is noted here that only two 2,3,7,8-TCDD detections have been observed at outfall 009 historically. As part of the future work plan tasks, the Expert Panel will evaluate more recent NPDES and ISRA dioxin results as well with respect to their previous dioxin background report conclusions.

Sizing criteria aside, it is recognized that there may be some instances where site constraints are such that smaller, opportunistic treatment system footprints may be all that are feasible, in which case these factors may directly dictate sizing. These factors, for example, may include the following ancillary project goals:

  - Ensuring consistency with the expected future open space parkland use of the site.
  - Minimizing impacts to riparian corridors and other natural resources.
  - Preventing interference with planned ISRA activities.
  - Minimizing the migration of contaminants in groundwater.

- Utilizing BMPs that are targeted to the specific fate and transport characteristics of the contaminants being treated.
- Considering the long-term operation and maintenance requirements of the treatment controls, including the assurance that such systems can be readily accessed for maintenance.
- Combining treatment controls in series ("treatment train" concept), where feasible and if required, to provide diverse treatment processes and thus treat runoff for multiple constituents and provide redundancy.
- Managing flows to increase treatment capture and reduce erosive flows to the stream channels, thereby promoting channel stability.
- Accounting for the different property ownership/administration in the Outfalls 008 and 009 watersheds (i.e., Sage Ranch, NASA, and Boeing). There are specific opportunities and constraints associated with each.
- Annually reassessing stormwater concentrations in context of the Expert Panel dioxins and metals reports.
- Utilizing an integrated runoff management approach, which leads towards a more comprehensive "systems approach" to managing stormwater runoff. An integrated system of preventive and control practices (e.g., erosion control and sediment control) are used to accomplish stormwater management goals related to downstream contamination. The first principle is to minimize the generation of runoff and pollutants through a variety of techniques. The second principle is to manage any runoff with its associated pollutants to minimize its impact on the environment through treatment controls where necessary.

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3.0 BMP SELECTION APPROACH AND CRITERIA

This section describes the BMP approach and criteria that will be implemented for the Outfalls 008 and 009 watersheds to identify BMP locations and then to selecting the BMPs type(s) for each identified location. For the purposes of this discussion, BMPs have been grouped into one of two categories: (1) source, erosion, and sediment controls; and (2) treatment controls (i.e., ENTS).

3.1 SOURCE, EROSION, AND SEDIMENT CONTROLS

The first category of BMPs that will be selected for the Outfalls 008 and 009 watersheds are source, erosion, and sediment control BMPs. Although source, erosion and sediment control measures have been and are being implemented in the Outfalls 008 and 009 watersheds, these will be utilized further at additional areas where needed. The following are brief definitions for source, erosion and sediment controls.

Source controls are practices that aim to reduce the quantity and improve the quality of stormwater runoff at or near the source of the constituents of concern. This may include schedules of activities, such as demolition activities and remediation activities to minimize exposure to potential runoff, structural devices (either constructed or natural), maintenance procedures, and managerial or operational practices such as removing the sources of contamination.

Erosion controls (a subset of source controls) are practices that protect sediment from eroding under rainfall, flowing water and/or wind conditions. Effective erosion controls are techniques in preventing water pollution and soil loss through minimization of soil or vegetation disturbance; the use of physical barriers, such as vegetation, rock, and runoff diversions to reduce the energy of the water that is causing the erosion; and stabilization measures of disturbed areas. These measures are often implemented in conjunction with sediment controls.

Sediment controls are practices designed to keep already eroded soil from discharging and causing water pollution to receiving waters. Sediment control measures are usually passive systems that rely on filtering or settling of particles from the stormwater runoff.

3.1.1 Selection Approach for Source, Erosion, and Sediment Controls

The approach for identifying source, erosion and sediment controls that will be implemented within the Outfalls 008 and 009 watersheds will be based on the type of area and control needed, as there is no “one size fits all” suite of controls or selection methodology. Source, erosion and sediment controls will also be selected based on coverage/use and observed effectiveness of the existing BMPs, results of subarea runoff monitoring, and recommendations from the Expert Panel.

Table 3-1 summarizes existing source, erosion, and sediment controls by area type and also identifies potential additional controls that may be considered for each area in the future.

Table 3-1. Existing and Potential Source, Erosion and Sediment Controls by Area

Type of Area	Existing Source, Erosion, and/or Sediment Controls Practiced	Additional Source, Erosion, and/or Sediment Controls that will be Considered, as Necessary
Construction Areas (including ISRA areas)	• Hydroseed/mulch • Straw wattles/Hay bales • Container plants within drainages	• Sediment control BMPs to be installed downstream of excavation areas. Diversion of concentrated flows is required upstream of the "fresh" excavation to mitigate any erosion and transport of sediment. • New seed mix • Sediment controls • Bank stabilization in drainages
Non-RFI Developed Areas (e.g., parking lots, roads, and buildings)	• Building/pavement demolition/removal	• Continued building/pavement demolition/removal • Low Impact Develop (LID) stormwater treatment practices such as vegetated swales and detention features • Following demolition, sediment control BMPs to be installed
RFI Areas	• ISRA source removal as identified • Long term remediation planning	• Sediment control BMPs to be installed downstream of excavation areas. Diversion of concentrated flows is required upstream of the "fresh" excavation to mitigate any erosion and transport of sediment. • New seed mix • Sediment controls • Bank stabilization in drainages
Natural Drainages	• Revegetation along banks • Phased Northern Drainage restoration plan including bank stabilization and bottom grade control measures	• Stream channel restoration where channel erosion is problematic
Dirt Roads (including Happy Valley & LOX truck turnaround)	• Gravel placement • Road abandonment and revegetation	• Regrading (to avoid/reduce concentrated flows in old road beds), cellular confinement systems, rolling dips, water bars, road outboarding, etc.
Other Open Space Areas	• Hydroseed/mulch where necessary/bare	

3.1.2 BMP Criteria for Siting and Selection

Source, erosion, and sediment control BMPs as identified above will be sited and selected for the Outfalls 008 and 009 watersheds where necessary based on field observations regarding sources of sediment transport and guidance from the Expert Panel. This will be accomplished through periodic inspections and review of BMPs, including during rain events to determine if they are operating properly, plus assessment of their maintenance and effectiveness. BMP inspection information will be reviewed by the Expert Panel for improvements or additional BMP implementations, with periodic site visits conducted by the Expert Panel for field review of conditions. If BMPs are observed not to provide enough treatment at targeted locations, an "upgrade" of the BMP will be evaluated and implemented as soon as possible in anticipation of the next storm event.

Selection criteria to be used for source, erosion, and sediment control BMPs may include:

- Effectiveness
- Sustainability
- Applicability
- Fate of captured pollutants
- Environmental constraints
- Permitting requirements
- Costs

Selection of BMPs will be reviewed on a case-by-case basis and will be selected as described in Section 3.1.1.

3.2 TREATMENT CONTROLS

The second category of BMPs that will be selected for the Outfalls 008 and 009 watersheds are treatment control BMPs. Treatment controls are engineered systems designed to remove pollutants by gravity settling of sediments, filtration, biological uptake, media adsorption or other physical, biological or chemical processes. A necessary part of the siting and selection of BMPs is a comprehensive review of existing data and future sampling/monitoring programs to identify areas that would benefit from treatment. The Expert Panel will compare the existing and future data to BMP evaluation levels (see section 4.2) to identify where additional structural treatment controls are needed in addition to the source, erosion and sediment control BMPs.

3.2.1 Selection Approach for Treatment Control BMPs

Treatment control BMPs will be selected in coordination with the Expert Panel as follows: (1) identify potential locations/subareas for treatment control implementation, including review of available water quality data, (2) monitor sub-area runoff from these areas, (3) assess subarea runoff water quality for need for treatment, (4) select potential BMPs, (5) evaluate hydrologic

parameters as an input for flows for the BMP selection and sizing process, (6) evaluate constraints related to implementation of a BMP, such as available footprint, (7) design and implement treatment controls, and (8) monitor treatment control performance and design enhancements if increased performance is needed.

3.2.2 BMP Criteria for Siting and Selection

The following criteria will be used:

- Implement treatment controls at potential BMP opportunity sites (i.e., where elevated concentrations in runoff is present) that are downstream of RFI and developed areas.
- Select and size treatment controls using methods similar to those employed previously for ENTS project and as described in previous Expert Panel reports (e.g., ENTS Alternatives Analysis, ENTS Hydrology Report, Design Storm White Paper, etc.).
- Select treatment controls that are suitable given unit processes that address the pollutant types and forms as identified in the subarea monitoring and data analysis results and the site conditions as listed below.

The following is a summary of those items for consideration that will affect treatment control selection and sizing:

- Subarea runoff water quality results as compared to evaluation levels (see Section 4.2)
- Soil contamination issues or RFI plans/activities
- Subarea topography
- Subarea *in situ* surface and near surface soil types
- Subarea runoff volume estimates
- Existing site uses
- Special habitat/species issues
- Restrictions on groundwater infiltration
- Other site conditions and constraints, as summarized in Section 2 Guiding Principles

The following includes a list of those treatment controls that may be considered. These are:

- **Extended vegetated detention basins** –Facilities designed to receive and hold stormwater and release it at a slower rate, usually over a number of hours. Vegetation enhances filtration and contact. The full volume of stormwater that enters the facility is eventually released minus some evapotranspiration and infiltration losses. Sedimentation is the primary removal mechanism. In addition, vegetative and soil contact time can contribute to removals of some pollutants. Also can be used to moderate peak flows through downstream treatment facility.
- **Vegetated swales** – Long and narrow, trapezoidal or semicircular channels, planted with a variety of trees, shrubs, and/or grasses or with a dense mix of grasses. Stormwater runoff from impervious surfaces is directed through the swale, where it is slowed and in some cases infiltrated, allowing pollutants to settle out or be absorbed by the media.

Check dams are often used to create small ponded areas to facilitate additional sedimentation, reduce re-entrainment and in areas where appropriate, enhance infiltration.

- **Bioretention/biofiltration basins or trenches** – Facilities that use soil filtration and both woody and herbaceous plants to remove pollutants from stormwater runoff. Runoff is typically captured and filtrated over a period of 6 to 48 hours. This type of facility can also be utilized with underdrains in areas of poorly draining soils or where mobilization of below ground contamination is of concern. Specialized media, using the results of the media treatment tests, can also be used within these systems for enhanced treatment of critical contaminants.
- **Seasonal Wetlands** – Constructed treatment wetlands consist of a sediment pre-settling basin and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the wetland. Constructed treatment wetlands typically include an inlet with energy dissipation, a sediment pre-settling basin for settling out coarse solids and to facilitate maintenance, a base with shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of the constructed treatment wetlands. They can also be designed as seasonal wetlands in areas with limited dry weather flows.
- **Other "natural" alternatives** – Natural BMPs function as soil and plant based filtration systems that remove pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Some natural alternatives may include planter boxes, vegetated filter strips, etc.
- **Infiltration Systems** – These systems promote infiltration as a primary runoff management option and can consist of infiltration basins, infiltration trenches, dry wells and other infiltration systems. Due to the potential concerns of mobilization of below ground pollutants, the Expert Panel would propose working with the Groundwater Expert Panel to determine what level of infiltration would be appropriate in what locations. As these systems can completely eliminate some portion of runoff they can be highly effective at both pollution reduction as well as reducing channel erosive flows. They do need to be designed with careful "pre-treatment" to ensure that groundwater is protected.
- **Other Treatment Systems** – In addition to the above natural systems, under some circumstances it may be appropriate to consider other types of treatment controls, including mechanical/chemical systems as employed in other site locations or other systems.
- **Combinations of the above ("treatment trains")** – A sequence of BMPs (i.e., with pre- or post-treatment), used to adequately address an entire list of pollutants of concern and provide reliable and consistent performance.

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4.0 BMP IMPLEMENTATION AND MILESTONES

A preliminary identification of short term and long term BMP activities to be performed within the Outfalls 008 and 009 watersheds is presented below, followed by a schedule with project milestones. Short-term activities include BMP controls that are currently ongoing or planned for 2010 and 2011. Long-term activities include the necessary data collection, data evaluation, and design requirements needed for the identified potential BMP areas. The schedule includes submittal dates of BMP Plan Addendums, permitting submittal requirements, and other supporting plans, and the next phase of implementation.

4.1 SHORT TERM ACTIVTIES

4.1.1 Planned Initial BMP Activities

The following are those BMPs as recommended by the Expert Panel for implementation within the next few months.

4.1.1.1 ISRA Activities (2010 and 2011)

ISRA activities are planned to occur at 18 ISRA areas within the Outfall 009 watershed in 2010 and 11 ISRA areas within the Outfall 009 watershed in 2011. These 29 areas are shown in Figures 1-7 and 1-8. Remedial alternative analysis for 27 of these ISRA areas identified excavation and offsite disposal as the recommended remedial action (MWH, 2010c), with a total volume of soil to be removed of approximately 25,000 cy (*ex situ* estimate). The remedial alternatives analysis for the two ISRA areas near the Area I Landfill RFI site is more complex than the other ISRA areas due to the relatively large volume of material (approximately 40,000 cy), the permitting requirements, and the involvement of multiple regulatory agencies. Therefore, a separate ISRA Work Plan Addendum is being prepared that summarizes the remedial alternatives analysis and identifies the recommended remedial action for these two ISRA areas. The Area I Landfill ISRA Work Plan Addendum is scheduled to be completed by the end of 2010. Prior to the start of remedial activities, erosion control BMPs will be installed and BMP inspections will continue throughout the construction activities.

Site restoration activities for the ISRA areas planned for excavation will involve recontouring with adjacent soils, and restoration of ISRA areas on Boeing property which may include backfilling excavations using soil from the Outfall 009 soil borrow area, which is shown in Figure 1-7 and Figure 1-8. Site restoration activities will involve recontouring with adjacent soils, and restoration of ISRA areas on NASA property and will include backfilling of excavations using soil from a to-be-identified soil borrow area. Restored excavations will approximately match the previously existing topographic grade and will be sloped to ensure there are no areas where water might pond. Erosion control BMPs including fiber rolls, hay bales, silt fences, and hydroseed mulch will be installed on and near the restored excavations.

Hydroseed mulch will incorporate the Expert Panel recommendations for hydromulching techniques, seed mixes, and weed control (Expert Panel, 2010b). BMP inspections will be conducted at completed ISRA areas for two rainy seasons. In addition, natural BMPs (plants and plant materials) will be installed following the plan developed by the Expert Panel (Josselyn, 2009), with specific planting locations associated with 2010 and 2011 ISRA areas identified in subsequent addenda to the plan.

4.1.1.2 Northern Drainage Activities

Upcoming BMP activities for the Northern Drainage include the installation of in-channel stone and riprap for bank stabilization within the drainage in the area of the LOX Debris removal. Hydroseed/hydromulch material utilizing Flexterra will also be implemented for the Northern Drainage. In addition, Boeing, H&A, Geosyntec, and members of the Expert Panel are developing a plan to stabilize the channel to reduce erosion and discharge of turbid runoff. The plan will be implemented in two phases to avoid subsequent damage caused by future soil removal activities, sampling, and foot or equipment traffic through the restored areas. In preparation for Phase I activities, a Section 401certification permit was requested and approved by the RWQCB to implement up to 500 linear feet of bank protection measures and an in-channel structure (if needed) within the Northern Drainage. Implementation of these restoration activities are scheduled for 2010/2011. The appropriate permits or certifications for subsequent phases of restoration activities beyond the scope of the current Section 401 certification will be obtained prior to commencing such work.

4.1.1.3 Initial BMP Recommendations

During a site walk with the Expert Panel on September 10, 2010, as potential areas where BMPs could be located were identified, along with BMP types per the guiding principles and selection criteria as described above. These areas are shown on Figures 4-1, 4-2, and 4-3. A brief summary of these areas and the BMP types identified include:

- **Road Rehabilitation/Maintenance (OF008-1, OF009-5, OF009-7).** Dirt road rehabilitation/maintenance activities such as gravel and/or cellular confinement system coverage to control erosion in the Outfall 008 watershed, at the truck turnaround area at the LOX RFI Site in the Outfall 009 watershed, and at other suitable locations such as Areas II Landfill access road, Sage Ranch road, and the dirt road to the B2 RFI/ISRA site. Unsurfaced or unprotected (without gravel or cellular confinement system) roads are recognized to be a significant source of sediment and a general objective is to remove them where they are no longer needed, followed by erosion and sediment control practices and revegetation. Roadside ditches will also be stabilized where necessary.
- **Erosion Control BMP Installation.** Erosion control BMPs (e.g., waterbars, rolling dips, wattles, etc.) along the dirt road in the B-1 area, including possibly routing flow towards the unpaved area.

- **Culvert Modifications (OF009-1).** Additional CMs (culvert inlet media filters) have been identified below the B1-2 ISRA area (just east of the Santa Susana entrance gate), and possibly (pending an assessment of flood conveyance capacity) downgradient of the AP/STP ISRA area. Any new CMs will have engineering design (e.g., hydrology and hydraulics analysis, geotechnical assessment, and at least a preliminary design drawing) completed prior to the beginning of construction, consistent with the previously-implemented CMs.
- **Soil Stockpile Area Runoff Control (OF009-3).** Control of runoff from the soil stockpile area in the lower parking lot by a combination of measures including stockpile covers and toe protection, and the construction of barriers to retain stormwater runoff, which will be pumped to a basin or other treatment BMP west of the parking lot on Santa Susana property.
- **Drainage Stabilization.** Stabilization measures in the Northern Drainage channel and selected tributaries, including adjoining areas such as the dirt road that parallels the northern channel and which could be stabilized with a cellular confinement system or other dirt road stabilization BMPs (e.g., water bars, rolling dips, road outboarding, or other previously-proposed dirt road maintenance BMPs).
- **Feature Removal and Site Restoration.** Continuation of the removal of asphalt, buildings, and other unused facilities, and the regrading/revegetation of these areas. This effort will need to be integrated with the Santa Susana infrastructure demolition plan, and require close coordination with that demolition team. For structures that remain, review of the use of galvanized metals should be conducted, and mitigated through the use of zinc controls where necessary or appropriate.
- **Electric Pole Runoff Control.** Stainless steel runoff capture rings around creosote-coated wood electric poles, which are known sources of dioxins. These rings may be backfilled with media to serve as a small-scale filtration device. The locations of these BMPs are not shown on the figures cited above due to scale of implementation.

4.2 LONG-TERM ACTIVITIES

The long term activities include an evaluation of surface water data (ISRA performance monitoring, PSD, and NPDES monitoring data) and collection of additional stormwater monitoring data to define additional treatment control locations. In addition, activities are included that will be performed as part of the BMP evaluation and implementation planning at the identified potential structural treatment BMP opportunity sites shown in Figures 4-1 through 4-3. The figures reflect a reassessment of the sites initially identified by the Expert Panel during the ENTS planning activities in 2008 (Expert Panel, 2008).

- **Existing Data Review.** The Expert Panel is reviewing the existing data to assess conditions at ISRA areas and NPDES outfalls relative to project "stormwater comparison thresholds." As described below, these will be developed based on analysis of stormwater runoff from naturally occurring soil concentrations. This includes ongoing data collected per the RWQCB NPDES requirements, CAO requirements (performance monitoring data), and additional data that Boeing elected to collected, such as PSD data. Progress

and findings of the data review will be documented in annual progress reports. This review will identify those locations where potential data gaps exist.

- **Develop Monitoring Plan.** Develop monitoring plan to describe subarea runoff quality monitoring and structural treatment BMP performance monitoring approaches. Plan will describe stormwater sampling locations, collection methods, frequency, analytes, and Quality Assurance/Quality Control (QA/QC) protocols.

- **Develop Sizing Criteria.** Develop project specific BMP sizing criteria based on standard practice and general stormwater BMP design guidance documents, as appropriate. This will serve as general sizing guidance for the project, whereas site-specific constraints may dictate actual structural treatment BMP sizing during design.

- **Develop BMP Evaluation Levels.** Review 2009/2010 season ISRA performance and NPDES compliance monitoring data, NPDES effluent limits, and data summarized in the Expert Panel's recent dioxins and metals stormwater background reports, and develop stormwater concentration thresholds or evaluation levels for key pollutants of concern (primarily dioxins and lead, but additional pollutants may be added based on NPDES exceedance information) for use in determining where stormwater treatment controls will be necessary in the Outfalls 008 and 009 watersheds. These levels will include pollutant concentrations (in water or on suspended solids, i.e., total water concentration minus dissolved concentration divided by total suspended solids (TSS) concentration), as well as perhaps a number of sample results above the evaluation level that will be used to determine if treatment controls are required. It is anticipated that the selected thresholds will likely reflect stormwater levels above natural soil concentrations so that treatment controls are only sited where subarea runoff quality is above these evaluation levels.

- **Evaluate Subarea Monitoring Results.** Compare subarea stormwater monitoring data with evaluation levels to determine locations for treatment control feasibility assessment and design.

- **Identify/Implement Structural Treatment Controls.** Identify appropriate structural treatment controls and designs (including completion of design drawings and applicable engineering analyses), permits (as necessary) and implement selected measures.

- **Performance Monitoring of Structural Treatment Controls.** Monitor structural treatment controls, and review and submit performance monitoring data. Evaluate statistical significance of the results as well as provide guidelines as to the number of samples needed to make conclusions regarding statistical significance.

- **Evaluate Performance Monitoring Results, and Upgrade BMPs Accordingly.** Where treated effluent quality consistently above evaluation levels, review and modify design to improve treatment performance.

4.3 MILESTONES

The proposed schedule accounts for phasing of implementation to allow completion of ongoing work within the Outfall 008/009 Watersheds, including ISRA and Northern Drainage cleanup.

2010:

October – December 2010	Plan, design, permit and implement where feasible and practicable Short-Term BMP Implementation Activities listed in Section 4.1 that can be completed in 2010.
December 2010	Submit BMP Performance Monitoring Plan Technical Memorandum, that identifies treatment control subarea monitoring locations and analytes for additional water quality runoff for the Outfalls 008 and 009 watersheds.[4]
2010/2011 Rainy Season	Collect surface water samples.

2011:

January – December 2011	Plan, design, permit, and implement where feasible and practicable Short Term BMP Implementation Activities listed in Section 4.1 that can be completed in 2011.
July 2011	Submit an evaluation of monitoring results identifying locations for treatment control feasibility assessment and design.
September 2011	Submit BMP Plan Addendum that identifies structural treatment controls (ENTS) to be designed and proposed implementation schedule.
2011/2012 Rainy Season	Collect surface water samples.

2012:

[4] The BMP performance monitoring plan will include ISRA performance monitoring requirements and will serve as the ISRA performance monitoring plan

Spring 2012	Complete required archeological and/or biological surveys for proposed work areas, grading plans and engineering design calculations, as necessary. Submit permitting packages or permitting amendments for potential implementation areas within drainages. Prepare supporting plans for implementation, including Soil Management Plan, Traffic Management Plan, and Health and Safety Plan, as necessary.
Summer – Fall 2012	Implement BMP Work Plan field work and restoration activities following approval by RWQCB, approval of necessary permits, contractor selection and completion of required studies/surveys. Work may be phased based on the scope of work identified in the Work Plan
2012/2013 Rainy Season	Collect surface water samples.

2013:

Summer 2013	Submit annual report and recommendation of BMP upgrades as necessary.
2013/2014 Rainy Season	Collect surface water samples.
Summer – Fall 2013	Implement Additional BMP Work Plan field work and restoration activities following approval by RWQCB, approval of necessary permits, contractor selection and completion of required studies/surveys.

2014:

Summer 2014	Submit BMP Upgrade Plan that provides a review of performance monitoring results and upgrades to the BMP if required.

As described previously in this section, following ISRA implementation, Northern Drainage activities, and BMPs/treatment control implementation, effectiveness of these measures will be evaluated primarily by the results of surface water samples collected at Outfalls 008 and 009,

supplemented by ISRA performance data, or any subarea data to be collected as part of this BMP Plan. These sampling results will be reviewed annually to determine whether additional upgrades may be warranted. If required, a BMP Upgrade Plan Addendum will be submitted for RWQCB review and approval.

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5.0 COMMUNICATION AND PUBLIC INVOLVEMENT PLAN

Because of the phasing of the work to be performed, Boeing proposes to provide the RWQCB quarterly progress reports until planned activities are completed. Boeing will post all project deliverables, including Work Plans, supporting plans, and Progress Reports on their NPDES web site:

http://www.boeing.com/aboutus/environment/santa_susana/isra.html

Each quarterly progress report will describe:

- Progress made, including type(s) of activity and work performed;
- Summary of confirmation and/or performance sampling, if any;
- Problems identified / corrective actions recommended; and
- Activities and work planned for next quarter.

Quarterly BMP Plan Reports will be submitted on March 31, June 30, September 30, and December 31 of each year, and will begin with the first submittal on December 31, 2010. Subsequent routine meetings will be held with RWQCB staff, the Expert Panel, and Boeing depending on project needs and demands of the RWQCB staff. Routine meetings may consist of weekly, bi-weekly, or monthly meetings, depending on project activity.

Additional public involvement / input will also be sought during site tours, informational sessions, and other forums such as public meetings with the Expert Panel.

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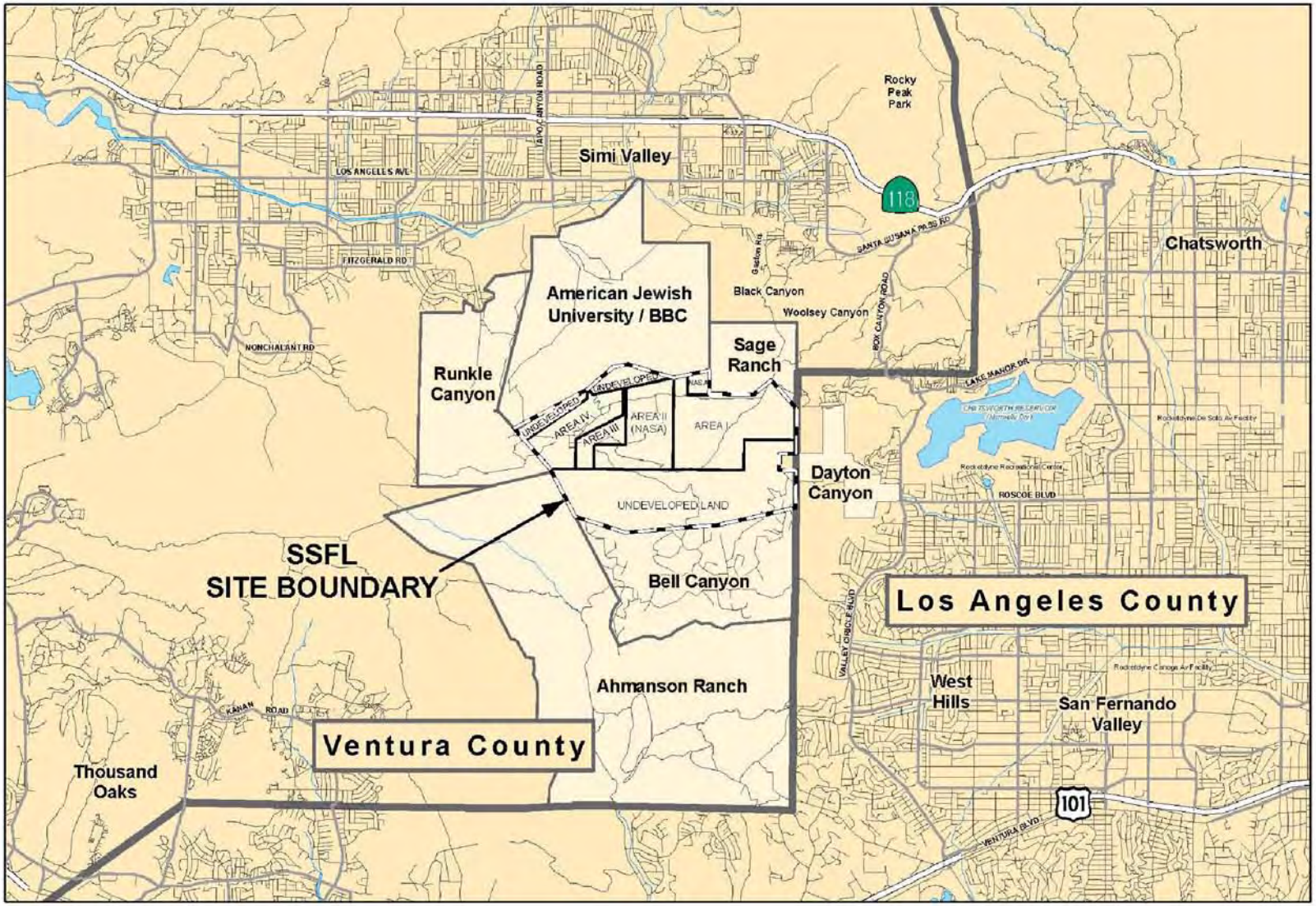
FIGURES



Miles
0 1.5 3

Regional Map

Date: September 17, 2010
File: \\Uspas1metapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig1-1_RegionalMap.mxd

MWH

FIGURE 1-1

DRAINAGE TO MEIER CANYON

DRAINAGE TO ARROYO SIMI

UNDEVELOPED LAND

NASA PROPERTY AREA I

UNDEVELOPED LAND

Silvernale Pond

R-1 Pond

Skyline Water Tanks

GETS

R-2B Pond

R-2A Pond

Perimeter Pond

AREA IV

AREA III

AREA II (NASA)

AREA I

DRAINAGE TO DAYTON CANYON

UNDEVELOPED LAND

GETS Discharge Location

DRAINAGE TO BELL CANYON

DESCRIPTIONS OF PROPOSED DISCHARGE OUTFALL LOCATIONS

NPDES OUTFALL NO.	DESCRIPTION	PRIMARY OVERSIGHT AGENCY
001	Treated Groundwater and Stormwater, South Slope	RWQCB
002	Stormwater, South Slope	RWQCB
003	Stormwater; Radioactive Material Handling Facility (RMHF)	RWQCB
004	Stormwater; Sodium Reactor Experiment Area	RWQCB
005	Stormwater; Sodium Burn Pit 1	RWQCB
006	Stormwater; Sodium Burn Pit 2	RWQCB
007	Stormwater; Building 100	RWQCB
008	Stormwater; Happy Valley	RWQCB
009	Stormwater; WS-13 Drainage	RWQCB
010	Stormwater; Building 203	RWQCB
011	Stormwater, Perimeter Pond	RWQCB
012	Stormwater, Alfa Test Stand	RWQCB
013	Stormwater, Bravo Test Stand	RWQCB
014	Stormwater; APTF (Advanced Propulsion Test Facility)	RWQCB
015	STP-1 (Remove Wastewater)	--
016	STP-2 (Remove Wastewater)	--
017	STP-3 (Remove Wastewater)	--
018	Stormwater, R-2 Spillway	RWQCB
019	Treated Groundwater, GETS	RWQCB

0 500 1,000 2,000 Feet

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

NPDES Outfalls (RWQCB Primary Oversight Authority)

Historical NPDES Outfalls

Groundwater Extraction Treatment System (GETS)

Legend

Effluent Pathways

Surface Water Drainage Divide

Natural Drainage

Concrete Lined Drainage

Graded Drainage

Surface Water Reclamation Ponds

Base Map Legend

SSFL Property Boundary

Administrative Area Boundary

Ground Elevation Contours

Drainage Pathways

A/C Curbing

Dirt Road

Existing Building or Structure

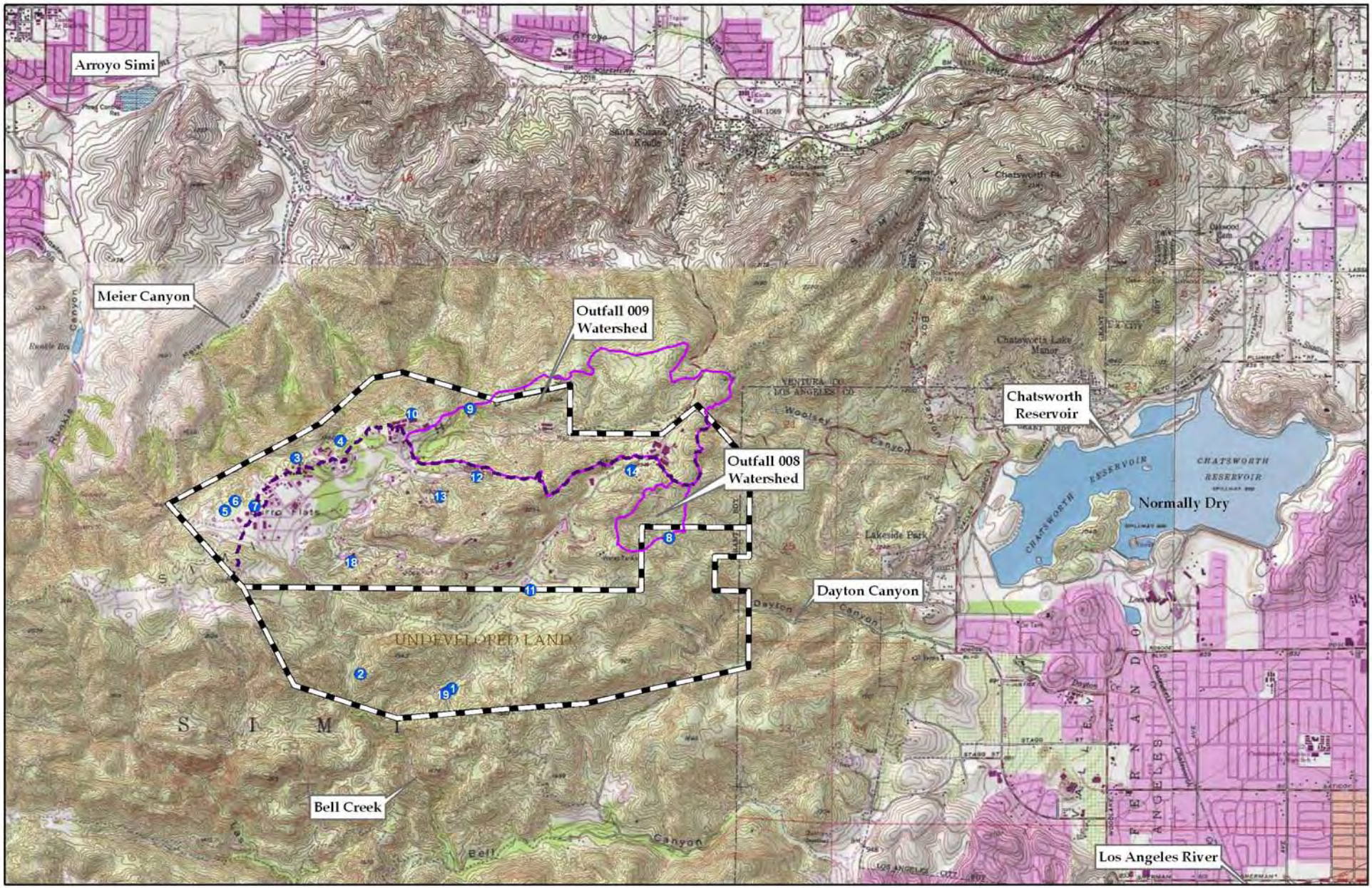
Site Map with Outfall Locations and Storm Water Drainage Systems

Date: September 17, 2010

File: \\Uspas1netapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig1-2_SiteMapOF_Drainages.mxd

MWH

FIGURE 1 - 2



Feet
0 2,000 4,000
MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

NPDES Outfalls
Watershed
SSFL Property Boundary
North Watershed Boundary

Topographic Source: USGS/ESRI

Drainages Leading From SSFL

MWH

FIGURE 1-3

American Jewish University / BBC

UNDEVELOPED LAND
(BOEING)

NASA
(AREA I)

MCRA/Sage Ranch

ELV

Area II Landfill

LOX

Rocketdyne/Atomic International
Rifle and Pistol Club
(SWMU 4.20)

B-1

B515 STP

Ash Pile

Area I Landfill

IEL

LETF/CTL-1

Canyon

Happy Valley South

BOEING
(AREA I)

Feet
0 350 700

Base Map Legend

- NPDES Outfall
- Surface Water Divide
- Surface Water Drainage
- Rocks
- Paved Roads
- Elevation Contour
- Administrative Area Boundary
- Historical Operations Areas (RFI Sites) Within Outfalls 008 and 009
- Existing Building or Structure

Outfalls 008 and 009 Location Map

Date: September 17, 2010

File: \\Uspas1netapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\OF8_9Location.mxd

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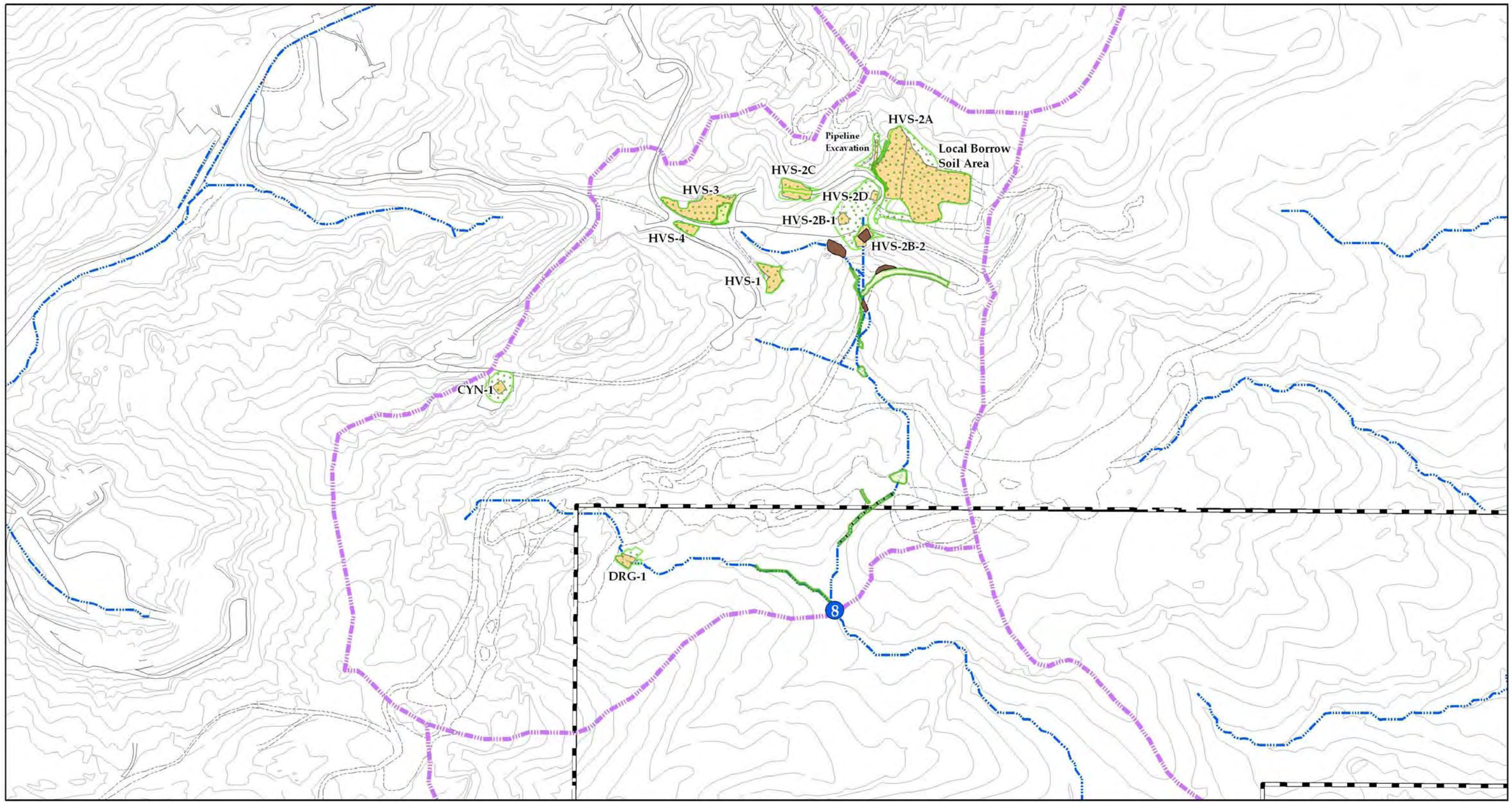
FIGURE
1-4



0 150 300 Feet

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

Erosion Control BMPs in Place

- NPDES Outfalls (RWQCB Primary Oversight Authority)
- Natural Drainage
- Surface Water Divide
- Planting Area (As-Built 2010)
- Mulefat Wattle
- ISRA Excavation, 2009 (Wattles Installed)
- Hydroseed
- Rock Crib

Base Map Legend

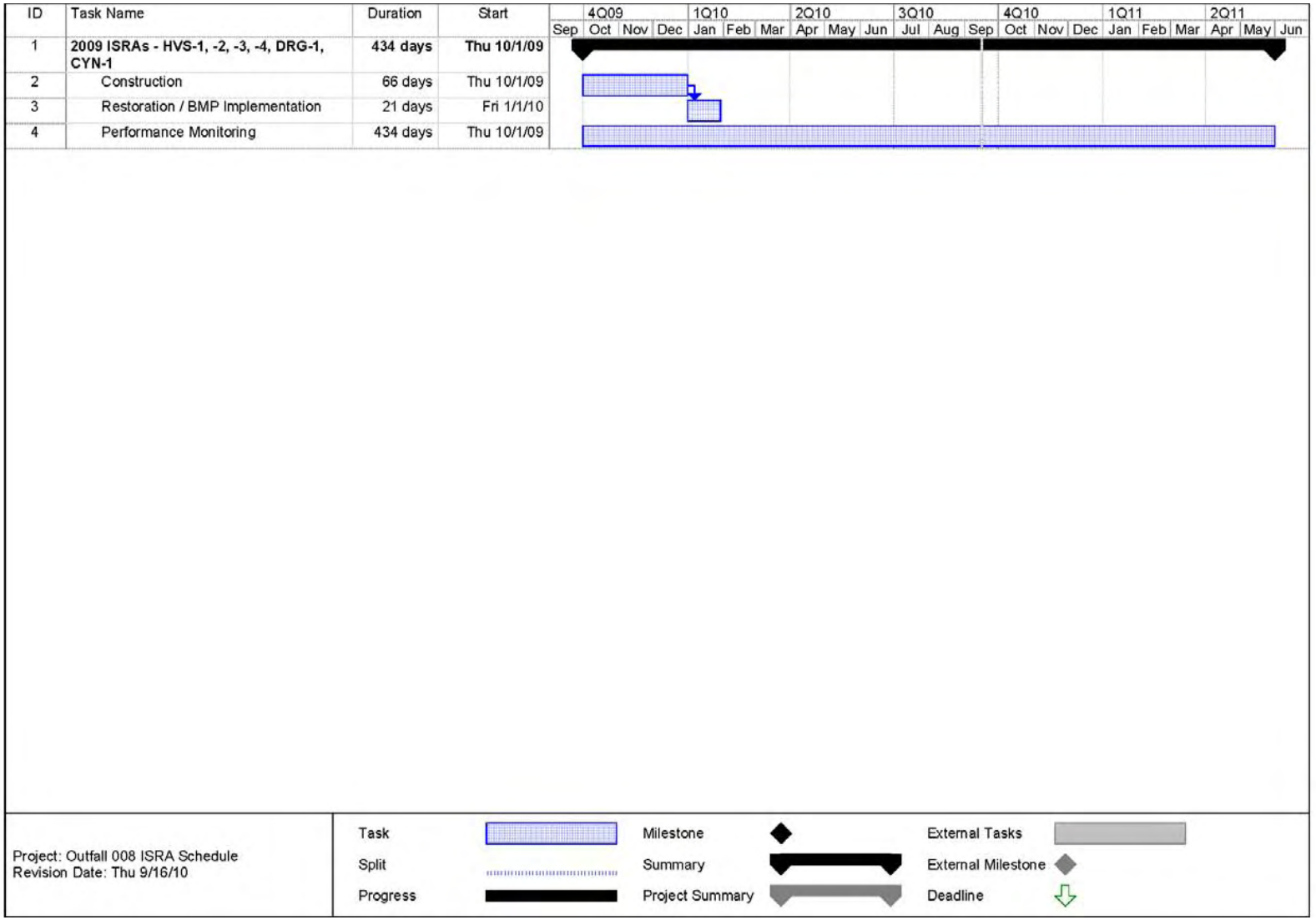
- SSFL Property Boundary
- Administrative Area Boundary
- Ground Elevation Contours
- A/C Curbing
- Dirt Road

Outfall 008 Existing BMPs

Date: September 17, 2010
File: \\Uspa1netapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig1-5_Outfall8_BMPExisting.mxd

MWH.

FIGURE 1 - 5



Outfall 008 Project Schedule

Date: September 17, 2010
File: Fig1-6_Outfall 008 Project Schedule.pub

MWH

FIGURE
1 - 6

0 20 40 Feet

NASA PROPERTY
AREA I

Outfall 790' To West

LOX-1-B2
LOX-1-B3
LOX-1-B1
LOX-1-A
LOX-1-B4
LOX-1-C
LOX-1-D

CM-2
CM-10
CM-3
CM-4
CM-5
CM-12
CM-6
CM-7
CM-11
CM-8
CM-9

B1-2
B1-1B
B1-1A
B1-1C
B1-1D

A1LF-2
A1LF-1
IEL-3
IEL-1
IEL-2

CTLI-1B
CTLI-1A

14

Soil Borrow Area

BOEING PROPERTY
AREA I

HVS-2A
Pipeline Excavation
HVS-2C
HVS-3
HVS-2D
Local Borrow Soil Area
HVS-4
HVS-2B-1

0 225 450 Feet

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

- NPDES Outfalls (RWQCB Primary Oversight Authority)
- Natural Drainage
- Surface Water Divide
- Completed ISRA 2009 (Construction BMP in place)
- ISRA 2010
- ISRA Post-2010
- Unknown Schedule

Erosion Control BMPs

- Culvert Maintenance
- Erosion Control Fabric
- Planting Area (As-Built 2010)
- Building Demolition

Structural BMPs

- X Gabion Tube/Rip Rap
- Hydroseed
- Stone Weir
- Box Culvert

Base Map Legend

- SSFL Property Boundary
- Administrative Area Boundary
- Ground Elevation Contours
- A/C Curbing
- Dirt Road

Note: Topographic contours from Sage, June 2, 2010.

Outfall 009 (Eastern) Planned and Existing BMPs

Date: September 17, 2010
File: \\Uspas1metapp1\gdei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig1-7_OF9_East_Existing_BMP.mxd

MWH.

FIGURE 1 - 7

UNDEVELOPED LAND

NASA PROPERTY AREA I

NASA PROPERTY AREA II

BOEING PROPERTY AREA I

9 A2LF-1

10

A2LF2-2A

A2LF2-2B

ELV-1C

ELV-1D

A2LF-3

CM-1

AP/STP-1E-2

AP/STP-1F

AP/STP-1D

AP/STP-1E-3

AP/STP-1E-1

AP/STP-1A

AP/STP-1C-1

AP/STP-1C-2

AP/STP-1B

LOX-1-B2

LOX-1-B3

LOX-1-B1

LOX-1-A

LOX-1-B4

LOX-1-C

LOX-1-D

CM-5

CM-12

CM-2

CM-10

CM-3

CM-4

CM-6

CM-7

CM-11

CM-8

CTLI-1B

CTLI-1A

14

12

13

Soil Borrow Area

Feet
0 225 450

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

NPDES Outfalls (RWQCB Primary Oversight Authority)

Natural Drainage

Surface Water Divide

Completed ISRA 2009 (Construction BMP in place)

ISRA 2010

ISRA Post-2010

Unknown Schedule

Erosion Control BMPs

Culvert Maintenance

Erosion Control Fabric

Planting Area (As-Built 2010)

Structural BMPs

X Gabion Tube/Rip Rap

Hydroseed

Stone Weir

Box Culvert

Base Map Legend

SSFL Property Boundary

Administrative Area Boundary

Ground Elevation Contours

A/C Curbing

Dirt Road

Note:
Topographic contours from Sage, June 2, 2010.

Outfall 009 (Western) Planned and Existing BMPs

Date: September 17, 2010

File: \\Uspas1metapp1\den\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig1-8_OF9_West_Existing_BMP.mxd

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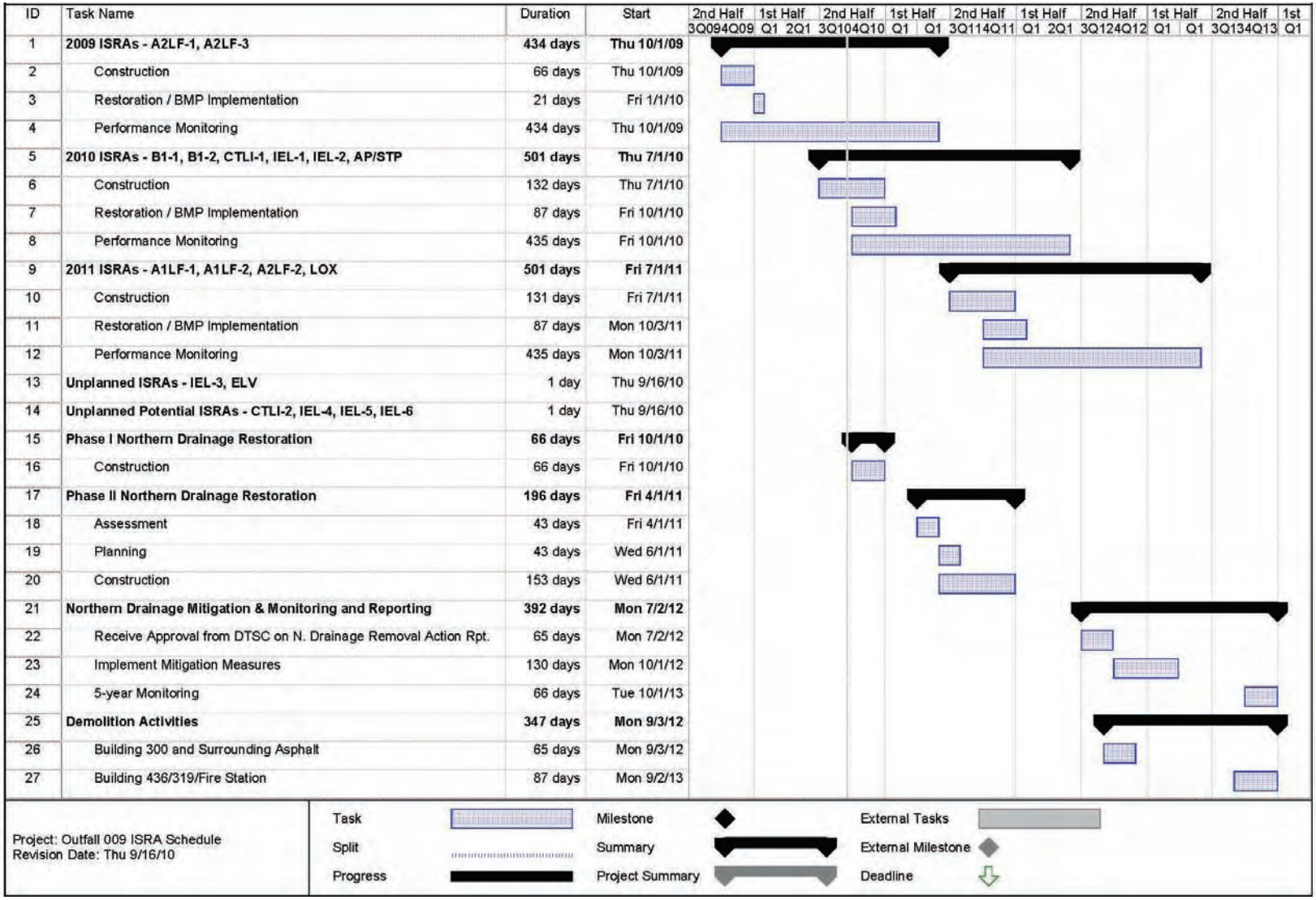
FIGURE 1 - 8

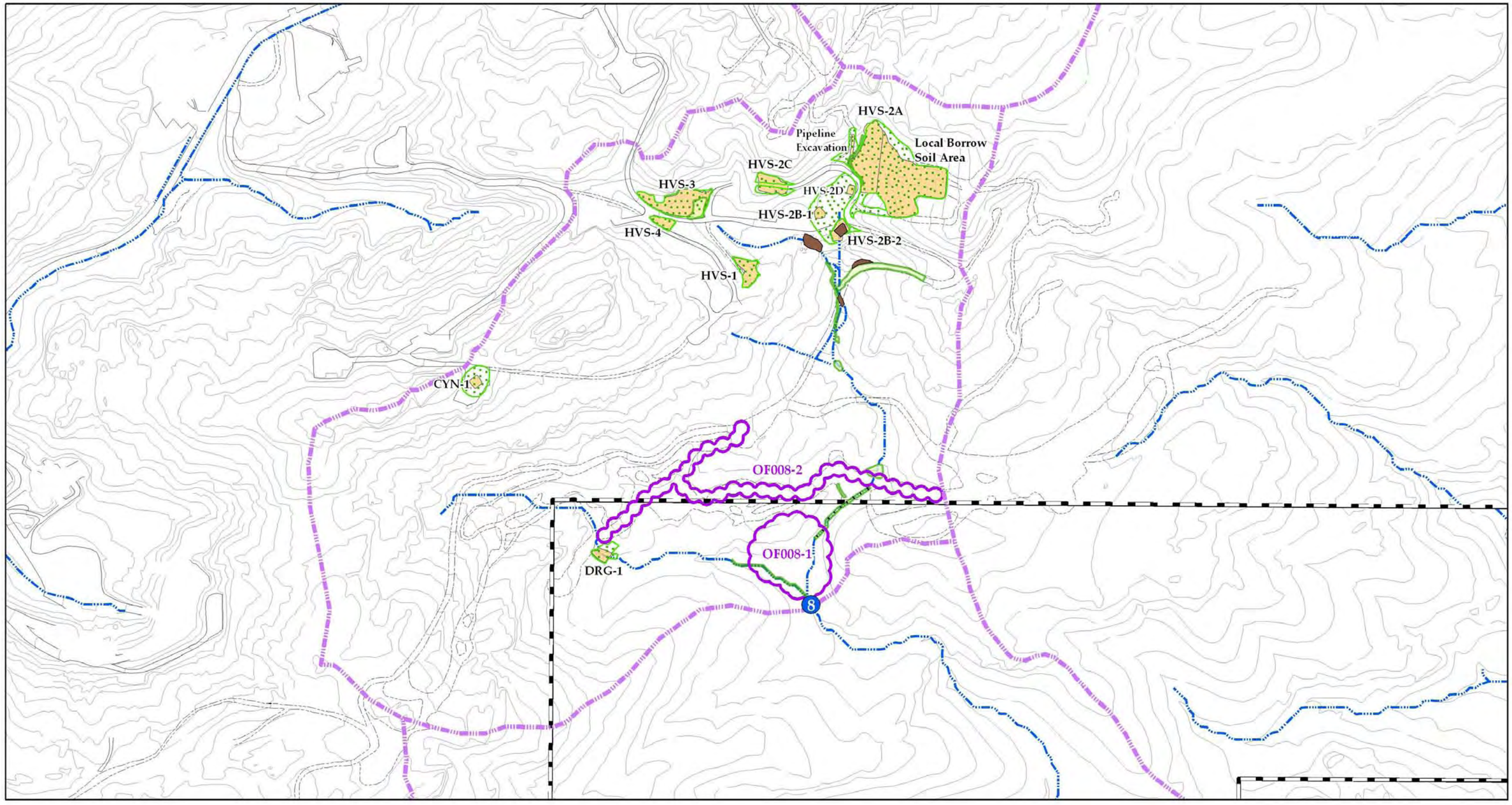


Outfall 009 Project Schedule

Date: September 17, 2010
File: Fig1-9_Outfall 009 Project Schedule.pub

MWH

FIGURE
1 - 9



N

0 150 300 Feet

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

Erosion Control BMPs in Place

- NPDES Outfalls (RWQCB Primary Oversight Authority)
- Natural Drainage
- Surface Water Divide
- Planting Area (As-Built 2010)
- Mulefat Wattle
- ISRA Excavation, 2009 (Wattles Installed)
- Hydroseed
- Rock Crib
- Potential BMP or ENTS Location

Base Map Legend

- SSFL Property Boundary
- Administrative Area Boundary
- Ground Elevation Contours
- A/C Curbing
- Dirt Road

Outfall 8 Potential BMPs

Date: September 17, 2010
File: \\Uspasfnetapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig4-1_Outfall8_BMPPotentialA.mxd

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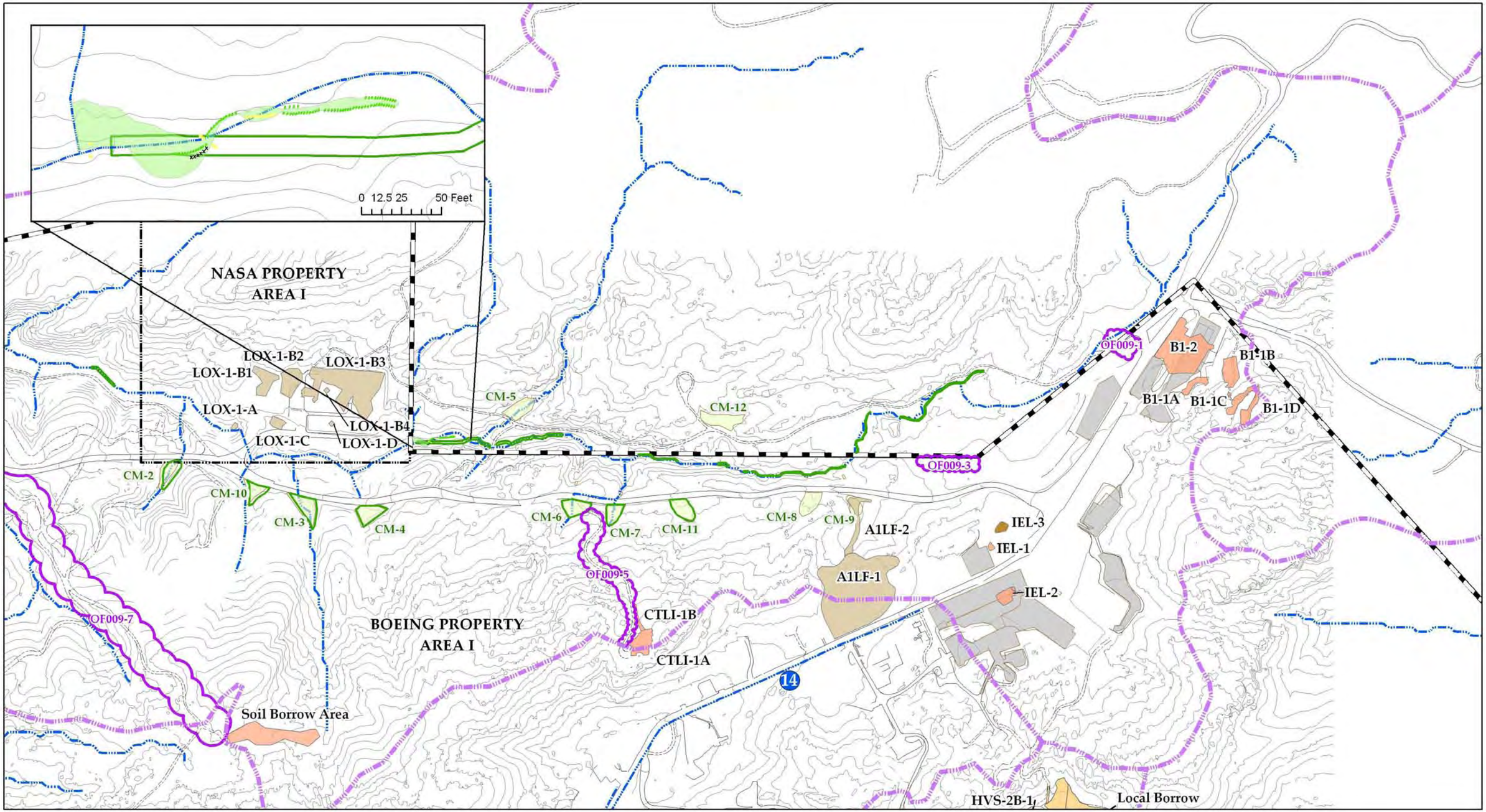
FIGURE 4 - 1



Feet
0 225 450

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

NPDES Outfalls (RWQCB Primary Oversight Authority)
Natural Drainage
Surface Water Divide

Completed ISRA 2009 (Construction BMP in place)
ISRA 2010
ISRA Post-2010
Unknown Schedule

Erosion Control BMPs
Culvert Maintenance
Erosion Control Fabric
Planting Area (As-Built 2010)
Building Demolition

Structural BMPs
X Gabion Tube/Rip Rap
Hydroseed
Stone Weir
Box Culvert
Potential BMP or ENTS Location

Base Map Legend
SSFL Property Boundary
Administrative Area Boundary
Ground Elevation Contours
A/C Curbing
Dirt Road

Note:
Topographic contours from Sage, June 2, 2010.

Outfall 009 (Eastern) Potential BMPs

Date: September 17, 2010
File: \\Uspas1ortapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig4-2_OF9_East_Potential_BMP.mxd

MWH.

FIGURE 4 - 2

UNDEVELOPED LAND

NASA PROPERTY AREA I

NASA PROPERTY AREA II

BOEING PROPERTY AREA I

9 10 12 13 14

A2LF-1

A2LF2-2A

A2LF2-2B

OF009-6

OF009-7

OF009-5

ELV-1C

ELV-1D

A2LF-3

CM-1

CM-2

CM-3

CM-4

CM-5

CM-6

CM-7

CM-8

CM-10

CM-11

CM-12

LOX-1-A

LOX-1-B1

LOX-1-B2

LOX-1-B3

LOX-1-B4

LOX-1-C

LOX-1-D

AP/STP-1A

AP/STP-1B

AP/STP-1C-1

AP/STP-1C-2

AP/STP-1D

AP/STP-1E-1

AP/STP-1E-2

AP/STP-1E-3

AP/STP-1F

CTLI-1A

CTLI-1B

Soil Borrow Area

Feet
0 225 450

MAP COORDINATES IN STATE PLANE, NAD 27, ZONE V

NPDES Outfalls (RWQCB Primary Oversight Authority)

Natural Drainage

Surface Water Divide

Completed ISRA 2009 (Construction BMP in place)

ISRA 2010

ISRA Post-2010

Unknown Schedule

Erosion Control BMPs

Culvert Maintenance

Erosion Control Fabric

Planting Area (As-Built 2010)

Building Demolition

Structural BMPs

X Gabion Tube/Rip Rap

Hydroseed

Stone Weir

Box Culvert

Potential BMP or ENTS Location

Base Map Legend

SSFL Property Boundary

Administrative Area Boundary

Ground Elevation Contours

A/C Curbing

Dirt Road

Note:
Topographic contours from Sage, June 2, 2010.

Outfall 009 (Western) Potential BMPs

Date: September 17, 2010

File: \\Uspas1netapp1\dei\rocketdyne gis\MasterGISFiles\ISRA_Projects\ISRA_MXD\BMP\CompliancePlanSept2010\Fig4-3_OF9_West_Potential_BMP.mxd

MWH.

FIGURE 4-3

APPENDICES A

SW EXPERT PANEL RECOMMENDATIONS FOR EROSION CONTROL HYDROSEEDING METHODS

SSFL Stormwater Expert Panel*

Robert Gearheart, Ph.D., P.E.
Jonathan Jones, P.E., D.WRE
Michael Josselyn, Ph.D.
Robert Pitt, Ph.D., P.E., BCEE, D.WRE
Michael K. Stenstrom, Ph.D., P.E., BCEE

Boeing Santa Susana Field Station
2010 Interim Source Removal Action (ISRA) Work Plan

Expert Panel Recommendations for Erosion Control Hydroseeding Methods
and Culvert Modification Areas
for ISRA Excavation Areas in Outfall 009 Watersheds

July 21, 2010

Introduction

This memorandum provides Expert Panel recommendations for sediment control and treatment associated with the 2010 ISRA Excavation Areas. Sediment transport is a primary concern in the discharge pollutants from the site. While excavation will reduce sources of pollutants at the identified ISRA sites, erosion from these areas may result in greater downstream sediment transport with any remaining associated pollutants. This report provides recommendations on improvements on hydromulching techniques, seed mixes, weed control, and use of culvert modifications where possible.

Hydromulch Product Recommendations

SSFL currently uses the product Flexterra-FGM. This product was recently refined and improved by the manufacturer. According to the manufacturer the new product, Flexterra High Performance – Flexible Growth Medium (Flexterra HP-FGM), has superior seed germination and growth rates than the original Flexterra-FGM. The manufacturer claims the germination rates are improved 600% and biomass is improved by 250% over the original product (See attached manufacture's literature Appendix 1).

Slight changes in the product recipe were made. The Materials Safety Data Sheet (MSDS) for the Flexterra HP-FGM are attached in Appendix 2. The only difference evident from the MSDS is the addition of guar gum. Guar gum is an edible carbohydrate polymer from a legume plant. It is a commonly added to hydromulch as a tackifier or thickener in foods and pharmaceuticals.

* The Expert Panel members are acting as private consultants in order to assist the Regional Board and The Boeing Company develop and implement methods to meet the requirements of Cease and Desist Order R4-2007-0056, dated November 1, 2007. Their opinions and directives are not the opinions and directives of their respective employers.

Hydromulch and Seed Installation Recommendations

Typically, contractors apply hydroseed and mulch in one step because it is less expensive and broadly accepted in the industry. However, the manufacturer's specifications for Flexterra-FGM and Flexterra HP-FGM, recommend applying hydroseed and mulch in a two-step application process. Seed suppliers (S&S Seed and Stover Seed) and the California Stormwater BMP Handbook also recommend a multi-step application process because it enhances seed to soil contact and offers better protection from predators. Seed germination rates should be improved with this process.

The two-step process includes applying 50% of the seed and a small amount of flexible growth medium (FGM) for visual metering first. The second step is to mix the remaining seed and the rest of the FGM. We recommend that Boeing require the contractor to use the manufacturer recommended two-step application. This installation process is more costly but is proven to be more effective, especially for native seed applications. Long-term costs may be reduced with the increased effectiveness of erosion control and seed germination. Previously at SSFL, the contractor has applied the seed and mulch at the same time in one step (per Gabriella Castrellon of Dietz Hydroseeding).

Seed Mix Recommendations

2010 ISRA work will be performed this summer creating new potential sources of erosion. Hydroseed applied this fall will have very little time to germinate and grow to provide adequate coverage – especially without irrigation. To make hydroseeding the most effective, a seed mix that will germinate rapidly is needed as is binding materials that would withstand any early precipitation events.

The following table shows the original proposed seed mix and application rate as approved by CDFG (column 1). This mix was revised at some point according to the Boeing contractor, Dietz Hydroseeding (column 2) and has been applied at the site through 2009.

While these species are all appropriate to the SSFL site the native shrubs tend to be slow growing and there has been limited coverage by grass species which can afford rapid colonization and sediment holding capability. In addition, the revised list removed two of the species of grass further reducing the capacity of the mix to provide fast vegetative cover.

We recommend restoring the two grass species (*Bromus arizonicus,* and *Nasella pulchra*) to the mix. We also recommend adding small fescue (*Vulpia microstachys*) at a rate of 10 lbs/acre to provide quick vegetative cover for the first rainy season. Small fescue is not long-lived but it will provide temporary erosion control while the other native species gain biomass and provide long-term coverage. We also recommend increasing the application rate for some species to improve the chances of seed soil contact. See Column 3 for the recommended seed mix and application rate.

Table 1. SSFL Seed Mix Comparison

Species	CDFG Approved SSFL Seed Mix	Revised SSFL Seed Mix (used through 2009)	Expert Panel Recommended Seed Mix	Notes
	Application Rate (lbs/Acre)			
Chamise (*Adenostoma fasciculatum*)	0.3	1.0	**1.0**	Increase for improved seed-soil contact
Black sage (*Salvia mellifera*)	0.6	0.3	**1.0**	Increase for improved seed-soil contact
Bush mallow (*Malacothamnus fasciculatus*)	NI	0.5	**0.5**	
Purple sage (*Salvia leucophylla*)	0.6	NI	**1.5**	Increase for improved seed-soil contact
California brome (*Bromus carinatus*)	2.0	5.0	**3.0**	Rapid Germination
Cucamonga brome (*Bromus arizonicus*)	4.0	NI	**4.0**	Rapid Germination
California bush sunflower (*Encelia californica)*	0.8	NI	**3.0**	Increase for improved seed-soil contact
Buckbrush (*Ceanthous cuneatus*)	2.5	5.0	**5.0**	
Purple needlegrass (*Nassella pulchra*)	2.0	NI	**2.0**	Rapid Germination
Deer weed (*Lotus scoparius*)	1.0	3.0	**3.0**	Increase for improved seed-soil contact
Laurel Sumac (Malosma laurina)	NI	2.5	**2.5**	
Small fescue (*Vulpia microstachys*)	NI	NI	**10.0**	Rapid Germination

NI = Not Included

Weed Management

Previously seeded areas have had low establishment of native plants and infestations of invasive species in some areas. Primarily, black mustard (Brassica nigra) has colonized these areas. Controlling black mustard is difficult without the use of herbicides. The best method of management is prevention and seed source removal. We recommend controlling the seed source for black mustard by mowing plants early in the growing season to remove flowers before plants reach a height of two to three feet tall and seed is set. Cut plants should be bagged and hauled away. We estimate that mowing should take place in March or April. Methods of mowing will need to take into account the difficult terrain. Mowing should be done with hand equipment such as gas-powered weed whackers, string cutters, machetes, or scythes to minimize soil disturbance and access difficult terrain.

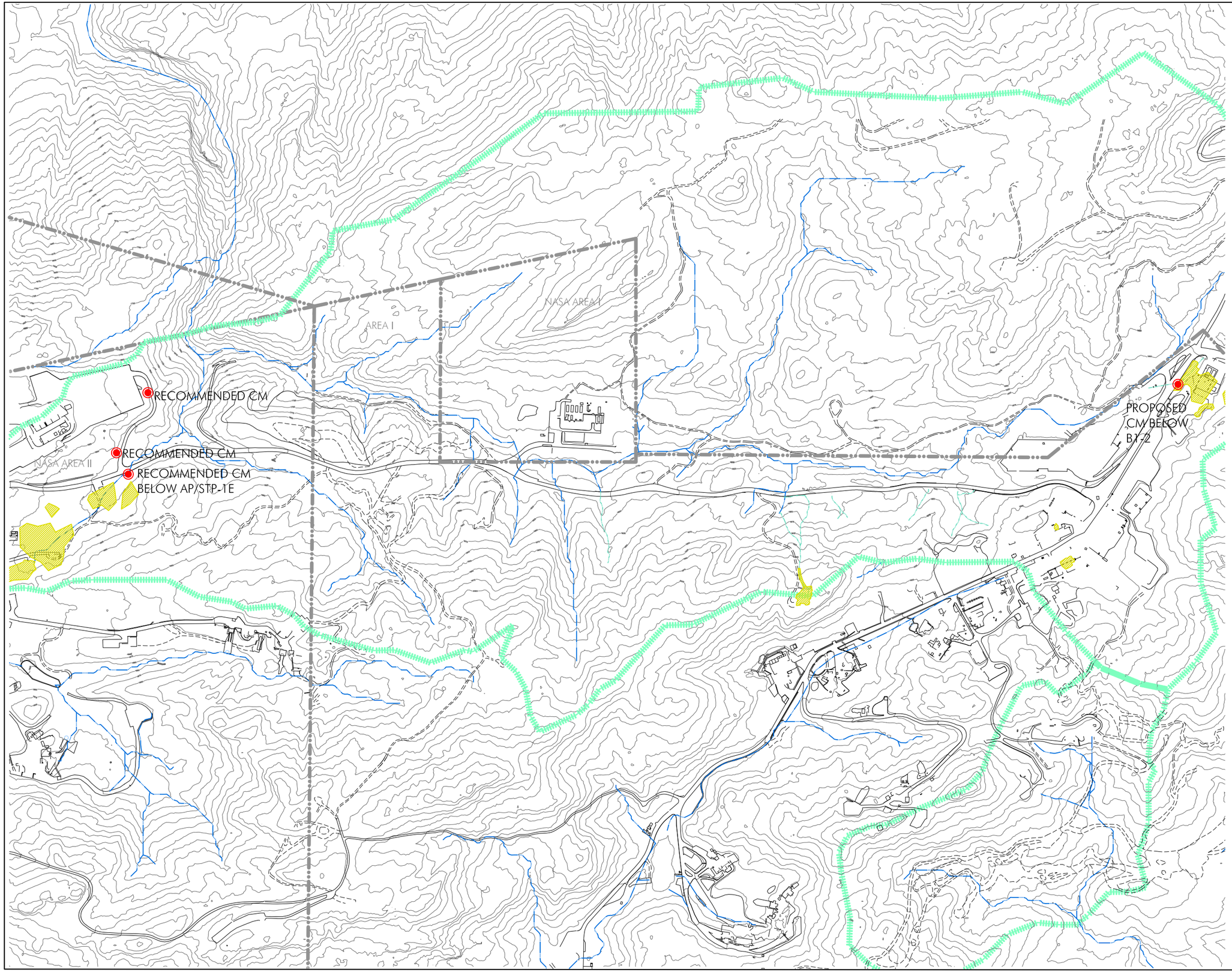
Weed seed contamination in the seed application may also be a source of invasive species. The Panel recommends that the hydroseeding contractor be required to clean the hydroseeding equipment prior to mixing and applying hydroseed at SSFL. The contractor should also be required to submit records of seed purity from the seed supplier to assure that the seed itself is not contaminated with a high percentage of weed seed.

Because we can not predict all the weeds that may become established in the ISRA areas, we recommend that the areas are inspected in February. Species specific weed management strategies should be developed for implementation in March-April.

Installation of additional culvert modification areas and maintenance of existing areas

The Panel has reviewed the performance results of the culvert modification areas and believes that while the data is not consistent, these areas help to retain sediment and likely have a role in reducing pollutant discharges from open space areas. Therefore, pending further analysis as part of the Work Plan required by the Regional Water Quality Control Board, the Panel recommends the installation of additional culvert modification structures where possible.

We understand that Boeing will be considering the installation of a culvert modification design on the drainage near the guard structure below RFI B1-2. The Panel supports the siting of an additional culvert modification structure at this location. The Panel has also identified three other locations where culvert modification structures could be beneficial because of their locations below RFI or paved areas (Figure 1). Previously installed culvert modification designs were based on hydraulic calculations to demonstrate percent of long-term capture, filtration capacity, or design flow rate, and water elevation during flood events to avoid problems with flooding. The Panel recommends a similar investigation is undertaken to ensure proper design of additional culvert modifications.



wra
ENVIRONMENTAL CONSULTANTS
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San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

Boeing SSFL

Watershed 009

ISRA 2010
AREAS

Figure 1

ADDITIONAL CULVERT MODIFICATION RECOMMENDATIONS

N

0' 600'

LEGEND

- RECOMMENDED LOCATION FOR ADDITIONAL CULVERT MODIFICAITON
- ESTIMATED RFI AREAS
- WATERSHED BOUNDARY
- DRAINAGE
- NON-JURISDICTIONAL SURFACE WATER PATHWAY

Date: October 2009
Image Date:
Image Source:
Map By: Megan Stromberg
Filepath: L:\Acad 2000 Files\17000\17166\dwg\Containerized Planting - Fall 2009\Containerized Planting Areas - Oct 2009.dwg

Appendix 1
Flexterra HP – FGM

Flexterra® HP-FGM™

600% GREATER GERMINATION, NEARLY PERFECT EROSION CONTROL, NOW 100% BIODEGRADABLE.

New patent-pending Flexterra® High Performance-Flexible Growth Medium™ (HP-FGM™) takes the near-perfect performance of the original Flexterra FGM to an even higher level. Introduced in 2004, Flexterra FGM rapidly set a new standard of excellence for controlling erosion and establishing vegetation on severe slopes. It outperformed blankets and led the movement toward more cost-effective, environmentally responsible hydraulically applied techniques. Flexterra HP-FGM represents the next generation in Flexible Growth Media and is proven to surpass the original's outstanding performance.

NEW FLEXTERRA HP-FGM DELIVERS:

- The highest germination and growth establishment
- Greater than 99% erosion control effectiveness immediately upon application
- 100% biodegradability
- Greater safety for even the most sensitive aquatic environment because it's non-toxic
- Near-perfect erosion control and denser vegetation while protecting the natural environment

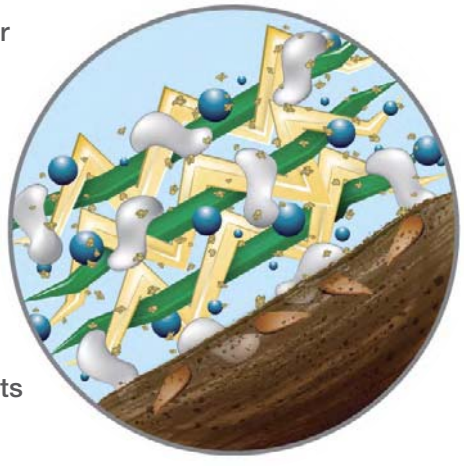
NEW HP TECHNOLOGY: GREENER BY DESIGN

Revolutionary Micro-Pore particles optimize water and nutrient retention

100% recycled Thermally Refined® wood fibers not only produce the highest yield and coverage per pound, they are also phyto-sanitized, eliminating weed seeds and pathogens

100% biodegradable interlocking man-made fibers help increase wet bond strength

100% non-toxic biopolymers and water absorbents further enhance performance



Profile®
Your Trusted Partner In Soil Solutions®

SETTING THE BAR EVEN HIGHER.

> **BETTER EROSION CONTROL—**Flexterra® HP-FGM™ immediately bonds to the soil surface. Its flexible yet stable matrix retains > 99% of soil, vastly reducing turbidity of runoff for up to 18 months. HP also features greater wet bond strength yielding increased resistance to sheet flow.

> **GREATER SEED GERMINATION AND GROWTH—**High Performance matrix outperforms traditional Flexterra FGM with 600% better initial germination and 250% increased biomass due to a combination of optimized water and nutrient retention.

> **SAFER FOR THE ENVIRONMENT—**Unlike rolled erosion control blankets, Flexterra HP-FGM has no nets or threads to endanger wildlife. It uses 100% biodegradable crimped interlocking fibers and 100% recycled and phyto-sanitized wood fibers. Flexterra HP-FGM is 100% safe for aquatic and terrestrial life forms.

> **EARTH-FRIENDLY *and* SUSTAINABLE RESULTS—**Flexterra HP-FGM is a result of Profile's Green Design Engineering,™ creating cost-effective and environmentally superior solutions through the design, manufacture and application of sustainable erosion control and vegetation establishment technologies.

TECHNICAL DATA

PHYSICAL PROPERTIES*	TEST METHOD	UNITS	MINIMUM VALUE
Mass/Unit Area	ASTM D6566[1]	g/m^2 (oz/yd^2)	407 (12)
Thickness	ASTM D6525[1]	mm (in)	5.6 (0.22)
Wet Bond Strength	ASTM D6818[1]	N/m (lb/ft)	131 (9)
Ground Cover	ASTM D6567[1]	%	99
Water-Holding Capacity	ASTM D7367	%	1700
Material Color	Observed	n/a	Green
ENVIRONMENTAL PROPERTIES*	**TEST METHOD**	**UNITS**	**TYPICAL VALUE**
Biodegradability	ASTM D5338	%	100
Functional Longevity[2]	ASTM D5338	n/a	Up to 18 months
Ecotoxicity	EPA 2021.0	%	96-hr LC50 > 100%
Effluent Turbidity	Large Scale[3]	NTU	< 100
PERFORMANCE PROPERTIES*	**TEST METHOD**	**UNITS**	**VALUE**
Cover Factor[4]	Large Scale[3]	n/a	< 0.01
Percent Effectiveness[5]	Large Scale[3]	%	> 99
Cure Time	Observed	hours	0-2
Vegetation Establishment	ASTM D7322[1]	%	> 800
PRODUCT COMPOSITION			**TYPICAL VALUE**
Thermally Processed Wood Fibers[6] (within a pressurized vessel)			80% ± 3%
Cross-Linked Biopolymers and Water Absorbents			10% ± 1%
Crimped, Man-Made Biodegradable Interlocking Fibers			5% ± 1%
Proprietary Mineral Activator			5% ± 1%

* When uniformly applied at a rate of 3900 kg/ha (3500 lbs/ac) under laboratory conditions.

1. ASTM test methods developed for Rolled Erosion Control Products that have been modified to accommodate Hydraulic Erosion Control Products.
2. Functional Longevity is the estimated time period, based upon field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to—temperature, moisture light conditions, soils, biological activity, vegetative establishment and other environmental factors.
3. Large scale testing conducted at Utah Water Research Laboratory. For specific testing information please contact a Profile technical service representative at 866-325-6262.
4. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
5. % Effectiveness = One minus Cover Factor multiplied by 100%.
6. Heated to a temperature greater than 193 degrees C (380 degrees F) for 5 minutes at a pressure greater than 345 kPa (50 psi) in order to be Thermally Refined®/Processed and to achieve phyto-sanitization.

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Green Design Engineering™ is a holistic approach, combining environmentally beneficial design and ecologically sound products with agronomic and erosion control expertise, to provide the most effective, customized and cost-efficient solutions for erosion control and vegetative establishment.

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Appendix 2
Materials Safety Data Sheet for Flexterra HP – FGM

MSDS Material Safety Data Sheet

PROFILE Products, LLC

Flexterra® HP

MSDS Number: CON062 Revision Date: 3/16/2010

1 PRODUCT AND COMPANY IDENTIFICATION

Manufacturer

PROFILE Products, LLC
750 LAKE COOK ROAD
SUITE 440
BUFFALO GROVE, IL 60089

Contact:
Telephone Number: (847) 215-1144
FAX Number: (847) 215-0577
E-Mail: profileproducts.com
Web www.profileproducts.com

Product Name:	Flexterra® HP
Revision Date:	3/16/2010
MSDS Number:	CON062
CAS Number:	Not applicable
Product Use:	Erosion control and revegetation mulch for hydraulic seeding

Product Description: Green dyed wood fibers, man-made biodegradable fibers, minerals and a proprietary binder mixture.

2 HAZARDS IDENTIFICATION

Route of Entry:	Inhalation, skin contact, eye contact
Target Organs:	
Inhalation:	Wood may cause sneezing, irritation, and dryness of the nose and throat. Dust may aggravate pre-existing respiratory conditions.
Skin Contact:	Wood dust can cause irritation. Skin absorption is not known to occur.
Eye Contact:	Wood dust can irritate the eyes.
Ingestion:	No reports of human ingestion.

NFPA-ratings (scale 0-4): Health = 1, Fire = 2, Reactivity = 0

OSHA Classification: Wood dust is a hazardous substance as defined by the Hazard Communication Standard 29CFR 1910.1200

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients:

Cas #	Perc.	Chemical Name
9000300	Proprietary	Guar gum
14808607	<.025%	Silica, crystalline quartz

4 FIRST AID MEASURES

Inhalation: Usually not a problem. Remove to fresh air if respiratory irritation develops, and get medical aid promptly if irritation persists. In high dust levels wear dust mask.

Skin Contact: Usually not a problem. Wash off with running water if irritation is experienced.

Eye Contact: Open eyelids and flush with water.

Ingestion: Get medical attention.

5 FIRE FIGHTING MEASURES

Flash Point: Not applicable
Flash Point Method: Not applicable
Autoignition Temperature: 200-206°C (400-500°F)
Flammability Classification: Combustible product

Conditions to avoid: In contact with flames or hot surfaces

Flammable- Extinguish with water;same as a wood fire

6 ACCIDENTAL RELEASE MEASURES

Scoop up product. Wear goggles and respirator if dust is produced in unventilated areas. Wet product will be slippery.

7 HANDLING AND STORAGE

Handling Precautions: Clean up areas where dust settles. Minimize blowdown or other practices that generate high airborne dust concentrations.

Storage Requirements: Store in a cool, dry place. Keep away from sources of ignition.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: None required for outdoor mixing and application. Use dust collection system for indoor handling operations.

Protective Equipment: Eye Protection: Wear goggles when emptying bags and during other operations where there is a risk of dust entering the eyes.
Gloves: Leather, plastic or rubber gloves could be worn to minimize skin irritation.
Respirators: When handling methods generate dust at concentrations that exceed occupational exposure limits, wear a NIOSH approved respirator. A fabric respirator or a facepiece respirator with dust cartridges will generally provideadequate protection.
Footwear: The product is slippery when wet. Wear appropriate footwear.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Dyed green wood fibers - Pine & mixed hardwoods		
Physical State:	Wood Fibers	**Boiling Point:**	
Odor:	Mild wood odor	**Freezing/Melting Pt.:**	
pH:		**Solubility:**	
Vapor Pressure:	N/A	**Spec Grav./Density:**	lighter than water
Vapor Density:			

10 STABILITY AND REACTIVITY

Stability:	Stable product
Conditions to avoid:	Contact with strong acids and oxidizers may generate heat. Product may ignite at temperatures in excess of 200°C (400°F).
Materials to avoid (incompatability):	Strong acids and oxidizers
Hazardous Decomposition products:	
Hazardous Polymerization:	Will not occur.

11 TOXICOLOGICAL INFORMATION

EFFECTS OF CHRONIC EXPOSURE:

Inhalation: Frequent and repeated exposure to wood dust is associated with an increased risk of developing nasal cancer.
Skin Contact: Although rare, wood dust may cause dermatitis in sensitized people.

Occupational Exposure Limits:

Wood dusts- All other species: ACGIH (2007): TLV-TWA 1 mg/m³ (Inhalable fraction); A4
Particulates Not Otherwise Regulated (PNOR): OSHA: PEL-TWA 15 mg/m³ (Total Dust); 5 mg/m³ (Respirable fraction)

Irritancy: Wood dust is a mild irritant
Sensitization: Some wood dusts may cause allergic skin reactions

12 ECOLOGICAL INFORMATION

Guar Gum (CAS# 9000-30-0) is listed as an inert ingredient permitted for use in nonfood use pesticide products by EPA. It is also classified under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as a minimal risk inert substance (List 4A) meaning that as a pesticide, guar gum is considered by the EPA to pose little or no risk to humans or the environment. The US Department of Agriculture (USDA) National Organic Program (NOP) also allows the use of Guar Gum in a variety of applications, but primarily as a pesticide in organic production operations. Finally, Guar Gum is listed on the Generally Recognized as Safe (GRAS) list by the Food and Drug Administration.

96-hr Survival LC_{50} = >100% for *Daphnia magna* when runoff generated using ASTM D7101 (4"/hr rainfall rate) was tested according to EPA-821-R-02-012.

13 DISPOSAL CONSIDERATIONS

Normally can be disposed of as a wood residue. Ensure disposal is in compliance with local, provincial (state), and federal regulations.

14 TRANSPORT INFORMATION

DOT Class: Not regulated #

15 REGULATORY INFORMATION

COMPONENT / (CAS/PERC) / CODES

*Guar gum (9000300 n/a%) TSCA

*Silica, crystalline quartz (14808607 <.025%) MASS, NRC, OSHAWAC, PA, TSCA, TXAIR

REGULATORY KEY DESCRIPTIONS

MASS = MA Massachusetts Hazardous Substances List
NRC = Nationally Recognized Carcinogens
OSHAWAC = OSHA Workplace Air Contaminants
PA = PA Right-To-Know List of Hazardous Substances
TXAIR = TX Air Contaminants with Health Effects Screening Level

CERCLA = Superfund clean up substance
CSWHS = Clean Water Act Hazardous substances
EHS302 = Extremely Hazardous Substance
EPCRAWPC = EPCRA Water Priority Chemicals
HAP = Hazardous Air Pollutants
NJEHS = NJ Extraordinarily Hazardous Substances
NJHS = NJ Right-to-Know Hazardous Substances
OSHAPSM = OSHA Chemicals Requiring process safety management
SARA313 = SARA 313 Title III Toxic Chemicals

TSCA = Toxic Substances Control Act

16 OTHER INFORMATION

END OF MSDS DOCUMENT