

**Final Implementation Plan  
for Greens Bayou  
Restoration Project**

**February 2011**

**I. Introduction**

- A. This *Draft Implementation Plan for Greens Bayou Restoration Project* (Implementation Plan or IP) describes the construction, monitoring and reporting requirements for the BNC Wetlands Restoration Project (“Restoration Project”) at the Baytown Nature Center (Nature Center), in Baytown, Texas. All work will be performed pursuant to the consent decree in *United States of America and the State of Texas v. GB Biosciences Corporation, ISK Magnetix, Inc and Occidental Chemical Corporation* (the “Consent Decree” or “Decree”) and this Implementation Plan is incorporated by reference therein and is an attachment to the Decree.<sup>1</sup> Unless otherwise expressly provided herein, terms used in this Implementation Plan that are defined in CERCLA, 42 U.S.C. § 9601 *et seq.*, in regulations promulgated under CERCLA, 43 C.F.R. Part 11 and 40 C.F.R. Part 300, or in the Consent Decree will have the meaning assigned to them in CERCLA, in the regulations or in the Decree.
- B. The restoration project will be conducted in four phases including project planning and approval, construction, planting, and monitoring. The construction involves the physical construction of the marsh by removal of debris, excavation of soil, and placement of soil in open water at elevations suitable to support marsh vegetation. After the marsh elevations have been established by a licensed professional land surveyor following an appropriate period of time for settling of the material, marsh grasses will be planted in the sediment at specified locations during the planting phase. The final phase of the restoration is to monitor the project success according to criteria established in the Implementation Plan.

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<sup>1</sup> As stated in the Decree, the settlement also includes the preservation in perpetuity of 100.17 acres of forested wetlands, which will be preserved in conjunction with the Spring Creek Preserve initiative spearheaded by local government and the Bayou Land Conservancy.

## **II. Project Planning and Approval Phase**

### **A. Description of Restoration Project**

1. The Restoration Project will restore approximately 13.8 acres of intertidal saltmarsh within the northern portion of the Nature Center. The Decree requires a minimum of 10.9 acres of restoration. The Nature Center consists of 450 acres of land across two connected peninsulas in the western extent of the city of Baytown, and is publicly owned and managed by the City of Baytown Parks and Recreation Department (Exhibit A). The two peninsulas are surrounded by three bays: Burnet Bay to the north, Scott Bay to the south and Crystal Bay and the Houston Ship Channel to the west. The Nature Center was established at the site of the former Brownwood subdivision, which was abandoned after severe subsidence and chronic flooding. Several wetland restoration projects have been implemented previously within the Nature Center, and this Restoration Project has been designed to build upon these previous efforts.
  
2. The Restoration Project will occur on three distinct parcels, Area 2, Area 3 and Area 4, as depicted in Exhibit A, and will include creating intertidal saltmarsh habitat by excavating overburden fill material and creating intertidal fringe saltmarsh habitat by pushing the material into the adjacent open water, to restore the saltmarsh to an elevation suitable to increase tidal exchange and thereby increase benthic productivity. Following all grading activities, the site will be planted with plugs of smooth cordgrass (*Spartina alterniflora*) and salt meadow cordgrass (*Spartina patens*).
  - a) Area 2 includes 3.8 acres of intertidal saltmarsh habitat and 1.3 acres of intertidal fringe saltmarsh habitat.
  - b) Area 3 includes 2.8 acres of intertidal saltmarsh habitat and 1.9 acres of intertidal fringe saltmarsh habitat.
  - c) Area 4 includes 2.6 acres of intertidal saltmarsh habitat and 1.4 acres of intertidal fringe saltmarsh habitat.

### **B. Planning and Approval Requirements**

3. Permit Applications. Within 6 months<sup>2</sup> of the effective date of the Consent Decree, the Settling Defendants will submit applications to the appropriate regulatory authorities for all permits required for the construction of the Restoration Project (e.g., Section 404 Clean Water Act permit, Section 401 Water Quality Certification). The Settling Defendants will also submit to the Trustees a list of the permits that have been sought and will certify that all required applications have been filed with the appropriate regulatory authorities.
4. Construction Schedule. At least 30 days before beginning construction of the Restoration Project, the Settling Defendants will submit a notice to the Trustees describing the construction schedule, including the first day construction will begin and the estimated completion date, along with the Settling Defendants' construction schedule for the Restoration Project.
5. Draft Design Plan. A draft Design Plan will be submitted for the Trustees' review and approval at least 30 days prior to beginning construction of the Restoration Project. The review and approval of the draft Design Plan and any revisions will follow the procedures outlined in Section V, Paragraph 11.B of the CD. The purpose of the Design Plan is to provide documentation of the details of the project construction. The Design Plan will include, at a minimum, the results of the survey of elevation in the reference marsh, the elevations in the project site, the required permits, and the construction schedule. The Design Plan will also provide additional details on the planting phase.

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<sup>2</sup> Or within the timeframe of the schedule specified in the Decree.

### **III. Construction and Planting Phases**

#### **A. Construction Criteria**

1. The Restoration Project will be constructed in accordance with the figures in Exhibit B and in accordance with the following construction criteria:
  - a. Remove concrete debris currently existing within Area 2 and Area 3.
  - b. Maintain a 10 foot buffer around the existing remnant swimming pool in Area 2, with a 3:1 slope.
  - c. Construct a minimum of 10.9 acres of intertidal saltmarsh at an elevation appropriate to support intertidal saltmarsh. The elevation for the construction will be determined by conducting a survey at a suitable reference marsh, as determined by the Trustees and the Settling Defendants, and recorded in feet National Geodetic Vertical Datum (NGVD) 88.
    - i. For the intertidal saltmarsh habitat, the area will be built by cutting the overburden material from the existing road at a 5:1 maximum slope to the specified elevation. The overburden material will then be cut to specified elevations and graded to maintain a gradual slope to the adjacent open water (see Typical Mitigation Area Cross Section figure in Exhibit B).
    - ii. For the intertidal fringe saltmarsh habitat, the area will be built pushing the excavated material out into the adjacent open water.
    - iii. The resulting planting area shall be at elevations suitable to support intertidal saltmarsh.

**B. Construction Completion**

2. Post-Construction Report. Within 30 days of completion of the construction phase of the Restoration Project, the Settling defendants shall notify the Trustees that the construction phase is complete and provide an “as-built” survey and drawings showing the elevations of the project and the location of significant features. Within 14 days after receipt of the Post-Construction Report, the Trustees will schedule and conduct an inspection of the completed Restoration Project to determine whether the project was completed in accordance with the Implementation Plan and the Design Plan.
3. Trustee Review Procedure for the Construction Phase. The Trustees will evaluate the Post-Construction Report and the results of any inspection they may conduct.
  - a. If the Trustees have determined that the Settling Defendants have achieved the applicable construction criteria for the Restoration Project, they will provide preliminary oral notice to the Settling defendants upon completing the inspection of the Restoration Project or 14 days after receipt of the Post-Construction Report, whichever is later. Within 30 days after providing oral notice of achieving the construction criteria, the Trustees will issue to the Settling Defendants, a written, dated Certificate of Construction Completion for the Restoration Project.
  - b. If the Trustees have determined that the Settling Defendants have not achieved the construction criteria, or that Settling Defendants have not provided the documentation needed for the Trustees to determine whether the Settling Defendants have achieved the construction criteria, they will provide preliminary oral notice of these circumstances to the Settling Defendants upon completing the inspection of the Restoration Project or 14 days after receipt of the Post-Construction Report, whichever is later. Within 30 days after providing oral notice of construction deficiencies, the Trustees will provide to the Settling Defendants a written description of the deficiencies.

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- c. The Trustees and Settling Defendants will meet (virtually or in-person) within 21 days after receipt of the notice of deficiency by the Settling Defendants, or the date of receipt of any missing information, whichever is later.
- d. Within 60 days after the receipt of the Trustees' description of deficiencies, the Settling Defendants will modify the project in accordance with the Trustees' comments and shall notify the Trustees upon completion of the modifications.
- e. The Trustees will again inspect the project noticed as complete and/or review information provided by the Settling Defendants.
  - i. If the Trustees have obtained or been provided satisfactory information to establish that the applicable criteria have been achieved, the Trustees will issue the written, dated Certificate of Construction Completion.
  - ii. If the deficiency has not been corrected, the Trustees will provide to the Settling Defendants a written notice of disapproval.
  - iii. Settling Defendants will within 30 days of receipt of notice of disapproval, submit additional information, modify construction of the deficient Restoration Project, or invoke the Dispute Resolution provisions in the Consent Decree.
  - iv. The process described in this paragraph will be repeated until the applicable construction criteria have been achieved or the Settling Defendants invoke the Dispute Resolution provisions in the Consent Decree.

**C. Planting Criteria**

4. Once the construction phase is complete, the restoration area will be planted on 3- to 5-foot centers using approximately 4-inch plugs of nursery-grown, purchased and/or harvested *S. alterniflora* and *S. patens*.
5. Should it be necessary to remove any existing wetland vegetation during the construction process, such vegetation shall be replaced by planting suitable species at the impacted location.

**D. Planting Completion**

6. The procedures set forth in Paragraphs III.B.2 and 3 of this Implementation Plan shall also apply to the Trustees' inspection and certification of the Planting Phase of the project with the substitution of the term planting for construction as appropriate.

**IV. Monitoring Phase**

**A. General**

1. The Restoration Project Monitoring Phase will consist of two stages (Stage I and Stage II) and will commence upon issuance by the Trustees of the Certificate of Planting Completion. The purpose of the Monitoring Phase is to determine whether and when the success criteria specified in Section V have been achieved and whether any corrective actions are required. The Monitoring Phase will continue for a minimum of three years after the date of issuance of the Certificate of Planting Completion.

**B. Monitoring Methods**

2. The Settling Defendants will determine if the success criteria specified in Section V have been or will be met during the Restoration Project, in accordance with the schedule specified in this Implementation Plan. Monitoring events will use a predetermined number of permanent, randomly selected monitoring locations. Stage I and Stage II monitoring will be conducted at least annually using both qualitative and quantitative field methods. Qualitative monitoring will involve visual observations of wildlife use, ground-level photographs and at least one aerial photograph

of the planted areas. Ground-level photography will provide a snapshot of the condition of the planted vegetation. Fixed photo monitoring stations will be established at and coincide with the center of each monitoring location. Four digital photographs facing each cardinal direction (i.e. north, south, east, and west) will be taken during both Stage I and Stage II monitoring. These photographs will document conditions at each monitoring location from a uniform vantage point over the course of the Stage I monitoring period. Ground photographs may also be taken, as needed, to document conditions such as herbivory damage, when the early successional community is most sensitive, and fauna observed at the Restoration Project.

Quantitative monitoring for both stages will include estimates of total vegetative cover, as well as specific cover estimates for each identified species at each monitoring location using quadrants. Quadrants will be randomly distributed over each planted area and estimates of percent cover and variability of survival of desired species will be determined for each quadrant with an Alpha level of 0.2.

### **C. Stage I Monitoring**

3. Stage I monitoring consists of a post-planting growth period. Stage I begins upon issuance of the Certificate of Planting Completion and will continue until the Trustees, in consultation with the Settling Defendants, have determined that the success criteria specified in Section V have been achieved but shall last a minimum of one year in any event.
  - a. During Stage I monitoring, the Settling Defendants must monitor the Restoration Project in accordance with the following schedule, at a minimum:
    - i. During the fall of each year after the first growing season, the Settling Defendants will monitor the Restoration Project to determine its status with respect to the success criteria.
    - ii. If the Settling Defendants have not achieved the success criteria by October 31 of the second growing season after issuance of the Certificate of Planting Construction, or by October 31 in any subsequent growing season, the Settling Defendants will arrange

an inspection with the Trustees to be conducted in November to determine whether corrective action should be undertaken by the Settling Defendants in accordance with the procedures specified in Section VI.

- iii. No earlier than one year after the date of issuance of the Certificate of Planting Completion for the Restoration Project, or at any time thereafter, if the Settling Defendants conclude that they have achieved the success criteria specified, the Settling Defendants will provide a Stage I Monitoring Report to the Trustees, documenting (in accordance with the monitoring methods specified in Section IV.C) that the Settling Defendants have met the success criteria. If the Trustees determine that the Settling Defendants have achieved the success criteria, the Trustees will issue to the Settling Defendants a written, dated Certificate of Stage I Monitoring Completion and the Stage II Monitoring period will commence.
- iv. If the Trustees determine that the Settling Defendants have not achieved the success criteria, the Trustees will provide a written notice of deficiency within 14 days of receipt of the Stage I Monitoring Report, and the Settling Defendants will follow the procedures outlined in the corrective action review process in Section VI.C.

**D. Stage II Monitoring**

4. Stage II monitoring consists of a performance monitoring period and commences upon issuance by the Trustees of the Certificate of Stage I Monitoring Completion. Stage II Monitoring will take place during the fall of each year at least annually and will continue until success criteria have been maintained for at least two consecutive years from the date of issuance of the Certificate of Stage I Monitoring Completion.
5. If the Settling Defendants conclude that they have maintained the success criteria specified in Section V without undertaking a corrective action for two consecutive years after issuance of the Certificate of Stage I Monitoring Completion, the Settling Defendants will arrange an inspection with the Trustees. Within forty-five days after the inspection date, the

Settling Defendants will provide a Stage II Monitoring Report to the Trustees, documenting that the Settling Defendants have met the Stage II success criteria in accordance with the monitoring methods specified in Section IV.D. If the Trustees determine that the Settling Defendants have achieved the success criteria, the Trustees will issue to the Settling Defendants the written, dated Certificate of Restoration Project Completion within twenty-one days of receipt of the Stage II Monitoring Report and the Settling Defendants will have no further obligations under this Implementation Plan.

6. If during the Stage II Monitoring, inspections of the Restoration Project by the Settling Defendants and/or the Trustees indicate that the success criteria are not being maintained, the Trustees will provide written notice of deficiency within fourteen days of receipt of the Stage II Monitoring Report and the Settling Defendants will follow the procedures outlined in the corrective action review process in Section VI.C. If corrective action is required, the Stage II Monitoring will be extended by one additional year from issuance of the Certificate of Corrective Action Completion for the affected portion of the Restoration Project. Regardless of the number of corrective actions undertaken, the Stage II Monitoring will not exceed a total of three years, i.e., two consecutive years from issuance of the Certificate of Stage I Monitoring Completion plus one year from issuance of the Certificate of Corrective Action Completion.

**V. Success Criteria**

- A. Success criteria define short-term milestones that, if met, will provide reasonable assurance of long-term project success. Monitoring provides the information necessary to assess the project status and to aid in determining project progress toward milestones or whether corrective actions may be necessary.
- B. Each stage of monitoring will be complete when the following criteria have been achieved:
  - 1. Attain an average vegetative cover of 70 percent of desired species over each of the planted areas in the Stage I monitoring period and maintain an average vegetative cover of 70 percent of desired species over each of the planted areas for two consecutive years during the Stage II monitoring period.
  - 2. Eliminate non-native or invasive plant species (i.e., common reed [*Phragmites australis*], Chinese tallow [*Sapium sebiferum*], salt cedar [*Tamarix spp.*], deep rooted sedge [*Cyperus entriarianus*]) that threaten the establishment of a native intertidal saltmarsh community during the Stage I monitoring period. During Stage II, shrubs and non-native or invasive species shall comprise less than 10 percent of the vegetative cover of the planted areas.

**VI. Corrective Action**

**A. Types of Corrective Actions**

- 1. If the Restoration Project fails to meet the success criteria during either the Stage I or Stage II Monitoring, the Settling Defendants will undertake corrective actions so that the success criteria may be achieved, subject only to the limits provided in Section VI.B. Corrective actions may include:
  - a. Adjustments to the elevation of the restored intertidal saltmarsh, or portions thereof

- b. seeding or replanting *S. alterniflora* and *S. patens* in the areas where the success criteria have not been achieved
  - c. removal of non-native or invasive plant species
  - d. construct a wave break in areas of the marsh which have been degraded by the result of wave energy.
2. After consultation between the Trustees and the Settling Defendants, the Trustees may require or authorize an alternative corrective action subject to the Limits on Corrective Actions in Section VI.B.

**B. Limits on Corrective Actions**

3. The Settling Defendants will not be required to undertake the corrective actions specified in Section VI.A.1.a and b, in excess of the following limits:
  - a. Limit on Corrective Action for Elevation or Erosion

If the Settling Defendants fail to achieve the vegetation criteria specified for the Restoration Project after issuance of the Certificate of Construction Completion because of subsequent changes in the elevation or loss of marsh due to erosion, as indicated in a survey conducted during the monitoring period, the Settling Defendants will be required to alter the planting area elevation (or construct a wave break for prevention of erosion) only once for each restoration area. To qualify for this corrective action limit within each restoration area, any elevation change or wave break must involve the one-time alteration of at least 10 percent of a contiguous restored saltmarsh area.
  - b. Limit on Corrective Action for Vegetation

If during the Stage II Monitoring, the Settling Defendants fail to maintain at least 70 percent vegetative cover of desired species on each planted area identified in the survey used for the Certificate of Construction, the Settling Defendants will not be required to replant more than the cumulative equivalent of 100 percent of the original area that was planted and certified. The 100 percent replanting limit will apply only after the Trustees have issued the Certificate of Stage I Monitoring Completion.

- c. The Settling Defendants will have no further obligation to undertake a corrective action required in Sections VI.A.1.a and b, after the limit for that corrective action, as specified in Section VI.B.3.a and b, has been met; however, they will undertake all other requirements specified by this Implementation Plan after the corrective action limits specified in this section have been met.

#### **C. Corrective Action Review Process**

4. The Settling Defendants may undertake corrective actions focused on the removal of non-native or invasive plant species without providing notice to the Trustees.
5. Either the Settling Defendants or the Trustees may provide written notice that a corrective action should be undertaken.
6. Except as provided under Paragraph V.C.4, the Settling Defendants will provide a Corrective Action Plan to the Trustees within 90 days after the Settling Defendants and/or the Trustees provide written notice that corrective action and a Corrective Action Plan are required for the Restoration Project. The Corrective Action Plan will include the following information, at a minimum:
  - a. Elevation Corrective Actions

An Elevation Corrective Action Plan will include the following components:

- i. description of the condition(s) or circumstance(s) to be addressed by the corrective action, including a map showing the affected area
- ii. analysis of the cause(s) for such condition(s) or circumstances(s)
- iii. action(s) and/or monitoring activities proposed to be undertaken to rectify, resolve or otherwise address the condition(s) or circumstance(s)
- iv. copies of any permits, leases, special use or other agreements necessary to implement the proposed activities
- v. additional information requested by the Trustees after notification of the elevation corrective action to be undertaken

b. Vegetation Corrective Actions

A Vegetation Corrective Action Plan shall include:

- i. description of the condition(s) or circumstance(s) to be addressed by the corrective action, including a map showing the affected area
- ii. analysis of the cause(s) for such condition(s) or circumstances(s)
- iii. action(s) and/or monitoring activities proposed to be undertaken to rectify, resolve or otherwise address the condition(s) or circumstance(s)
- iv. additional information requested by the Trustees after notification of the vegetation corrective action to be undertaken

c. Wave Break Corrective Actions

A Wave Break Corrective Action Plan shall include:

- i. description of the condition(s) or circumstance(s) to be addressed by the corrective action, including a map showing the affected area
  - ii. analysis of the cause(s) for such condition(s) or circumstances(s)
  - iii. action(s) and/or monitoring activities proposed to be undertaken to rectify, resolve or otherwise address the condition(s) or circumstance(s)
  - iv. additional information requested by the Trustees after notification of the wave break corrective action to be undertaken
  - v. copies of any permits, leases, special use or other agreements necessary to implement the proposed activities.
7. For all Corrective Action Plans, within 30 days of receipt of an adequate Corrective Action Plan, the Trustees will provide written notification either approving the Corrective Action Plan, or disapproving the Corrective Action Plan because the proposed corrective action is determined by the Trustees to be insufficient or inappropriate to address the problems. If the Trustees approve the Corrective Action Plan, the Settling Defendants will undertake the action and/or monitoring activities in accordance with the approved Corrective Action Plan. If the Trustees do not approve the Corrective Action Plan, the Trustees will provide to the Settling Defendants their written rationale for disapproving the Corrective Action Plan and the Settling Defendants will provide a revised Corrective Action Plan to the Trustees within 60 days of receipt of the Trustees' notice of disapproval.
8. For all corrective actions undertaken pursuant to Paragraphs V.C.4 through V.C.7, the Settling Defendants will submit a Corrective Action Report within 30 days of completing the actions, describing their compliance with the requirements of the Corrective Action Plan and providing written documentation establishing the results of the corrective action.

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9. For any Corrective Action, the Trustees shall issue a Certificate of Corrective Action Completion within thirty (30) days of receipt of the Corrective Action Report if the Trustees determine that the Corrective Action was carried out in accordance with the approved Correction Action Plan.

**VII. Reporting and Notice Requirements**

- A. The Trustees will provide written notices and/or certifications pertaining to the following matters:
  - 1. Notice of Approval of Design Plan
  - 2. Certificate of Construction Completion
  - 3. Certificate of Planting Completion
  - 4. Certificate of Stage I Monitoring Completion
  - 5. Whether a corrective action will be required
  - 6. Corrective Action Plan(s)
  - 7. Corrective Action Report(s)
  - 8. Certificate of Corrective Action Completion
  - 9. Monitoring Report(s)
  - 10. Certificate of Restoration Project Completion
  
- B. The Settling Defendants will prepare the following plans and reports in accordance with the requirements of this Implementation Plan:
  - 1. Design Plan
  - 2. Post-Construction Report
  - 3. Post-Planting Report
  - 4. Annual and Final Stage I Monitoring Report(s)
  - 5. Annual and Final Stage II Monitoring Report(s)
  - 6. Corrective Action Plan(s)

7. Corrective Action Report(s). As appropriate, these reports may be prepared and submitted separately or combined in a single report.
- C. The Post-Construction Report will include, at minimum:
1. as-built drawings including grading plan
  2. as-built survey
  3. post-construction aerial photograph of the site
- D. The Post-Planting Report will include, at minimum:
1. planting plan, which will include
    - a. figure showing schematic of planted areas
    - b. table with quantity of plants per area, plant spacing per area, plant density per area
- E. Annual and final Stage I Monitoring and Stage II Monitoring Reports will include, at a minimum:
1. brief summary of the quantitative and qualitative data
  2. monitoring results and analyses, including tables and figures, as appropriate
  3. site maps showing data collection locations and results, as appropriate
  4. annual aerial photograph of the site
  5. summary of any non-native or invasive species control actions taken
  6. results or outcomes from any previous corrective actions, if applicable.