

DOCKET 01-EP-7C
DATE _____
RECD. APR 01 2009

GWF Hanford Combined Cycle Amendment

Soils and Water Resources Data Response Clarifications

The following clarifications are responses to comments provided by Mark Lindley on February 19, 2009 and discussion held between the CEC and GWF on March 3, 2009.

Data Response 24

GWF has created an Equivalent Annual Cost (EAC) estimate as suggested by the CEC comparing the cost of utilizing secondary treated water from the Hanford Wastewater Treatment Plant as the primary water source for GWF Hanford versus the proposed use of banked water with the Kings County Water District. The analysis is attached as Attachment DR3.2-24.

Siemens Water Technologies Corporation provided engineering guidance and capital cost estimates for the equipment required to treat the recycled water and the resultant waste streams. The Turlock Irrigation District was contacted for operational and maintenance costs for recycled water treatment and use. These values were scaled to account for differences in system sizing and operational conditions.

The EAC analysis estimates the use of recycled water for GWF Hanford would cost approximately \$10.30 per MWh. The proposed water source is estimated to cost approximately \$1.27 per MWh. The difference of \$9.03 per MWh shows that the use of recycled water at GWF Hanford is economically infeasible.

The banked water with the Kings County Water District is not subject to allocation restrictions, so the 15% allocation scenario suggested by the CEC is not realistic for GWF Hanford and was therefore not analyzed.

Data Response 26

The contributing watershed has been highlighted in Attachment DR3.2-26. All areas within the permanent fence shall drain to the expanded stormwater retention basin.

Areas outside of the permanent fence shall be routed away from the site and will not discharge to the stormwater retention basin. Hanford LP, located immediately to the west of GWF Hanford, has a laydown area to the west and south of the stormwater retention basin within the permanent fence. This permanent laydown area will drain to the expanded stormwater retention basin. Runoff from the construction parking and laydown area to the north of the site shall be handled under the Construction SWPPP.

The storm water retention basin in service at GWF Hanford is exempt from the Industrial Activities Storm Water General Permit requirements because of criteria 4 under **Types of Discharges Not Covered By This General Permit: Facilities Which Do Not Discharge Storm Water To Waters of the United States: 4b. Facilities That Do Not Discharge Storm Water To Surface Waters or Separate Storm Sewers:** ... “storm water that disposed of to evaporation ponds, percolation ponds, or combined sewer systems are not required to obtain a storm water permit.”

As a Best Management Practices, GWF Hanford will maintain a Storm Water Pollution Prevention Plan that will identify pollution prevention controls and monitoring activities of storm water discharges. The levels of oil and grease, pH, TSS and metals that have been reported from the current monitoring activities are insignificant and below any threshold limits that would be required by an NPDES permit were this facility subject to waste discharge orders for surface water discharges.

Data Response 27

GWF calculated the required stormwater retention basin volume for all areas within the permanent fence. The calculation can be found in Attachment DR3.2-27.1. The permanent area was broken up into three distinct areas with different runoff coefficients. The areas are identified in Attachment DR 3.2-27.2. The estimated required retention basin volume was 143,730 cubic feet versus the proposed total volume of 158,243 cubic feet.

With respect to the vector management, the retention basin has been in active use for nearly 20 years without a single incident related to vector management. Based on this extensive history of operation over a range of conditions, there is no evidence to suggest that vector management is a significant concern. The potential for occurrence of a vector management issue is extremely low and can be adequately addressed (in the unlikely event of occurrence) through means other than designing the retention basin's capacity to drain within three to five days. Options could include application of an approved vector control agent to the surface of the pond or if necessary, removal of standing water for discharge to an approved offsite facility using a properly licensed hauler. Since neither of these actions has been necessary in the 20-year operating history of the plant, GWF does not anticipate the need for them in the future.

GWF Hanford Combined Cycle Project

Capital Cost Estimate

Category	Item	Hours	Rate	Estimated Cost	Notes
Environmental Study/ Permitting				\$ 40,000	
Easements				\$ 75,000	
Water Purchase Agreement				\$ 50,000	
Legal				\$ 10,000	
Engineering		480	125	\$ 60,000	
Pump Station					
	Equipment Cost			\$ 100,000	
	Install			\$ 60,000	
Pipeline					
	Material cost			\$ 100,000	
	Install			\$ 400,000	
Tertiary Treatment Unit					
	Equipment Cost			\$ 1,100,000	Based on quote from Siemens
	Foundation			\$ 30,000	
	Installation			\$ 660,000	
	OEM T/A			\$ 28,500	\$200/hr for 3 man-weeks + 3x\$1000 flights + 15x\$100 per diem
	Training			\$ 9,500	\$200/hr for 1 man-week + \$1000 flight + 5x\$100 per diem
	Startup and Testing			\$ 19,000	\$200/hr for 2 man-weeks + 2x\$1000 flight + 10x\$100 per diem
Zero Liquid Discharge System					
	Equipment Cost			\$ 3,200,000	Based on quote from Siemens + 1.5M for Crystallizer and auxiliaries
	Foundation			\$ 50,000	
	Installation			\$ 1,920,000	
	OEM T/A			\$ 38,000	\$200/hr for 1 man-month + 4x\$1000 flights + 20x\$100 per diem
	Training			\$ 9,500	\$200/hr for 1 man-week + \$1000 flight + 5x\$100 per diem
	Startup and Testing			\$ 19,000	\$200/hr for 2 man-weeks + 2x\$1000 flight + 10x\$100 per diem
Total				\$ 7,978,500	

Operational Cost Estimate

Fixed O&M

Labor - Operators	8760	52.5	\$	459,900	\$35/hr with 50% burden
Labor - Ops./Maint Supervisor	2080	75	\$	156,000	\$50/hr with 50% burden
Labor - Maintenance	4160	60	\$	249,600	\$40/hr with 50% burden
Environmental/Safety			\$	40,000	
Electricity			\$	314,000	estimated load of 700 kW for Tertiary treatment and ZLD
Fixed regular maintenance			\$	65,114	
Other					
Contingency			\$	192,692	
Subtotal			\$	1,477,306	

Variable O&M

Variable regular maintenance			\$	230,859	
Chemicals			\$	86,009	
Water					
Waste removal/disposal			\$	229,356	
Resin Bottle charge			\$	258,026	
Subtotal			\$	869,363	
Total Annual Cost			\$	2,346,670	

Equivalent Annual Cost

Cost of Capital		8%	
Equivalent Annual Capital Cost	\$	1,246,438	Assume 9 years financing
Annual Operating Cost	\$	2,346,670	
Total Equivalent Annual Cost	\$	3,593,107	

Estimated Electricity Generated

Hours of operation per year	3500 hours
Generation Capacity	120 MW
Annual MWh generated	420,000 MWh

Cost per MWh Comparison

Cost per MWh for option	\$	8.56
Cost per MWh for Ion Exchange (no sewer)	\$	1.74
Estimated Cost per MWh total (recycled water option)	\$	10.30
Cost per MWh for base water	\$	1.13
Cost per MWh for Ion Exchange (Hanford actual 2007)	\$	0.14
Total Cost per MWh (proposed option)	\$	1.27
Cost increase for recycled water	\$	9.03 per MWh

Assumptions

- 1) Capital costs for tertiary treatment and ZLD were based on Siemens Water Technologies quote and discussions.
- 2) Operational Costs were based on conversations with operating plants utilizing recycled water as a major water source.
- 3) Operational Costs were scaled to account for differences in system size and operational conditions.
- 4) ZLD operational costs were used as a proxy for tertiary treatment operational costs based on conversations with Siemens and operating companies.
- 5) Cost estimates for water and Ion Exchange were based on actual costs from Hanford Peaker and other GWF operating plants.
- 6) Assumed zero cost for recycled water.
- 7) Assumed 9 year financing and a cost of capital of 8%.
- 8) Assumed 3,500 hours of operation, based on historical California grid operational data for equivalent heat rate plants.

RETENTION POND IMPROVEMENTS- COMBINED CYCLE (rev. 3/20/09)
GWF, Hanford, CA

The existing retention pond in the north-western corner of the existing site will be widened to the west to increase the volume to include runoff for the new development, and to keep the water elevation in the event of the 100 year storm to 0.5 foot lower than the lowest catch basin grate in phase 2.

Stormwater retention basin volume needed for the total permanently disturbed area.

Source: City of Hanford, CA Public Works Construction Standards Manual - Storm Drainage Design Criteria Section

Volume of Runoff to be Contained (pg 3 of 7): $V_{req} (ft^3) = C A R$

Industrial Areas (Power plants)

C = Runoff Coef. (pg 6 of 7)	0.80
A = Drainage Area (ft ²)	317,201
R = Runoff (ft) for 100 yr, 10 day storm	0.473
Vreq(prop)	120,113 ft³

Retention Basin

C = Runoff Coef. (pg 6 of 7)	1.00
A = Drainage Area (ft ²)	29,285
R = Runoff (ft) for 100 yr, 10 day storm	0.473
Vreq(prop)	13,862 ft³

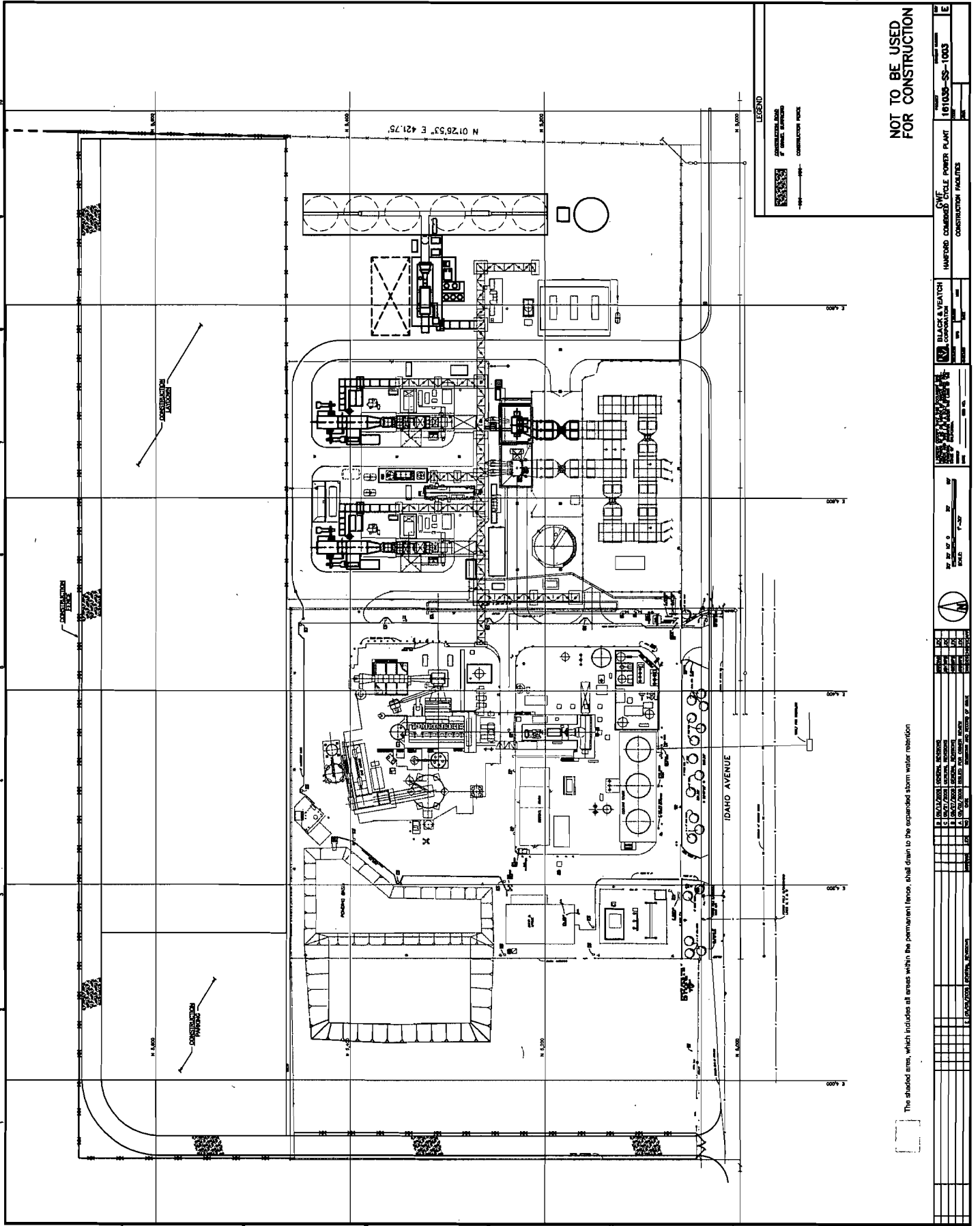
Permanent Laydown Area (dirt field with no surfacing)

C = Runoff Coef. (pg 6 of 7) ¹	0.30
A = Drainage Area (ft ²)	68,697
R = Runoff (ft) for 100 yr, 10 day storm	0.473
Vreq(prop)	9,755 ft³

Total Drainage Area	415,183 ft²
Total Retention Volume Required	143,729.87 ft³

Notes

- 1) Runoff Coefficient for dirt area is estimated at 0.3 by Jim Hansen of Zumwalt and Hansen, a local surveying and civil engineering firm
- 2) Basin will contain runoff from entire site within permanent fence.

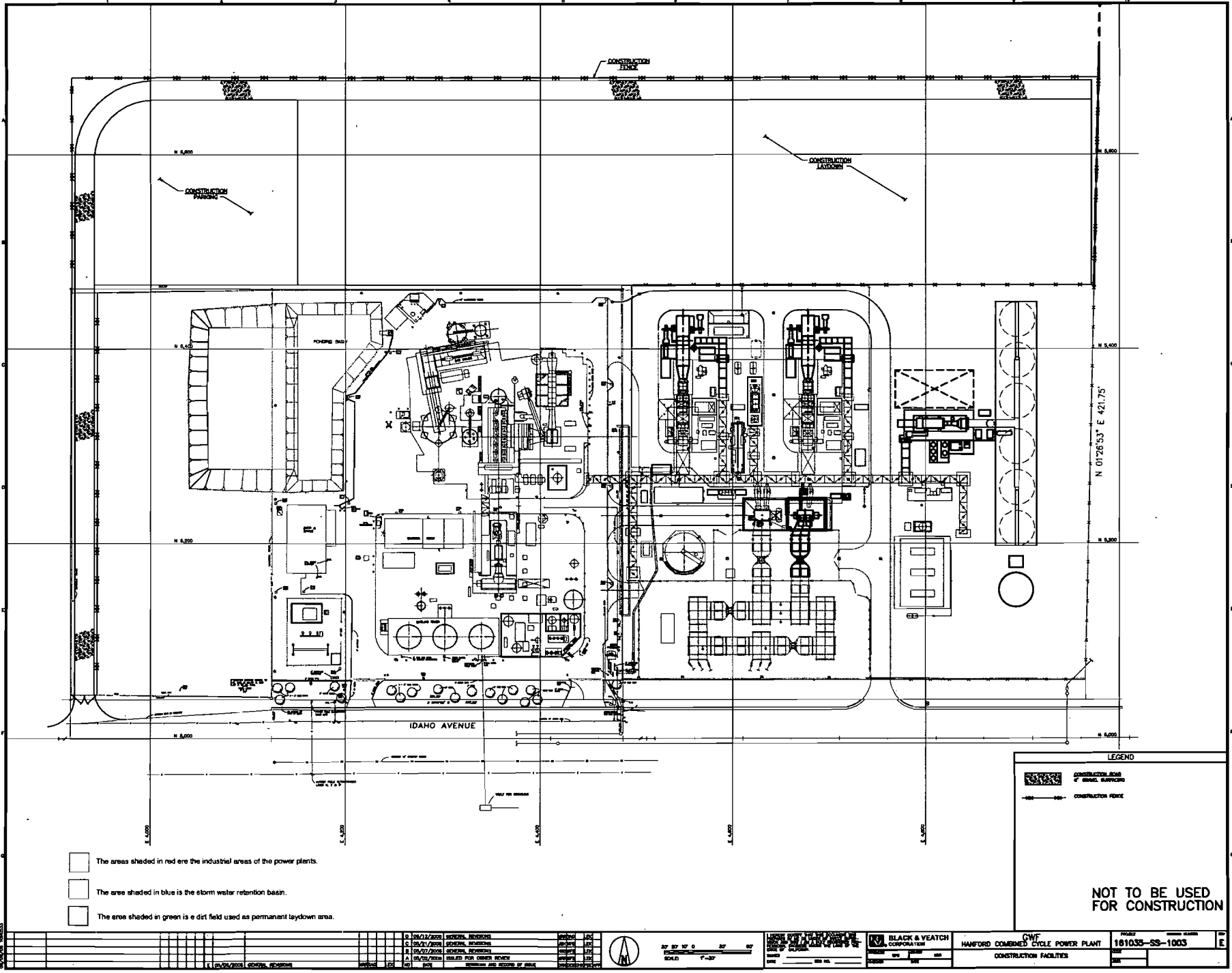





The shaded area, which includes all areas within the permanent fences, shall drain to the expanded storm water retention

NOT TO BE USED FOR CONSTRUCTION


PROJECT NO.	161036-SS-1003
PROJECT NAME	HANFORD COMBINED CYCLE POWER PLANT CONSTRUCTION FACILITIES
CLIENT	BLACK & VEATCH CORPORATION
DATE	08/27/2008
SCALE	AS SHOWN
PROJECT LOCATION	161036-SS-1003
PROJECT STATUS	CONSTRUCTION
PROJECT TYPE	POWER PLANT
PROJECT PHASE	CONSTRUCTION
PROJECT AREA	CONSTRUCTION FACILITIES
PROJECT OWNER	BLACK & VEATCH CORPORATION
PROJECT MANAGER	BLACK & VEATCH CORPORATION
PROJECT ENGINEER	BLACK & VEATCH CORPORATION
PROJECT ARCHITECT	BLACK & VEATCH CORPORATION
PROJECT SURVEYOR	BLACK & VEATCH CORPORATION
PROJECT DRAFTER	BLACK & VEATCH CORPORATION
PROJECT CHECKER	BLACK & VEATCH CORPORATION
PROJECT APPROVER	BLACK & VEATCH CORPORATION
PROJECT REVIEWER	BLACK & VEATCH CORPORATION
PROJECT DATE	08/27/2008
PROJECT TIME	10:00 AM
PROJECT LOCATION	161036-SS-1003
PROJECT STATUS	CONSTRUCTION
PROJECT TYPE	POWER PLANT
PROJECT PHASE	CONSTRUCTION
PROJECT AREA	CONSTRUCTION FACILITIES
PROJECT OWNER	BLACK & VEATCH CORPORATION
PROJECT MANAGER	BLACK & VEATCH CORPORATION
PROJECT ENGINEER	BLACK & VEATCH CORPORATION
PROJECT ARCHITECT	BLACK & VEATCH CORPORATION
PROJECT SURVEYOR	BLACK & VEATCH CORPORATION
PROJECT DRAFTER	BLACK & VEATCH CORPORATION
PROJECT CHECKER	BLACK & VEATCH CORPORATION
PROJECT APPROVER	BLACK & VEATCH CORPORATION
PROJECT REVIEWER	BLACK & VEATCH CORPORATION

Attachment DR3.2-27-2 GWF Hanford Basin Design Areas



-  The areas shaded in red are the industrial areas of the power plants.
-  The area shaded in blue is the storm water retention basin.
-  The area shaded in green is a dirt field used as permanent laydown area.

LEGEND

 CONSTRUCTION AREA
 CONSTRUCTION FACILITIES

NOT TO BE USED FOR CONSTRUCTION

<p>DATE: 11/11/2008 DRAWN BY: [Name] CHECKED BY: [Name]</p>		<p>NO. 02 OF 02 SHEET OF 02</p>		<p>SCALE: 1" = 40'</p>		<p>BLACK & VEATCH A CORPORAION</p>		<p>GWF HANFORD COMBINED CYCLE POWER PLANT CONSTRUCTION FACILITIES</p>		<p>PROJECT NUMBER: 181035-SS-1003</p>		<p>E</p>
<p>DATE: 11/11/2008 DRAWN BY: [Name] CHECKED BY: [Name]</p>		<p>NO. 03 OF 02 SHEET OF 02</p>		<p>SCALE: 1" = 40'</p>		<p>BLACK & VEATCH A CORPORAION</p>		<p>GWF HANFORD COMBINED CYCLE POWER PLANT CONSTRUCTION FACILITIES</p>		<p>PROJECT NUMBER: 181035-SS-1003</p>		<p>E</p>
<p>DATE: 11/11/2008 DRAWN BY: [Name] CHECKED BY: [Name]</p>		<p>NO. 04 OF 02 SHEET OF 02</p>		<p>SCALE: 1" = 40'</p>		<p>BLACK & VEATCH A CORPORAION</p>		<p>GWF HANFORD COMBINED CYCLE POWER PLANT CONSTRUCTION FACILITIES</p>		<p>PROJECT NUMBER: 181035-SS-1003</p>		<p>E</p>
<p>DATE: 11/11/2008 DRAWN BY: [Name] CHECKED BY: [Name]</p>		<p>NO. 05 OF 02 SHEET OF 02</p>		<p>SCALE: 1" = 40'</p>		<p>BLACK & VEATCH A CORPORAION</p>		<p>GWF HANFORD COMBINED CYCLE POWER PLANT CONSTRUCTION FACILITIES</p>		<p>PROJECT NUMBER: 181035-SS-1003</p>		<p>E</p>