REVISED 404 (B) (1) ALTERNATIVES ANALYSIS

BP Cherry Point Cogeneration Project

Prepared for:
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1.0 INTRODUCTION

This Alternatives Analysis replaces the Alternatives Analysis prepared by Golder Associates (Golder Associates 2003) that was submitted to EFSEC as Appendix H-5 of the Revised Application for Site Certification. This replacement incorporates information from the earlier document and provides additional information and analysis.

2.0 PURPOSE AND NEED

The basic purpose of the cogeneration project is to provide a reliable and cost-effective supply of both steam and electricity to the BP Cherry Point refinery and to provide electricity to the regional power grid.

The BP Cherry Point refinery needs significant amounts of steam and electricity to refine and process petroleum products. BP needs a supply of steam and electricity that is both reliable and reasonably priced. Without a reliable source of steam and electricity, the refinery cannot maintain operations, and the refinery satisfies fundamental regional needs for petroleum products. A reliable source of steam and electricity is also needed to operate the refinery safely. Unanticipated interruptions in supply could require the emergency shutdown of refinery operations and the safety risks associated with unplanned shutdowns. BP also needs steam and electricity to be available at a reasonable price. In the past, extreme electricity price volatility has imposed a significant economic cost on the refinery, and over the long term, could threaten the viability of the refinery.

The region also needs additional electricity generation capacity, as demand for electricity continues to grow. The cogeneration project would provide electrical energy for sale into the regional power grid, thus supplying a growing public need for electricity.

In order for the cogeneration project to satisfy the refinery's need for electricity and steam, and the region's need for additional generating capacity, the cogeneration project must be an appropriate size, capable of producing cost-competitive steam and power, located in close proximity to the refinery, and commercially feasible.

The fundamental purpose and need for the laydown areas is to provide temporary construction staging and support areas for the cogeneration project and permanent area for routine maintenance of refinery components. In order to satisfy that purpose and need, the laydown areas must be located in close proximity to the east of the refinery and cogeneration project site, of sufficient size for anticipated activities, and must not compromise security at the refinery.

2.1 RELIABILITY

Refinery operations require significant amounts of both electricity and steam. The BP refinery currently uses approximately 85 MW of electricity, and this requirement is expected to grow in the future. In particular, BP plans to add process units to allow the refinery to produce cleaner

gasoline and diesel to comply with clean fuel regulations that will go into effect in 2005 and 2006. BP is currently completing the Isomerization Project, which will produce the cleaner gasoline, and that project is expected to increase electricity demand by approximately 2.5 MW. BP will eventually be installing new equipment to produce cleaner diesel fuel as well. This equipment will further increase the refinery's electricity demand. Although it is too early in the project development to determine the amount of the additional electricity demand, it is likely to be about 2.5 MW more.

The BP refinery also uses a substantial amount of steam. Steam is used to heat materials and to provide pressure to drive pumps and compressors. Four utility boilers currently provide steam to the refinery, each with the capacity to produce 150,000 lbs./hr. of steam for a total capacity of 600,000 lbs./hr. The range of steam production varies greatly with a variety of refinery process conditions, with the current steam requirement averaging 287,000 lbs./hr on an annual basis. The clean gasoline and diesel projects discussed above will increase the refinery's steam requirement. The Isomerization Project will increase the average steam requirement to 510,000 lbs./hr, and a new boiler will be added to provide additional steam capacity. The clean diesel project will increase steam demand further, although it is too early to determine the amount of the additional steam demand.

Maintaining a reliable supply of electricity and steam is necessary from operational, safety, and economic perspectives.

First, a reliable supply of electricity and steam is necessary to maintain operation of the refinery. Without electricity and steam, the refinery cannot operate. Brief power outages or even sudden voltage changes can cause some refinery process units to be shut down temporarily. For example, in March 2004, lightning struck a transmission line near Lynden, Washington, causing a drop in voltage from 115kV to about 25kV. Automatic equipment corrected the problem in about 70 milliseconds, and the closure of breakers on the line caused a second similar dip for 70 milliseconds. This transmission line connects to a substation in common with a transmission line supplying the BP Cherry Point refinery, and those brief power dips caused a calciner hearth and a utility boiler to shut down.

Refinery equipment that must be shut down suddenly without prior planning can require a considerable amount of time to bring back on line. It may require hours, even weeks, to make process units safe to start up after a sudden and unplanned shutdown. Some heavy liquids solidify if allowed to cool. If these liquids solidify inside process equipment such as pipes, vessels, valves and pumps, it is very difficult to remove, clean up and prepare the equipment for startup. Maintaining a constant reliable supply of both electricity and steam is, therefore, critical to maintaining continuous operations at the refinery.

Second, a reliable supply of electricity and steam is necessary to minimize safety risks at the refinery. The refinery has procedures to allow the safe shutdown of process unit operations for sudden and unplanned reasons. However, the restart of equipment following sudden and unplanned shutdowns can present safety risks. For example, a very serious incident occurred at a neighboring refinery, when a sudden loss of electric power resulted from a severe storm and caused the shutdown of steam production and process operations. The sudden shutdown of one process unit resulted in unprocessed material being left inside the equipment. Two days later,

the opening of the vessel to discharge the partially cooled material caused the unexpected release of volatile material that caught fire and resulted in the death of six refinery personnel (U.S. Chemical Safety and Hazard Investigation Board 2001). Although these kinds of accidents can be avoided with careful procedures, this accident illustrates the potential risks associated with unplanned shutdowns.

Third, a reliable source of electricity and steam is important to the regional economy. Without steam and electricity, the refinery cannot operate. Interruptions in the production and supply of refined petroleum products cause problems for the regional economy. About one fifth of the vehicles in the state of Washington run on gasoline produced by BP Cherry Point Refinery, and about 80 percent of the jet fuel for Sea-Tac airport comes from the BP refinery. Interruptions in supply would have a major effect on the economy of the region.

The importance of power reliability to the refinery is reflected in the redundant systems currently in place to supply electricity and steam to the refinery. There are four separate electrical power transmission lines feeding the refinery today: two separate transmission lines from the Custer Substation, one transmission line from the Bellingham Substation, and one transmission line from the Puget Sound Energy Point Whitehorn Generating Station. Except for the generating station, any one of the transmission lines by itself could supply the refinery power needs. Likewise, the refinery maintains multiple boilers, so that all need not be operational to satisfy the refinery's demand for steam. Maintaining reliability is fundamental to the operation of the refinery, and improving it when possible is prudent.

In order to ensure a reliable supply of both electricity and steam, BP has designed the cogeneration project to have three gas-fired turbines, each with a heat recovery steam generator (HRSG) that can provide steam directly to the refinery or to the cogeneration unit’s steam turbine. Having three gas turbines and HRSGs will ensure a continuous supply of steam and electricity to the refinery, even if one gas turbine were off-line for maintenance and a second turbine shut down unexpectedly.

2.2 COST-EFFECTIVENESS

BP needs to obtain electricity and steam for the refinery at a reasonable price. The average annual electricity cost has been $21 million. In 2000 and 2001, however, the cost of electricity for the refinery was more than triple the 10-year average cost, and the cost for those two years combined was more than $100 million above the 10-year average. On a long-term basis, such electricity costs would threaten the economic viability of the refinery.

The proposed cogeneration facility is cost-effective because the combined cost of electricity and steam it would provide to the refinery is expected to be at or below the typical average combined cost of buying electricity from the regional grid and producing steam from stand-alone boilers. In this region, the cost of both electricity and gas is typically lower in the late spring and summer, and the cogeneration/refinery operation can adapt to the price.

The region also requires additional electrical generating facilities that are capable of generating electricity at a reasonable and competitive price. As a privately-financed project, the

cogeneration project can only go forward if it is able to compete successfully in the regional power market by selling power at a competitive price. Most of the base-load power in the region is provided by hydroelectric, nuclear, and coal power plants, but new units of those types of plants are unlikely to be added to the supply. Only gas-fired power plants are likely to be built, and only the most efficient are competitive for base-load power. Other plants with higher operating costs can operate economically only during peak demand periods when prices are higher. An important part of the ability of the project to operate competitively in a base-load market is that, as a cogeneration plant, this facility will be one of the most fuel-efficient gas-fired power plants available.

The concept of cogeneration is fundamental to efficiency, because it allows steam to be generated once and used at least twice. The power plant will be a combined cycle plant with water cooling for greatest efficiency. A stand-alone power plant would have to condense 100% of the low-pressure steam from the steam turbine into water in order to pump it back into the heat recovery steam generators (HRSGs). The heat in this low-pressure steam is then lost to the atmosphere. Cogeneration allows part of this heat to be used in refinery processes. The steam sent to the refinery would be used both to heat and to move oil and then once it is used, the condensed steam would be pumped back to the cogeneration plant to be reused to make more steam. The steam that is provided by the cogeneration project allows the refinery to discontinue the production of steam in the utility boilers. The steam delivered to the refinery from the cogeneration plant will be delivered as though it were being produced at nearly 100% efficiency. The existing boilers produce steam at a range of about 70% to 83% efficiency. The refinery is constantly reviewing energy usage by comparing current energy usage to a number called the Energy Intensity Index (EII.) The cogeneration steam will help lower the refinery EII. With the cogeneration plant in place, the three existing least efficient boilers at the refinery will be decommissioned.

2.3 SIZE OF FACILITY

The size and configuration of the proposed cogeneration facility were determined primarily by two factors. First, BP requires a redundant supply of steam. Given the importance of steam reliability described above, BP designed the cogeneration project with three separate generating units, each sized so that it could provide required steam to the refinery even if one unit were down for maintenance and a second unit were shut down unexpectedly. Second, the project must be cost-effective and capable of competing successfully in the regional electricity market as a continuously-operating or base-load facility.

Although a smaller three-turbine facility (utilizing smaller turbines) could provide a triple-redundant supply of steam to the refinery, it would not be cost-effective. The capital costs of a generating facility are not linear in relation to the facility's output. On the contrary, larger turbines are generally more efficient, and a substantial share of the costs associated with a larger facility are also incurred in connection with a smaller facility. The economies of scale are such that the cost per megawatt of electricity generated declines as the size of the facility increases. This is particularly true with a cogeneration facility, which requires significant infrastructure to integrate the generating facility with the steam host, in this case. BP estimates the cost associated with that infrastructure to be at least $10 million for the proposed cogeneration

project. BP has proposed a facility of a size that will take advantage of the economies of scale and spread the cogeneration infrastructure costs so that it can provide cost-effective steam and electricity to the refinery and compete in the regional electric market.

Three General Electric 7 FA turbines (nominal 174 MW each) and one steam turbine (nominal 243 MW, but only 216 MW when 510,000 lbs per hour of steam are being delivered) were used to develop base case economics for the project. The combination would produce a nominal total of 720 megawatts (MW). The actual output is less than the individual ratings because the power plant uses 18 MW in its operation. Smaller turbines available as options are less efficient and would reduce the return to investors enough that their selection would not be cost-effective and would make the project impracticable.

2.4 CRITERIA FOR EVALUATING PRACTICABLE LOCATIONS

Potential locations for the cogeneration plant and laydown areas may be rendered impracticable as a result of cost, technology or logistical considerations [40 C.F.R. § 230.3(q)]. Four specific parameters that may render sites impracticable for use as a cogeneration project site or laydown area as a result of associated cost, technology or logistical limitations are size, proximity to the refinery, security, and accessibility. Each of these limiting parameters is described below.

2.4.1 Size

The location of both the cogeneration plant and associated laydown areas must be of the appropriate size to accommodate the facility and the required construction activities. Given the available technology and associated equipment required for a cogeneration facility of the size needed, BP has determined that a site of at least 33 acres is required.

BP has designed the plant configuration to be as compact as possible so that the footprint, the materials of construction, the interconnections with the refinery and associated costs are minimized. However, an equally important and competing consideration is that the plant components must be spaced far enough apart to allow for maintenance. BP has balanced these two considerations against one another and proposed a configuration of the facility that will occupy approximately 33 acres and utilize approximately 33 acres for construction laydown.

The 33-acre project site is typical for this type of facility. Similar power plants occupy 30 to 40 acres. For example, the 750 MW Pastoria Energy Facility in California has a 31-acre site, (California Energy Commission 2000) and the 850 MW Mercer Ranch project proposal in Washington had a 40-acre site (EFSEC 2000). Two larger power plant projects proposed in Washington (Starbuck and Wallula) have sites of 40 and 97 acres, respectively (Starbuck Power Company 2001, Wallula Generation 2001). Three recently permitted combustion turbine power projects in Washington (Chehalis, Satsop, and Sumas), each with two turbine units, have project sites ranging from 20 to 33 acres in size (Chehalis Power 1994, Duke Energy 1994, SE2 2001).

Fifteen to 20 acres of construction laydown area are required for the materials and assembly of the major components. Different contractors do different parts, and construction schedules require that several different components be in progress at once in order for each to be ready

when required to fit into or be connected to others. In addition, each contractor requires office space and parking. Hundreds of workers, vendors, and delivery people are at the site at the same time, and parking and security have to be provided to accommodate the peaks.

Logistical considerations require at least 33 acres of laydown area for cogeneration project construction. Table 1 shows the cogeneration project construction laydown area uses and approximate acreage required for each use during peak construction.

Table 1
Construction Laydown Uses and Area

Item	Estimated Acreage Requirement[1]
Gas Turbines	4
Steam Turbine	1.5
HRSGs	8
Cooling Tower	1
Structural Backfill	2
Civil Materials	1.5
Structural Steel	2.5
Misc. Equipment	1
Piping Materials	2.5
Electrical Bulks	1.5
Electrical Cable	1
Receiving area	0.5
Warehouse	0.5
Small Construction Equipment	0.5
Trailer Complex	2.5
Craft Parking	2.5
Total	33

[1] These acres are used for planning purposes, but the actual use of many of the acres includes several different functions during construction. Some functions have area requirements that vary over time.

The laydown area requirements for the construction of the cogeneration project total 33 acres in addition to the 3 acres of existing contractor parking area. The 3-acre existing contractor parking area was incorporated as area that can be used at times other than turnarounds, reducing the total laydown area from the 36 acres identified in the Revised EFSEC Application to 33 acres and further reducing the wetland fill needed for the laydown use. Eleven acres of the laydown area will be temporary impact areas that can be restored after the construction of the cogeneration project. Twenty-two acres will be permanently impacted either because they are required for cogeneration project facilities or because they will be required for future refinery maintenance activities.

Of the 22 acres permanently required, approximately 4 acres will be occupied by stormwater facilities, roads, and other interconnections between the cogeneration project and the refinery.

Logistical and cost considerations require at least 22 acres of permanent laydown area for refinery maintenance activities, including annual "turnarounds" where one or more major components of the refinery undergo planned refurbishment. These turnarounds involve the

dismantling and refurbishment of large equipment. Hundreds of additional workers are involved, and space is needed to move and store equipment and materials. Turnaround activities must be performed quickly and efficiently because refinery operations are temporarily shutdown during these activities. Anything that causes these activities to take longer results in significant opportunity costs to BP and interrupts the region's supply of needed petroleum products. In order to perform turnarounds quickly and efficiently, a significant amount of space is needed. In the past, major turnarounds have utilized up to 45 acres for laydown purposes. Many of the spaces used for turnaround and maintenance activities in the past have and will be taken up by new refinery equipment used to comply with new clean fuel regulations and other changes in refinery operations. Additional space is, therefore, needed for maintenance and turnarounds, and for some functions, it must be in close proximity to the refinery components.

2.4.2 Proximity to Refinery & Related Infrastructure

Technology, logistics, and cost require the cogeneration plant to be located in close proximity to the refinery because of the numerous connections integrating the cogeneration facility with the refinery.

An essential part of the cogeneration project is the delivery of steam to the refinery. The steam must be delivered through insulated pipes and maintained at specific temperature and pressure. Existing technology does not allow steam to be reliably transported more than a few thousand feet (less than a mile) at a constant temperature and pressure.

The actual distance threshold is derived from a complex combination of factors. In order to deliver steam to the refinery in useable form, it must remain superheated to prevent condensation from forming water droplets that could damage turbines. This can be accomplished over a certain increased distance by thicker insulation, but the chance of condensation increases with increasing distance. The steam also must be delivered at a high pressure. This can be accomplished over some distance by increasing the diameter of the pipe. The pressure cannot be allowed to drop substantially because the refinery header pressure must be maintained within a narrow band (about 1 to 2 pounds per square inch above or below 600) in order to overcome significant fluctuations in steam demand. Refinery steam demand fluctuates on a minute-to-minute or hour-to-hour basis as refinery processes and components are started, stopped, or adjusted to produce different products or components of products. The length of pipe required is also longer than the linear distance between the steam source and the refinery because expansion loops are required as part of the design. All of these factors combine to limit the feasible locations for a steam source to those immediately adjacent to the refinery. As the distance increases, the tolerance for changes in conditions that could affect steam delivery temperature, pressure, and rate decreases. In order to maintain reliable steam delivery, the distance is effectively limited to less than 5,000 thousand feet.

The distance of the cogeneration facility from the refinery is also limited by cost and logistical factors. The cogeneration facility will be connected to the refinery in several ways. Pipes will provide steam to the refinery and will return condensate to the cogeneration project. Pipes will transport waste water from the cogeneration facility to the refinery's waste water treatment system. A pipeline connection will transport natural gas from the existing pipeline at the refinery to the cogeneration facility. Transmission lines will transmit electricity from the cogeneration

facility to the refinery. The cost issues associated with each of these connections increases with distance. A more distant location would also present logistical difficulties if piping and transmission lines would have to cross roads, rights-of-way, or other utility corridors. For these reasons, BP limited its consideration of alternative sites to those less than 5,000 feet away from the refinery.

Laydown areas must be located near both the cogeneration project site and the refinery. The laydown areas must provide ready access between the laydown area where the major power plant components are assembled and the site where they will be installed. In order to be used for refinery maintenance and turnaround activities, permanent laydown areas must be located near the refinery. They must also be located near needed utilities, such as electrical, water and sewer connections. In many instances, it would not be logistically feasible to transport the large refinery components on public roads to a more distant laydown area.

2.4.3 Security

In order for the cogeneration facility to provide a reliable source of steam and electricity, it must remain secure. Since September 11, 2001, security has been increased at all refineries and power plants in the United States. The cogeneration facility site and laydown areas were selected to facilitate the security measures in place at the refinery. Having the cogeneration plant adjacent to the refinery would allow the existing security fence to be extended around the cogeneration project and would allow the cogeneration facility and the connections between the cogeneration project and the refinery to be incorporated into the security system of the refinery. Keeping the connections within the refinery security system will help protect them both from intentional sabotage and from accidental damage by vehicle damages or other mishap. Any site that would require the steam pipeline to cross a public road is considered unacceptable from a security standpoint. Unlike the other pipelines and piping connections, the steam pipeline must be above-ground. Crossing a public road would make it too vulnerable to intentional or accidental damage. Within the refinery security fence, vehicle safety is tightly enforced and drivers are either employees or are escorted by employees and must pass rigorous safety training.

Locating the cogeneration project laydown and staging areas and the permanent refinery laydown/materials storage sites within the existing or extended refinery security fence maintains security. Locating these laydown areas elsewhere would require significant expense to install and maintain alternative security measures. Logistically, separate secured locations would also present more potential areas of vulnerability.

2.4.4 Accessibility

The primary issues with accessibility are logistical, although efficiency of operation is also extremely important, and efficiency directly translates to cost. Two major considerations of accessibility are the delivery of equipment and materials to the laydown areas and accessibility between the laydown areas and the construction site or the refinery components being refurbished.

The laydown areas must receive large equipment and materials of various sizes and quantities that arrive by highway. Therefore, there must be a direct connection with existing highways. That connection must be separate from the primary entrances to the refinery to keep one operation from compromising another (i.e., refinery operation and construction of the cogeneration facility).

Since the permanent laydown areas will serve two purposes, they must be located so they are accessible to both the refinery and the cogeneration facility. The location of the permanent laydown areas must provide unobstructed access to the refinery components that are regularly refurbished. Some of the components are large enough to be very difficult to move on public roads, and some of the mobile equipment used to move refinery components for maintenance would not be appropriate on public roads. Equipment being moved during periods of high maintenance must be moved within the secured areas of the refinery in order to limit access and maintain efficient operations. The refinery was constructed to accommodate the majority of the turnaround activities in the open space immediately adjacent to the east side of the refinery facilities. Performing these activities at other locations would either not be feasible or at least be more difficult, more time-consuming, more expensive and much more disruptive to on-going refinery operations.

In addition, none of the feasible alternative locations for the cogeneration project are west of the refinery. Therefore, in order to be accessible for both the refinery maintenance operations and the cogeneration construction, the permanent laydown areas must be on the east side of the refinery.

3.0 ALTERNATIVES

The Cogeneration Project is not a water-dependent project. Therefore, alternative actions, alternative sites, and alternative site configurations were considered to determine if they could satisfy the project purpose and need, would be practicable, and would result in less wetland and overall environmental impact.

3.1 ALTERNATIVE ACTIONS

If the cogeneration facility were not built, other actions would have to be taken to attempt to satisfy the purpose and need. The actions associated with each component of the purpose and need are discussed below.

3.1.1 Steam Reliability

A reliable steam supply could be provided by using existing boilers and adding boilers as the refinery steam demand grows. Even the most efficient stand-alone boilers would produce steam less efficiently than the cogeneration project, so more natural gas would be consumed and more air pollutants and greenhouse gases would be emitted per unit of steam produced. No alternate technology is known that would take the place of the boilers. Therefore, while it is possible to supply steam reliably by means other than the cogeneration plant, it can only be done at a higher

cost, with greater natural gas use, and with higher air emissions per unit of steam than with cogeneration.

3.1.2 Electricity Reliability and Cost-Effective Supply

There is no alternative that would provide the refinery with a reliable and cost-effective supply of electricity. As long as the refinery's electricity must be purchased on the market, the refinery contributes to the increasing regional demand for electricity and is vulnerable to all the factors that can cause the price and availability of electricity to fluctuate. Very high electrical prices in late 2000 and early 2001 placed the viability of the refinery at risk. In fact, during that period, BP spent over $100 million more than it has historically spent on electricity to operate the refinery. While the price volatility has decreased significantly since then, the projected growth in regional power needs and the variability in hydropower availability will require new power generation to balance supply and demand. The effects of the imbalance in supply and demand could be felt as early as 2006 (Western Electric Coordinating Council 2002). In the current market, BP is not able to obtain a long-term contract for electricity at a reasonable guaranteed price. Power is now typically sold on a "toll" basis, which means essentially a cost-plus basis. The cost of natural gas will drive the cost of electricity whenever the demand above other existing supplies is met by electricity produced by gas-fired power plants. Most of the new combustion turbine power plants have the ability to produce power when the gas price is favorable and not produce it at other times. The cogeneration plant's efficiency advantage will give it a broader effective price range within which it is economical. With the cogeneration project in place, the combined cost of steam and electricity to the refinery is expected to be at the lower end of prices, and the refinery would be supplied directly from the cogeneration plant, which maximizes reliability.

Not building the cogeneration project simply will not accomplish the purpose of providing a reliable and cost-effective electricity and steam supply for the refinery. No other action would do so, and no other known technology would do so. The costs to the refinery would be higher, and the resulting cost of producing gasoline and diesel in the region would also be higher.

Other power facilities could be constructed to satisfy the region's need for additional electrical generating capacity. If the cogeneration project is not built, the power plants most likely to be built to fulfill regional electricity demand will be stand-alone gas-fired combustion turbine plants. Very few large-scale cogeneration facilities are built because a large host willing to enter into a long-term, contract for steam or heat is necessary (CTED 2003). A stand-alone facility would be less efficient than the cogeneration plant. It would consume fossil fuels at a higher rate, and therefore, emit air pollutants and greenhouse gases at a higher rate.

3.1.3 Laydown Areas/Turnaround Space

The 11 acres of temporary laydown area would not be needed if the cogeneration plant were not built. However, the refinery would still require the permanent laydown areas for refinery maintenance and "turnarounds." The site shown in this document to provide that space with the least wetland and other environmental impact is the proposed site at the northeast corner of the refinery just west of Blaine Road and south of Grandview Road. Only the areas of permanent fill

would be constructed, which would fill about 19 acres of wetlands. No other action would substitute for this requirement and have less wetland or overall environmental impact.

3.1.4 Summary Impact Evaluation

If the cogeneration project were not built, it would be possible to meet the need for a reliable steam supply by conventional boilers but at a higher cost and with greater environmental impacts. It would not be possible to significantly decrease the cost and improve the reliability of the electricity supply for the refinery. It would be possible to provide additional electricity to the region but at less efficiency and therefore greater fuel use and environmental impacts. . It would not be possible to provide the refinery maintenance turnaround area with less than about 19 acres of wetland impact. Therefore, the no-action alternative would not meet half of the components of the purpose and need, and more than half of the wetland impacts would still occur.

If the cogeneration project were not built, permanent impact by the cogeneration plant on about 12 acres of wetland and temporary impact by the laydown areas on about 5 acres of wetland would not occur. It is also reasonable to assume that any new power plant to be built in western Washington to supply the power demand will have some impacts on wetlands, since wetlands are so prevalent in this region. Therefore, the actual reduction in impact on wetlands by not building the cogeneration plant may be small. In other words, a no-build alternative is not likely to be without wetland impacts.

Other impacts associated with alternative steam and electricity sources would be higher than with the cogeneration plant. Without the cogeneration facility, the steam produced for the refinery would be produced with higher emissions of air pollutants per unit of steam. For example, the NOx emissions are more than 2 times higher for the most efficient stand-alone boiler that might be used and more than 16 times higher for some of the existing boilers than the cogeneration plant per unit of fuel. In addition, because the cogeneration plant is so much more efficient, the stand-alone boilers would use significantly more fuel than the cogeneration plant per unit of steam, thus increasing the effective difference in emissions.

Similarly, differences in air emissions and fuel consumption would exist between the cogeneration plant and any additional power plants that would provide the needed electricity. The cogeneration plant would be the most efficient source of power. Any likely alternative source (gas-fired plants) would necessarily have higher fuel consumption rates per unit of power and therefore, higher emissions of air pollutants and greenhouse gases. Air emissions are also likely to be higher because most power plants in the region are not subject to emissions limitations as stringent as those proposed for the Cogeneration Project.

The environmental impacts avoided by not building the cogeneration facility at the BP Cherry Point refinery may be more than offset by the environmental impacts of other actions required to fill the needs. In addition, the impacts of the cogeneration project are readily mitigated, while some alternative action impacts may be less easily mitigated.

3.1.5 Economic Considerations

The economic consequences of not building the cogeneration plant must also be considered.

The BP Cherry Point refinery is the only BP refinery in the United States without a cogeneration plant. Because refineries are large steam users, a cogeneration plant interconnected to a refinery is a good fit. With the cogeneration project, the refinery will receive less expensive reliable steam and power than without cogeneration, and the power produced for the regional market will be more cost-effective than other new sources of power. The reason for the refinery to pursue the construction of a cogeneration plant is the substantial annual savings in energy costs and reduced vulnerability to power market fluctuations. However, the economic benefits go much beyond the economics of the BP Cherry Point refinery. The economics of the whole region are linked to the reliable supply and price of electricity and fuel. .

It is difficult to predict what effect future power market fluctuations might have on the refinery, but in 2000 and 2001, they put the viability of the refinery at significant risk. In response to sky-rocketing electricity prices, the refinery temporarily added 26 diesel generators during the most severe electric power prices, and then replaced the diesel generators with 14 natural gas-fired generators until the power market stabilized. If electricity prices had stayed high long enough, the refinery may not have continued to operate. Without the refinery operating, the regional supply of fuel would be severely constrained, and the economic consequences would be enormous.

Electricity can not be stored. Therefore, supply must precisely equal demand. As this balance becomes closer and the reserve generating capacity margin becomes smaller, power prices become very volatile and can increase rapidly. Power buyers must find sources to meet demand, and if the supply gets too tight, they must find power at any cost, or their customers would be without power. Because supply must meet demand, if it falls short it is not that customers get less power, rather they get none, which is the reason for blackouts. All customers, including residential, commercial and industrial customers find this inconvenient and potentially devastating. Having the cogeneration plant operating would help prevent such disasters in two ways. The power demand of the refinery would no longer be a drain on the regional power grid, thus effectively lowering the demand. The excess electricity produced by the cogeneration plant would also increase the supply available to meet the growing regional demand.

3.1.6 Conclusion

The alternative of not building the cogeneration project would not satisfy the purpose and need stated at the beginning of this document. While it might reduce the amount of wetland impact, that is not certain, because some less efficient power generation facilities would have to be built in the region, and many proposed projects have significant wetland impacts. The economic consequences of not building the cogeneration plant might be enough to shut down the refinery under certain circumstances, and that would have broad and severe regional economic consequences. Not building the cogeneration facility would also forego the economic and environmental benefits of more efficient electricity production in the region.

3.2 ALTERNATIVE COGENERATION SITES.

As explained above, alternative cogeneration plant sites must meet four criteria in order to be practicable: size, proximity to refinery, security, and accessibility. Alternate technologies are not applicable for comparing sites. While there is likely to be a difference in costs between sites, costs are less important than impacts or feasibility. The cogeneration plant will require a site that is at least 33 acres in size. As explained above, the cogeneration site must be located within a one-mile pipe distance of the refinery and may not be located across a highway from the refinery in order to be a feasible site. Therefore, potentially feasible sites would include sites within the refinery fence, i.e., between Grandview Road on the north, Jackson Road on the west, Aldergrove Road on the south, and Blaine Road on the east. Existing refinery facilities already occupy most of this land, and sites on the west of the refinery do not have adequate accessibility from the highway and to the cogeneration site and refinery. This leaves only the northeast corner of the refinery with enough open space to consider inside the security fence and the highways. In addition, sites adjacent, but outside the fence to the east could be secured and are potential sites. Since Brown Road is gated and controlled by BP, sites both north and south of Brown Road would meet the security criteria.

Four potential sites (Sites 1 through 4) meet the four criteria, including enough area available to fit the cogeneration project (Figure 1). BP owns all of the potential sites, and therefore all are potentially available for the project. Two additional sites (Sites 5 and 6) were discussed in the Alternatives Analysis prepared by Golder Associates for the EFSEC permit application. These sites do not fit all the selection criteria, but are addressed here for completeness.

3.2.1 Site 1 (Proposed Site)

Site 1 is the proposed site. It is located just south of Grandview Road and east of the refinery fence. This site is referred to as Site 3 in the Golder Alternatives Analysis.

Size & Wetland Impacts

The proposed site has at least 40 acres available. The site could be expanded south or east, but that would encroach on more wetlands. It cannot be expanded to the north because of the County requirement for a 300-foot buffer between the plant site and Grandview Road. The site location has been selected to minimize wetland impact area. With the proposed site layout occupying 33 acres, 12 acres of wetland would be filled.

Proximity to Refinery & Related Infrastructure

This site is directly adjacent to the refinery fence and would have minimal impacts from connecting to required infrastructure. One access road and a permitted corridor for a transmission line connection to the BPA transmission line to the east are immediately adjacent. An existing natural gas line with capacity is in the utility corridor adjacent to the west edge of the site, and a water supply pipe from the Whatcom PUD is also in the corridor but a few hundred feet south.

Security

Site 1 is immediately east of the refinery security fence, which can be readily expanded to include the site. In addition, the steam pipeline would not have to cross a public road and it would therefore be secure.

Accessibility

This site is directly accessible to the proposed laydown areas and all facilities and infrastructure. Access to the refinery and Blaine Road are about 250 feet away, and access to Grandview Road is similarly short.

3.2.2 Site 2

Site 2 is south of the proposed site. It is just north of Brown Road and east of the refinery fence and the proposed Brown Road Materials Storage Area. This site includes a large part of Site 1 in the Golder Alternatives Analysis.

Size & Wetland Impacts

Site 2 has at least 40 acres available. The site could be expanded north or east, but those areas are essentially all wetland. With a site layout of 33 acres, at least 31 acres would be wetland fill. This impact conclusion is based on a wetland delineation for the Brown Road Materials Storage Area (URS 2003) and on a delineation by Golder Associates (Golder 2003) which showed 2 acres of upland in patches outside the Brown Road Materials Storage Area. The remainder of Site 2 is wetland.

Proximity to Refinery & Related Infrastructure

The site is near to the refinery, and impacts of connecting to the infrastructure would be only slightly greater than the proposed site because of greater distances for some utilities.

Security

Site 2 is close enough to the east of the refinery security fence that the fence could be readily expanded to include the site. In addition, steam pipeline could be made secure because it would not have to cross a public road.

Accessibility

This site is directly accessible to potential laydown areas (as evaluated below) and all facilities and infrastructure. Highway access would be by way of Brown Road.

3.2.3 Site 3

Site 3 is just south of Brown Road (and Site 2) and adjacent to the east refinery fence. This site is included as part of Site 6 in the Golder Alternatives Analysis.

Size & Wetland Impacts

This site has at least 40 acres available. The site could be expanded to the south or east, but those are essentially all wetland areas. With a site layout occupying 33 acres, it would essentially all be wetland fill. This impact conclusion is based on a wetland delineation for the Brown Road Materials Storage Area (URS 2003) that found about 5.5 acres of upland in the 11 acres to be used for the Brown Road Materials Storage Area. Nearly all of the adjacent area to the south appears to be wetland, based on reconnaissance-level information by both Golder Associates and URS. Site 3 would be located mostly south of the Brown Road Materials Storage Area in an area that is almost all wetland.

Proximity to Refinery & Related Infrastructure

The site is adjacent to the refinery. The impacts of connecting to the infrastructure would be similar to the proposed site. The transmission line connection would have to go an additional 1,200 feet. The gas pipe would have to be extended a few hundred feet from the metering station. A water pipe is nearby in the utility corridor.

Security

Site 3 is immediately east of the refinery security fence, which can be readily expanded to include the site. In addition, steam pipeline could be made secure because it would not have to cross a public road.

Accessibility to Laydown Areas

This site is directly accessible to potential laydown areas (as evaluated below) and all facilities and infrastructure. Highway access would be by way of Brown Road.

3.2.4 Site 4

Site 4 is the northeast corner of the refinery south of Grandview Road and west of Blaine Road. This site is referred to as Site 5 in the Golder Alternatives Analysis.

Size & Wetland Impacts

Site 4 consists of Laydown areas 1, 2, and 3 associated with the proposed site and the existing contractor parking lot. Although the 32 acres available at this location might be large enough for the cogeneration facility if the configuration were altered, it would be impossible to maintain the buffer along Grandview Road that is required by Whatcom County Code. Approximately 20 acres of this site are wetlands. The site could not be expanded because it is constrained on all sides. On the west, it is constrained by the drainage course that conveys clean runoff to the north across Grandview Road, which has refinery facilities just to its west. On the north, the site is constrained by the refinery security fence and the adjacent Grandview Road. To the east, the site is constrained by Blaine Road (a refinery road here) and the adjacent utility corridor, which has natural gas pipelines, water pipelines, and electrical transmission lines and must be maintained as

a utility corridor. To the south, the site is bounded by wetlands and existing refinery facilities and use areas.

Proximity to Refinery & Related Infrastructure

All of the infrastructure is nearby, and the impacts of connecting to it would be similar to the proposed site. However, as explained above, the refinery needs additional laydown/turnaround areas. If this area were used as the project site, an additional 33 acres would be needed for construction laydown and turnaround activities, and the impacts to wetlands would occur for these new refinery laydown/turnaround areas.

Security

Site 4 is within the refinery security fence. Piping would be secure because the steam pipeline would not have to cross a public road.

Accessibility to Laydown Areas

The laydown area would occupy the site proposed for the cogeneration facility. In other words, if the cogeneration unit occupies this site, that would require a direct switch with the area occupied by the laydown area. Accessibility would be the same as the proposed site.

3.2.5 Site 5

Site 5 is located within the refinery and is the area previously used for refinery turnarounds. Part of that area is where the Isomerization Unit for meeting clean gasoline requirement is being constructed. This site is referred to as Site 2 in the Golder Alternatives Analysis.

Size & Wetland Impacts

This site was much too small (less than 20 contiguous acres) to accommodate a cogeneration facility even before part of it was required for other purposes. It has been eliminated from further consideration on this basis alone. The site is bounded on three sides and part of a fourth side by refinery facilities and use areas, and the remainder of the fourth side is a wetland adjacent to the proposed laydown area.

Proximity to Refinery & Related Infrastructure

This site is actually too close to refinery operations because construction of a cogeneration facility in the midst of the refinery would interfere with refinery operations. Construction in the midst of the refinery would be more difficult and more expensive, and would result in costly interference with refinery operations.

Security

Site 5 is within the refinery security fence. Piping would be secure because the steam pipeline would not have to cross a public road.

Accessibility to Laydown Areas

The site is accessible to the proposed laydown area and to Grandview Road via Blaine Road.

3.2.6 Site 6

Site 6 is located north of Grandview Road. It consists of approximately 2 acres of mixed forest and shrub habitat surrounded by old fields that include emergent wetlands. This site is referred to as Site 4 in the Golder Alternatives Analysis.

Size & Wetland Impacts

33 acres could be available at this location. Wetlands occur here, but we have not determined how much wetland fill would be required because the site failed to satisfy other essential criteria. The south side of the site is bounded by Grandview Road. Expansion in the other directions would encroach into wetlands.

Proximity to Refinery & Related Infrastructure

This site is not adjacent to infrastructure or security. Extension of gas, water, and transmission lines to the site would entail other impacts, including wetland impacts. For these items, there is also a cost element, because the infrastructure would have to be extended further to this site than to other sites. The distance that steam pipes would have to cover to deliver steam to the refinery would be more than a mile, which is beyond the threshold of current technology. The extra costs to extend infrastructure were not calculated because the site failed the security criterion.

Security

Site 6 is not readily incorporated into the existing refinery security system, so an additional security system for the site itself would be required. Such a system would be more costly and less secure than a single secured area. In addition, the steam pipeline would not be secure because it would have to cross a public road. Because security is such an important item in refinery operation, this is a fatal flaw, and therefore, the site fails the security criterion. Existing technology will not solve the problem.

Accessibility to Laydown Areas

The only areas available for laydown that are not almost entirely wetlands are located across a state highway from this site. Construction would be logistically very difficult, disruptive to the surrounding community and much more expensive. Therefore, accessibility is not suitable for the construction activity.

3.2.7 Summary Comparison of Alternative Cogeneration Sites

The alternative sites are compared in Table 2 on the basis of the criteria necessary to be practicable and wetland impact. It is clear that the only sites that might have lower wetland impact than the proposed site are not practicable according to one or more of the criteria.

Table 2
Comparison of Alternative Cogeneration Sites

Site	Size	Proximity to Refinery	Security	Accessibility	Wetland Impacts
1	Meets Criterion	Meets Criterion	Meets Criterion	Meets Criterion	12 acres
2	Meets Criterion	Meets Criterion	Meets Criterion	Meets Criterion	31 acres
3	Meets Criterion	Meets Criterion	Meets Criterion	Meets Criterion	33 acres
4	Meets Criterion	Meets Criterion	Meets Criterion	Meets Criterion	About 20 acres
5	Fails Criterion	Meets Criterion	Meets Criterion	Meets Criterion	2.5 acres
6	Meets Criterion	Fails Criterion	Fails Criterion	Meets Criterion	Unknown

3.3 ALTERNATIVE LAYDOWN SITES

Alternative laydown sites must meet three criteria in order to serve the purpose and need: size, accessibility, and security. Cost is anticipated to be similar enough not to be a discriminator in comparing sites. Technology is also not relevant in comparison of sites because no alternate technology is available that would be applicable or be different on one site versus another. The cogeneration project requires construction laydown and staging areas 33 acres in size with easy accessibility to the construction site. The permanent laydown area for refinery use must be 22 acres.

The same sites considered practicable for the cogeneration plant would also meet the key criteria for practicability for the laydown/turnaround area (see Figure 2).

3.3.1 Site A (Proposed Laydown/Turnaround Area)

As a means of minimizing wetland impact overall, the construction laydown for the cogeneration plant is proposed to use mostly areas that will ultimately be used for refinery maintenance and turnarounds. That way, only one set of wetlands will be filled, not two. The proposed site is Site 4 considered for the cogeneration project located at the northeast corner of the refinery, south of Grandview Road and west of Blaine Road. A separate temporary laydown area (Laydown Area 4) of about 4 _ acres is located between the cogeneration site and Grandview Road. Site A is referred to as Laydown Site One, Areas One and Two, in the Golder Alternatives Analysis.

Size & Wetland Impacts

Using this approach, about 5 acres of wetland will be impacted by fill for temporary construction laydown area for the cogeneration project only. Those five acres will then be restored as wetland along with six acres of upland and become part of a visual buffer along the south side of Grandview Road. The remaining area (22 acres) will be permanently filled to provide the construction laydown needs for the cogeneration project and then the turnaround areas for ongoing refinery refurbishment activities. An existing 3.2-acre contractor parking lot would be incorporated as part of the laydown/turnaround area, but it is already used during turnarounds.

Accessibility

This site is readily accessible from the cogeneration construction area, the refinery, the highway, and the needed infrastructure.

Security

This site is within the refinery fence and meets all security requirements.

3.3.2 Site B (Proposed Cogeneration Site)

The site where the cogeneration project is proposed would not be available for use as a laydown/turnaround area if it is occupied by the cogeneration project. Potentially the two could be swapped.

Size & Wetland Impacts

A site big enough for the cogeneration project is big enough for the laydown area. If the locations were swapped, then the same amount of wetland impacts would occur at both locations.

Accessibility

Although this site would be readily accessible from the cogeneration facility if the cogeneration and laydown swapped places, it would not provide adequate accessibility from the refinery and its infrastructure that will be needed for the permanent refinery laydown/turnaround area.

Security

This site is adjacent to the refinery security fence and could be made secure by extending the fence.

3.3.3 Site C (Alternate Cogeneration Site)

Site C is the same site designated as Cogeneration Site 2 above. It is just north of Brown Road and east of the refinery fence and the proposed Brown Road Materials Storage Area. This site includes a large part of Site 1 in the Golder Alternatives Analysis.

Size & Wetland Impact

Site C has at least 40 acres available. With a site layout of 33 acres, at least 31 acres would be wetland fill. This impact conclusion is based on a wetland delineation for the Brown Road Materials Storage Area (URS 2003) and on a delineation by Golder Associates (Golder 2003) which showed 2 acres of upland in patches outside the Brown Road Materials Storage Area. The remainder of Site C is wetland.

Accessibility

Site C is adjacent to the proposed cogeneration site and would provide adequate accessibility to the cogeneration construction. While it is near to the refinery fence, it is farther from the functions needed for ongoing refinery maintenance and the infrastructure required for some of those functions. Therefore, the criterion of accessibility for refinery maintenance is only partially satisfied.

Security

Site C is near enough to the refinery security fence that it could readily be included within the security fence.

3.3.4 Site D (Alternate Cogeneration Site)

Site D is the same as Alternate Cogeneration Site 3. Site D is just south of Brown Road (and Site C) and adjacent to the east refinery fence.

Size & Wetland Impact

Site D has at least 40 acres available. With a site layout of 33 acres, it would essentially all be wetland fill. This impact conclusion is based on a wetland delineation for the Brown Road Materials Storage Area (URS 2003) that found about 5.5 acres of upland in the 11 acres to be used for the Brown Road Materials Storage Area. Nearly all of the adjacent area to the south appears to be wetland, based on reconnaissance-level information by both Golder Associates and URS. Site D would be located mostly south of the Brown Road Materials Storage Area in an area that is almost all wetland.

Accessibility

Site D is separated from the proposed cogeneration site by about 1,400 feet. The site would be accessible so long as no intervening facilities interfere with transport of materials, but it would make cogeneration project construction more logistically difficult and more costly than utilizing the proposed site. Site D is also adjacent to the refinery fence, but it is farther from the functions needed for ongoing refinery maintenance and the infrastructure required for some of those functions. Utilizing this site for refinery maintenance and turnaround activities would be more difficult logistically, more time consuming and more costly as a result. Therefore, the criterion of accessibility for refinery maintenance is only partially satisfied.

Security

Site D is adjacent to the refinery security fence and could readily be included within it.

3.3.5 Site E (Alternate Cogeneration Site)

Site E is located south of Aldergrove Road and east of Jackson Road along the refinery pipeline corridor. This site is referred to as Laydown Site 2 in the Golder Alternatives Analysis.

Size & Wetland Impacts

This site has at least 33 acres available. It is constrained on the west by Jackson Road, on the north by Aldergrove Road, and on the south by another public road. To the east is land not owned by BP, which is forested and probably contains wetlands. Part of the area was previously filled and is not wetlands, but an unknown amount of wetland would have to be included.

Accessibility

Site E fails the accessibility criterion for both cogeneration project construction and refinery maintenance and turnaround activities. It is located nearly two miles from the proposed cogeneration site. Assembling equipment at such a distance from the project site is logistically difficult and costly. Very large equipment would have to be transported on public roads, which would require modifications of the roads and interruption of traffic. The site is outside the refinery, across a public road, and at least a mile from key refinery infrastructure. It would not work for refinery maintenance activities.

Security

The site is outside the security fence and could not be incorporated within the refinery security perimeter. This site could not practicably be made secure for all the activities it would need to support. The key element for security is the security of the steam pipe extending across a public road. Technology does not solve the problems of making it both secure and functional.

3.3.6 Summary Comparison of Alternative Laydown Sites

The alternative sites are compared in Table 3 on the basis of the practicability criteria and wetland impact. It is clear that the only sites that might have lower wetland impact than the proposed site are not practicable according to one or more of the criteria.

Table 3
Comparison of Alternative Laydown Area Sites

Site	Size	Security	Accessibility	Wetland Impacts
A	Meets Criterion	Meets Criterion	Meets Criterion	19 acres
B	Meets Criterion	Meets Criterion	Meets Criterion for cogeneration, not for refinery use	12 acres
C	Meets Criterion	Meets Criterion	Meets Criterion for cogeneration, not for refinery use	31 acres
D	Meets Criterion	Meets Criterion	Meets Criterion for cogeneration, not for refinery use	33 acres
E	Meets Criterion	Fails Criterion	Fails Criterion	unknown

3.4 COMBINATIONS OF SITES

For the cogeneration project, all of the components of the project must be contiguous in order to function. It would not be practicable to put part of the components on one site and others on another site, since they are mostly integral components of the power plant.

However, for the laydown/turnaround area, it would be possible to have multiple sites as long as the size of each was large enough to accommodate the functions required and the other functional requirements are met. These sites would also have to be located in such a way as to efficiently manage the work and the work force.

For the cogeneration laydown areas, the smallest contiguous block now proposed is about 5 acres. This area would be used by one contractor to construct the electrical switchyard. All of the other activities will be controlled by the general contractor and must use a single entrance for security and site control. Some components of the project are large and require large contiguous areas to be available in order to maneuver several components simultaneously. Therefore, it is not feasible to further break the laydown area into smaller units located in different areas.

For the turnaround functions, the refinery area previously used provided over 25 acres of contiguous useable area. The many large components and simultaneous activities require such a large area, and it must provide unobstructed access to the refinery components. It might be possible to segregate a few functions into a separate area on a smaller parcel, but that would not diminish the requirement for a large contiguous block of area.

The only combination of sites that might offer some hope of reducing wetland impact might be a combination of the two sites north and south of Brown Road and adjacent to the cooling tower. In order to get 33 acres of laydown/turnaround area, more than 23 acres of wetland fill would be required.

No combination of sites would give the required laydown/turnaround area and require less wetland fill than the proposed site.

3.5 ALTERNATIVE CONFIGURATIONS

Alternative configurations for both the cogeneration site and the laydown/turnaround site were considered, and the practicable configuration with the least impact on wetlands was selected. The process is discussed below.

The first consideration was whether any of the alternate sites could accommodate either a reconfigured cogeneration layout or a reshaped laydown/turnaround area and result in less wetland impact than either the proposed cogeneration site or the proposed laydown/turnaround site. Since the wetlands in all the alternate sites are in large contiguous areas with small upland areas interspersed, there is no way to get the required area, meet the minimum requirements for access and security, and have less impact on wetlands. Therefore, alternative configurations of the two proposed sites were considered and none were found to be better than the proposed ones.

3.5.1 Cogeneration Site

The selection of the specific preferred site was made by moving the original site footprint around to incorporate as much upland as possible. That placed the site as close to the south side of Grandview road as allowed by the 300-foot setback from the road required by Whatcom County

Code. It also placed the site just east of the drainage ditch along the east boundary of the utility corridor that parallels Blaine Road.

The original footprint was generally rectangular, and the early design assumptions placed the detention basin mostly outside the rectangular plant footprint. Refinements in the design process and further efforts to minimize the facility footprint have allowed further reductions in wetland impact to be realized. As a result of these factors, the southeastern corner of the site (which is all wetland) is no longer proposed to be filled, which reduced the originally proposed wetland impact by 2.5 acres. The detention basin is now designed within the rectangular footprint. As a result, the area of wetland fill was reduced by about an acre. However, because the water that feeds that wetland will unavoidably be blocked by the constructed pad for the cogeneration plant, we have conservatively assumed the wetland will be lost.

3.5.2 Laydown/Turnaround Site

The original expectation of laydown area need was 41 acres. By taking advantage of existing access and keeping the laydown areas contiguous with the construction site, the area needed was reduced to 36 acres. The 3-acre existing contractor parking area was then incorporated as area that can be used at times other than turnarounds, reducing the total laydown area to 33 acres and further reducing the wetland fill needed for the laydown use. By temporarily using area that will become the buffer along Grandview Road, it was possible to make about six acres of that be upland and another five acres be temporary wetland impact.

The permanent turnaround area could not be further reconfigured to reduce wetland impact, since essentially all of the remaining area is wetland. However, choosing this site avoided the wetland impact that would likely occur if it were necessary to provide utilities and security to other locations.

4.0 CONCLUSION

This Alternatives Analysis has demonstrated that no other practicable action, site, combination of sites, or site configuration would have less wetland impact or environmental impact overall and at the same time meet the purpose and need. Therefore, the proposed sites for the cogeneration project and the laydown/turnaround area meet the required tests of Clean Water Act section 404 (b) (1) and section 230.10(a) Guidelines for Implementing the Clean Water Act.

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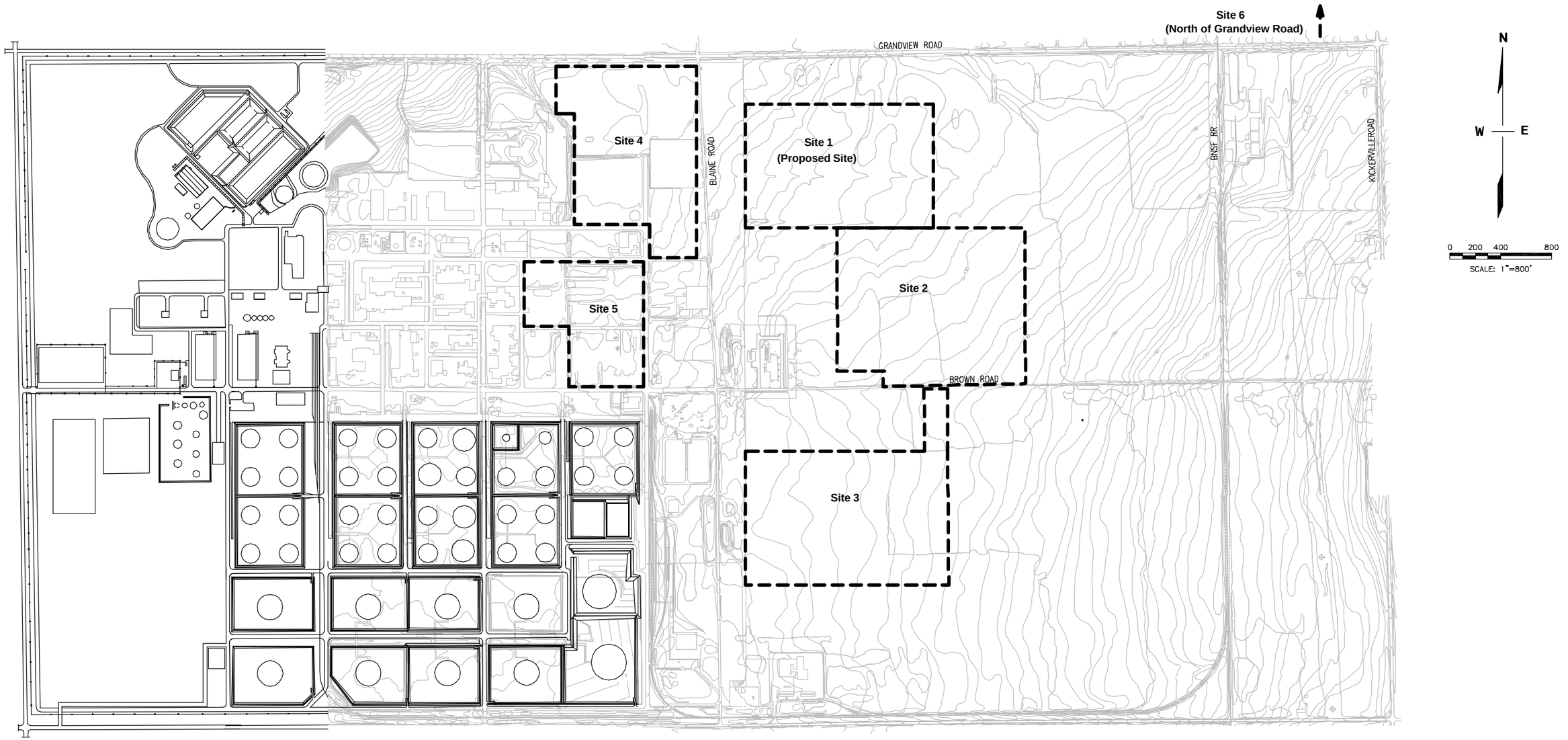

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Figure 1
BP Cherry Point
Alternative Cogeneration Plant Locations

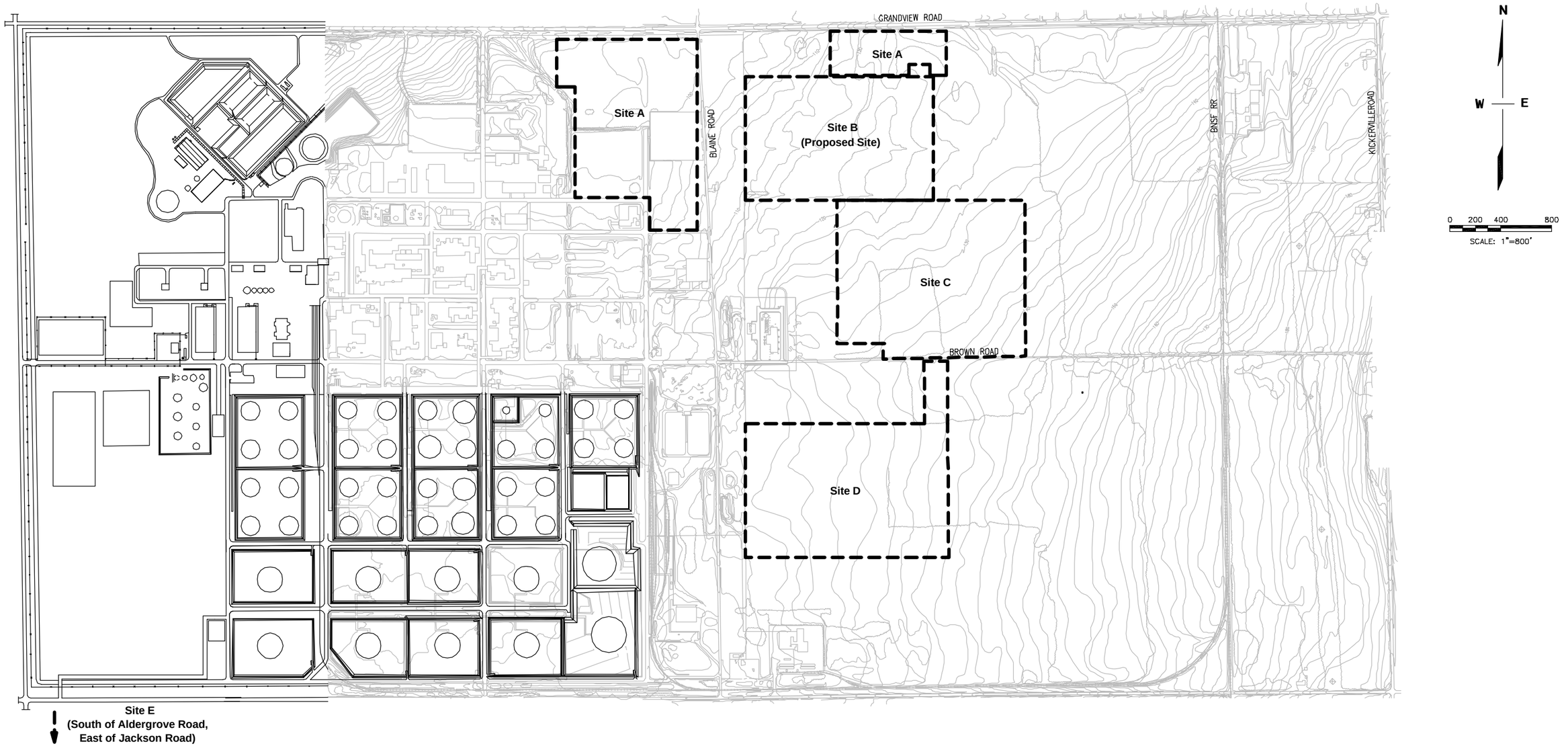

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Figure 2
BP Cherry Point
Alternative Laydown and Staging Locations