
EXECUTIVE SUMMARY

1.1 BACKGROUND

The North Beach Basin, located in north Seattle on Puget Sound, is shown in Figure 1.1. The North Beach Basin covers approximately 633 acres and drains to the North Beach Pump Station along its northern edge. Its approximate eastern edge is 14th Avenue NW and its southern boundary generally follows NW 85th Street.

King County is proposing to construct a 0.23 million gallon (MG) storage pipeline located in Triton Drive NW and NW Blue Ridge Drive public right-of-way to control combined sewer overflows (CSOs). Existing facilities are inadequately sized to convey peak combined sewage (wastewater and stormwater) flows from the North Beach Basin to the West Point Treatment Plant. The capacity of the North Beach Pump Station and Force Main limits the peak flow rate that can be conveyed downstream to approximately 3 million gallons per day (mgd), but the peak wet-weather flow in the North Beach Basin is approximately 9.6 mgd, well in excess of this limit.

Flows in excess of 3 mgd overflow the system's fixed weirs into the existing outfalls that empty into Puget Sound. There were an average of 10 such CSOs annually from 1991 to 2009, with an average annual total overflow of 2.2 million gallons.

This project was initiated to address the following:

- **Revised Code of Washington (RCW) 90.48.480:** This law requires “the greatest reasonable reduction of combined sewer overflows.”
- **Washington Administrative Code (WAC) 173-245-020 (22):** “The greatest reasonable reduction’ means control of each CSO in such a way that an average of one untreated discharge may occur per year.”

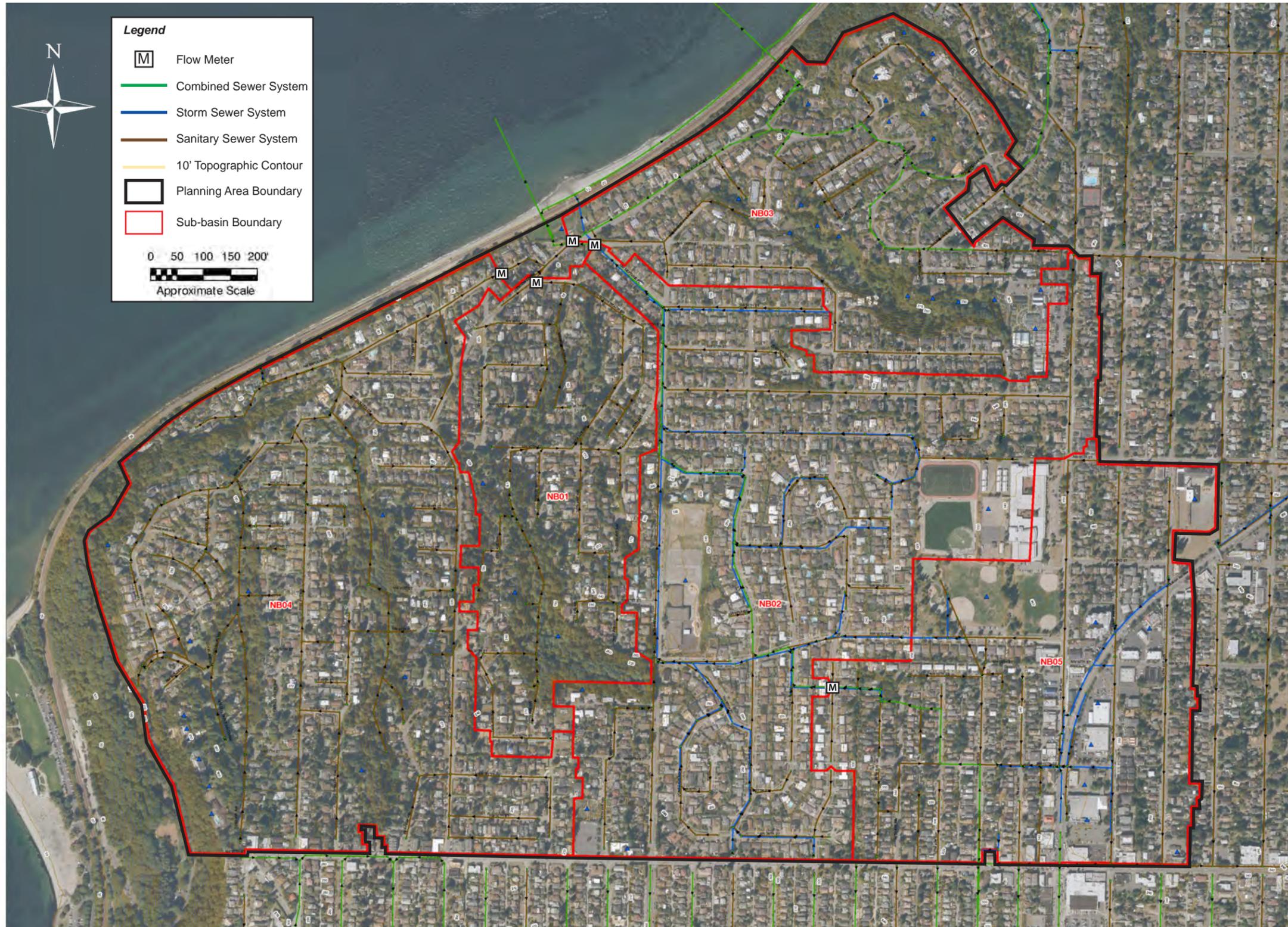
Therefore, according to these regulatory requirements, CSOs must be controlled to an average of no more than one untreated discharge per year per outfall based on a long-term average. This Facility Plan outlines improvements to the King County conveyance system serving the North Beach Basin that are necessary to control CSOs in compliance with the RCW and WAC.

1.2 BASIS OF PLANNING

During the planning process, four CSO control approaches were considered potentially effective at controlling overflows to the required level. These approaches were:

- Storage.
- Convey-and-Treat.

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**Figure 1.1
NORTH BEACH BASIN
OVERVIEW**

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- End-of-Pipe Treatment.
- Peak-Flow Reduction (Demand Management).

In addition, a combination of these approaches was considered wherever feasible.

The North Beach Basin was modeled and calibrated based on historical flow monitoring to determine peak wet-weather flows and volumes. The calibrated models were run for a 30-year long-term simulation for the period from January 1, 1978 to June 30, 2008. Based on the modeling data, the required storage volume and peak flow rate were determined for the following conditions:

1. The long-term average from the entire rainfall record.
2. The average of 20-year averages.
3. The maximum 20-year rainfall period in the entire rainfall record.

The results of the three conditions were nearly the same (well within the accuracy of the analysis). Table 1.1 summarizes the resulting basis-of-planning requirements for the North Beach Basin.

Table 1.1 North Beach Basis-of-Planning Requirements	
Control Approach	Required Volume or Capacity
Convey-and-Treat	6.6 mgd¹
Required Peak Convey-and-Treat Capacity	9.6 mgd
Existing Convey-and-Treat Capacity	3.0 mgd
Storage	0.23 MG
End-of-Pipe Treatment	6.6 mgd²
Peak Flow Reduction (Demand Management)	
Storage Volume for 25% Impervious Disconnection ³	0.12 MG
Storage Volume for 50% Impervious Disconnection ³	0.06 MG
Storage Volume for 75% Impervious Disconnection ³	0.02 MG
Notes:	
1. Convey-and-treat capacity is the difference between "required peak convey-and-treat capacity" and "existing convey-and-treat capacity".	
2. End-of-pipe treatment capacity is the difference between "required peak convey-and-treat capacity" and "existing convey-and-treat capacity".	
3. Represents the percentage of impervious surface currently connected to the combined sewer system that must be disconnected to reduce the required storage volume.	

1.3 PRELIMINARY ALTERNATIVE DEVELOPMENT AND EVALUATION

Identification of preliminary alternatives included evaluation of suitable sites for facilities based on technical criteria. The initial screening resulted in identification of several parcels and right-of-way locations meeting the project requirements.

Using these potential sites, preliminary alternatives were developed based upon control approaches and basis-of-planning requirements. Nine preliminary alternatives were developed for the North Beach Basin as summarized in Table 1.2.

Approach	Alternative	Description
Storage	1A	Rectangular storage at bottom of basin
	1B	Pipeline storage at bottom of basin in public right-of-way
	1C	Pump station at bottom of basin with storage at top of basin and conveyance to 8th Avenue Interceptor
	1D	Pump station at bottom of basin with storage at bottom of basin and conveyance to 8th Avenue Interceptor
Convey-and-Treat	2A	Pump station at bottom of basin and force main through beach alignment to Carkeek; additional treatment at Carkeek
	2B	Pump station at bottom of basin and force main through neighborhood alignment to Carkeek; additional treatment at Carkeek
End-of-Pipe Treatment	3A	Treatment plant at bottom of basin
	3B	Pump station at bottom of basin and treatment plant at top of basin
Combination	5A	Inflow Improvements with storage, infiltration improvements or green stormwater infrastructure (GSI)

The nine alternatives were refined and evaluated between August 2009 and February 2010. The preliminary alternatives were evaluated based upon a range of factors:

- Technical feasibility.
- Environmental impacts.
- Community impacts.
- Land use and permitting impacts.
- Property acquisition.
- Cost.
- Operations and maintenance.

The preliminary alternative development and evaluation process resulted in a short-list of three alternatives, Alternative 1A, 1B and 1D, which were recommended for further evaluation.

1.4 REFINEMENT OF SHORT-LISTED ALTERNATIVES

The project team convened several focus group meetings between March 2010 and August 2010. The team reviewed updated and new information about these alternatives developed by the team and elicited from community input. The team refined the criteria and evaluation ratings as a result of this information.

In July 2010, the project team conducted a project implementation risk assessment workshop for the short-listed alternatives. The purpose of this workshop was to identify potential high-impact risks, such as Shoreline Permit appeals, that would have a high-probability (greater than 60%) of impacting the project schedule and/or cost.

Alternative 1A and 1D had a number of potential high-impact and high-probability risks. This resulted in higher cost and schedule risks for these alternatives which may affect meeting the permit compliance schedule and/or cost to County rate payers. Alternative 1B (Pipeline Bottom-of-Basin Storage) had one potential high-probability and high-impact risk, and so had much lower cost risk to the rate payers and risk to meeting the permit compliance schedule.

The team compiled evaluation results from the focus group meetings and convened a workshop in August 2010 to make a recommendation for a proposed alternative to carry forward for further environmental review. Table 1.3 contains a summary of the project team's analysis of the three short-listed alternatives.

Alternative 1B (Pipeline Bottom-of-Basin Storage) is the alternative proposed for further environmental review for the following reasons:

- Straightforward approach, similar to other county facilities, with minimal technical complexity.
- Minimal permitting/zoning issues.
- Private property acquisition not required.
- Preferred by the community.
- No known environmental issues of concern.
- Lowest capital and life-cycle costs.
- Lowest schedule and cost risk.

Conceptual design details and costs for the proposed alternative were further developed and refined subsequent to the August 2010 workshop. Details of the proposed alternative are presented in Section 1.5 and Chapters 6, 7 and 8.

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Table 1.3 North Beach Basin Short-Listed Alternative Data			
	Alternative 1A: Rectangular Bottom-of-Basin Storage	Alternative 1B: Pipeline Bottom-of-Basin Storage	Alternative 1D: Centralized Storage at Bottom of Basin with Conveyance to 8th Avenue Interceptor.
Evaluation Ratings	This alternative was in the middle for low-impact scores and tied with Alternative 1D for the most high-impact ratings.	This alternative had the most low-impact ratings and had the fewest high-impact ratings.	This alternative had the fewest low-impact scores and tied with Alternative 1A for the most high-impact ratings.
Technical Considerations	Passive diversion of flows and infrastructure similar to other county facilities. Shoring, groundwater, and physical space concerns for constructability. No street access required. Minimum staffing and maintenance requirements.	Passive diversion of flows and infrastructure similar to other county facilities. Shoring, groundwater, and physical space concerns for constructability. Street access may be required - concern about staff safety and street closure requirements. Increased staffing and maintenance requirements due to facilities in the right-of-way.	Passive diversion of flows and infrastructure similar to other county facilities. Shoring, groundwater and physical space concerns for constructability. Increased maintenance due to two-stage pumping. No street access required and minimum staffing and maintenance requirements.
Preliminary Cost Estimates⁽¹⁾			
Project Costs	\$10,350,000	\$9,080,000	\$33,610,000
Land Acquisition (including easements)	\$600,000	\$400,000	\$785,000
Street Use Permits	\$0	\$350,000	\$480,000
Life Cycle Costs (annual)	\$560,000	\$550,000	\$1,780,000
Community Input	Not as much support as Alternative 1B.	Support for this alternative.	Not as much support as Alternative 1B.
Real Estate	Opposition to acquisition of portion of Blue Ridge Park (private park owned by the Blue Ridge community).	No property acquisition required. Facilities within right-of-way or county property.	Opposition to acquisition of portion of Blue Ridge Park (private park owned by the Blue Ridge community).
Land Use Permits (in addition to the typical construction permits)	Shoreline Permit Council Conditional Use Permit – The storage tank would be located in a privately-owned park designated "Conservancy Recreation" (CR) in Seattle's Shoreline Master Program. Storage is considered a "Utility Service Use." Utility Service Uses are prohibited.	Council Conditional Use Permit - Would be straight forward because Seattle Municipal code says this is permitted and there is community support for this alternative.	Shoreline Permit Council Conditional Use Permit – The storage tank would be located in a privately-owned park designated "Conservancy Recreation" (CR) in Seattle's Shoreline Master Program. Storage is considered a "Utility Service Use." Utility Service Uses are prohibited.
Environmental Considerations	No known environmental issues of concern.	No known environmental issues of concern.	Known contaminated sites and potential to encounter contaminated soils in the vicinity of the drop structure and odor control facility site and pipeline alignment near Holman Road.
Notes:			
1. Preliminary cost estimates are from the phase of work to refine and evaluate short-listed alternatives (August 2010). Preliminary costs estimates are based on the best available information at the time of the evaluation. Project costs include construction and non-construction capital costs except for specific itemized costs noted in the table. These costs do not necessarily match the refined costs for the proposed alternative and presented in Section 1.5 and Chapter 7 of this Facility Plan. The refined costs are based on additional detailed information for the proposed alternative not necessarily available for the other alternatives.			

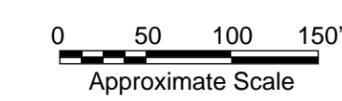
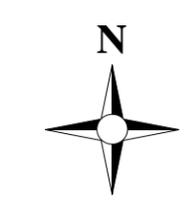
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1.5 PROPOSED ALTERNATIVE

Alternative 1B includes a buried storage pipeline located in Triton Drive NW and NW Blue Ridge Drive public right-of-way. The pipeline provides 0.23 MG of storage volume for combined sewage. Ancillary facilities would be located on the North Beach Pump Station site. Figure 1.2 illustrates the alternative. It includes the following elements:

- A new diversion structure to redirect peak flows from the sewer to storage.
- A buried storage pipe nominally 325 feet long and 12 feet in diameter. The storage pipeline includes:
 - A 20-inch influent sewer.
 - A pump station to empty the pipeline contents over a 24-hour period following a wet-weather event.
 - A 6-inch effluent line to the local combined sewer system (CSS).
 - A flushing system, including a flap gate and utility water equipment, to facilitate cleaning the pipeline.
 - Access features for routine and long-term operations and maintenance.
- An ancillary equipment facility for odor control, mechanical, and electrical equipment including:
 - Control panels and motor control centers (MCC).
 - Standby power generator, including fuel storage tank.
 - Odor control system including mist eliminator, carbon scrubbers, and fans.
 - Ventilation system.
 - Utility water system including backflow preventer, air gap tank, pumps, and hydropneumatic tank.
- Site improvements including:
 - Improvements as required by the Seattle Department of Transportation (SDOT) along Triton Drive NW and NW Blue Ridge Drive.
 - North Beach Pump Station surface access improvements, fencing, and landscaping modification/restoration.

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Legend

-  Combined Sewer System
-  Storm Sewer System
-  Sanitary Sewer System
-  10' Topographic Contour
-  Feasible Area for Pipe Location

Figure 1.2
NORTH BEACH BASIN ALTERNATIVE 1B SITE PLAN

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Table 1.4 summarizes the total project cost estimate including engineering, construction management, and County administrative costs.

Table 1.4 Project Cost Summary	
Item	Amount
Construction	\$5,100,000
Property Costs (Temporary construction easements and construction staging)	\$750,000
Additional Costs (Tax, allied costs, permit fees, and project contingency)	\$4,000,000
Total	\$9,850,000

Table 1.5 summarizes O&M costs for the first year of operation. Subsequent years are escalated at approximately 3 percent per annum for the life-cycle cost calculations.

Table 1.5 O&M Cost Summary	
Item	\$/yr, 2014
Operations and Maintenance Labor (Tank, Diversion Structure, Ancillary Facilities)	\$34,900
Electricity (ventilation, power)	\$ 4,700
Chemicals (activated carbon replacement once per two years)	\$ 5,000
Standby Generator (fuel)	\$ 1,200
Total	\$45,800

The preliminary project schedule is summarized in Table 1.6. The dates are approximate and the schedule will be updated as the project progresses.

Table 1.6 Preliminary Project Schedule	
Activity	Anticipated Dates
Facility Plan Development	June 2010 – December 2010
SEPA	November 2010 – April 2011
Facility Plan Approval	June 2011
Permitting and Property Acquisition	June 2011 – September 2012
Final Design Consultant Selection	December 2010 - June 2011
Final Design	September 2011 – September 2012
Construction	March 2013 – August 2014
Start-up	September 2014
Project Commissioning	October 2014 - May 2016 (2 wet seasons)