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SMALL STORAGE HYDROELECTRIC RESOURCE OPTIONS STUDY REPORT

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EXECUTIVE SUMMARY

Knight Piésold Ltd. (KP) was retained by BC Hydro to complete an assessment of storage hydro potential in three regions of BC: the North Coast, Vancouver Island, and the Lower Mainland. The study areas were further limited within these regions by a maximum of 50 km from BC Hydro transmission lines and a variety of exclusion zones. Given these parameters KP established a four-step screening process that applied increasing constraints to narrow down the areas of interest to projects that may be technically and commercially viable:

- Screen 1: Drainage Area Mapping, to eliminate rivers with drainage areas that would be too small (thereby requiring unachievable amounts of head) or too large (thereby resulting in an under-sized facility that would require excessive diversion structures and spillways).
- Screen 2: Dam Site Identification, a review of mapping and Google Earth to identify potentially viable dam sites.
- Screen 3: Minimum Capacity Screening, to determine the combination of head and flow required to achieve a minimum power output of 20 MW, as required to meet the BC Hydro definition for Dependable Capacity.
- Screen 4: Dam Geometry and Capital Cost Screening, an iterative process of adjusting facility configuration to provide minimum and maximum reservoir operating range, design flows, penstock, transmission line, and access road lengths, and to determine high-level capital cost estimates for each site passing Screen 3.

In total, KP identified 6 sites on the North Coast, 2 sites on Vancouver Island, and 8 sites in the Lower Mainland region which have estimated overnight capital costs of less than \$8M/MW for the 16-hour per day generation period. Study results for all generation periods assessed are summarized below.



Study Results – 16-Hour Generation

Region	SITE NAME	Dam Height for Dependable Capacity (m)	Total Head (m)	Design Flow (m³/s)	Installed Capacity (MW)	Total Capital (Overnight)	Capacity Cost (/MW)	Annual Energy Production (GWh)
North Coast	Ball Creek	23	123	21.1	21.6	\$ 168,580,000	\$ 7,800,000	46.2
North Coast	Nass River	39	39	192.1	61.8	\$ 457,917,000	\$ 7,408,000	290.4
North Coast	Kinskuch River	10	705	5.4	31.8	\$ 207,309,000	\$ 6,519,000	129.6
North Coast	Zymoetz River	45	45	136.4	51.2	\$ 330,990,000	\$ 6,459,000	276.8
North Coast	Anudol Creek (a)	15	507	6.6	28.1	\$ 213,927,000	\$ 7,611,000	134.1
North Coast	More Creek	34	34	135.6.6	38.3	\$ 261,833,000	\$ 6,833,000	148.8
Van Island	Nimpkish River (b)	12	54	171.2	77.6	\$ 518,430,000	\$ 6,683,000	463.7
Van Island	Chemainus River	47	161	19.0	25.5	\$ 181,117,000	\$ 7,100,000	137.6
Lower Mainland	Freda Creek	21	348	10.5	30.6	\$ 193,069,000	\$ 6,319,000	202.5
Lower Mainland	Squamish River (b)	22	43	189.7	67.7	\$ 506,534,000	\$ 7,481,000	375.1
Lower Mainland	Elaho River	42	55	139.0	63.9	\$ 427,915,000	\$ 6,696,000	354.7
Lower Mainland	South Creek	27	625	8.7	45.1	\$ 242,970,000	\$ 5,382,000	251.4
Lower Mainland	Siwash Creek	41	437	5.7	20.7	\$ 132,452,000	\$ 6,388,000	77.3
Lower Mainland	Silverhope Creek	34	299	20.5	51.1	\$ 373,088,000	\$ 7,301,000	313.8
Lower Mainland	Nahatlatch River	20	166	60.7	83.9	\$ 416,465,000	\$ 4,963,000	442.6
Lower Mainland	Spuzzum Creek	18	419	8.6	30.2	\$ 184,602,000	\$ 6,116,000	156.3

Study Results – 12-Hour Generation

Region	SITE NAME	Dam Height for Dependable Capacity (m)	Total Head (m)	Design Flow (m³/s)	Installed Capacity (MW)	Total Capital (Overnight)	Capacity Cost (/MW)	Annual Energy Production (GWh)
North Coast	Ball Creek	23	123	28.1	28.8	\$ 191,428,000	\$ 6,643,000	46.2
North Coast	Nass River	39	39	192.1	61.8	\$ 457,917,000	\$ 7,408,000	290.4
North Coast	Kinskuch River	10	705	5.4	31.8	\$ 207,309,000	\$ 6,519,000	129.6
North Coast	Zymoetz River	45	45	136.4	51.2	\$ 330,990,000	\$ 6,459,000	276.8
North Coast	Anudol Creek (a)	15	507	6.6	28.1	\$ 213,927,000	\$ 7,611,000	134.1
North Coast	More Creek	34	34	180.8	51.1	\$ 302,548,000	\$ 5,922,000	166.3
Van Island	Nimpkish River (b)	12	54	171.2	77.6	\$ 518,430,000	\$ 6,683,000	463.7
Van Island	Chemainus River	47	161	19.9	26.7	\$ 184,852,000	\$ 6,914,000	141.6
Lower Mainland	Freda Creek	21	348	10.5	30.6	\$ 193,069,000	\$ 6,319,000	202.5
Lower Mainland	Squamish River (b)	22	43	189.7	67.7	\$ 506,534,000	\$ 7,481,000	375.1
Lower Mainland	Elaho River	42	55	139.0	63.9	\$ 427,915,000	\$ 6,696,000	354.7
Lower Mainland	South Creek	27	625	8.7	45.1	\$ 242,970,000	\$ 5,382,000	251.4
Lower Mainland	Siwash Creek	41	437	7.6	27.6	\$ 150,290,000	\$ 5,436,000	86.9
Lower Mainland	Silverhope Creek	34	299	20.5	51.1	\$ 373,088,000	\$ 7,301,000	313.8
Lower Mainland	Nahatlatch River	20	166	60.7	83.9	\$ 416,465,000	\$ 4,963,000	442.6
Lower Mainland	Spuzzum Creek	18	419	8.6	30.2	\$ 184,602,000	\$ 6,116,000	156.3



Study Results – 8-Hour Generation

Region	SITE NAME	Dam Height for Dependable Capacity (m)	Total Head (m)	Design Flow (m³/s)	Installed Capacity (MW)	Total Capital (Overnight)	Сар	oacity Cost (/MW)	Annual Energy Production (GWh)
North Coast	Ball Creek	23	123	42.2	43.2	\$ 235,463,000	\$	5,448,000	46.2
North Coast	Nass River	39	39	240.0	77.2	\$ 504,527,000	\$	6,531,000	324.5
North Coast	Kinskuch River	10	705	6.8	40.1	\$ 227,504,000	\$	5,671,000	151.8
North Coast	Zymoetz River	45	45	136.4	51.2	\$ 330,990,000	\$	6,459,000	276.8
North Coast	Anudol Creek (a)	15	507	9.5	40.3	\$ 251,969,000	\$	6,257,000	168.2
North Coast	More Creek	34	34	271.2	76.6	\$ 383,985,000	\$	5,011,000	169.3
Van Island	Nimpkish River (b)	12	54	171.2	77.6	\$ 518,430,000	\$	6,683,000	463.7
Van Island	Chemainus River	47	161	29.9	40.1	\$ 224,580,000	\$	5,600,000	168.5
Lower Mainland	Freda Creek	21	348	13.8	40.1	\$ 224,330,000	\$	5,601,000	210.7
Lower Mainland	Squamish River (b)	22	43	189.7	67.7	\$ 506,534,000	\$	7,481,000	375.1
Lower Mainland	Elaho River	42	55	139.0	63.9	\$ 427,915,000	\$	6,696,000	354.7
Lower Mainland	South Creek	27	625	8.7	45.1	\$ 242,970,000	\$	5,382,000	251.4
Lower Mainland	Siwash Creek	41	437	11.4	41.5	\$ 184,726,000	\$	4,454,000	87.6
Lower Mainland	Silverhope Creek	34	299	20.5	51.1	\$ 373,088,000	\$	7,301,000	313.8
Lower Mainland	Nahatlatch River	20	166	60.7	83.9	\$ 416,465,000	\$	4,963,000	442.6
Lower Mainland	Spuzzum Creek	18	419	11.6	40.4	\$ 218,104,000	\$	5,397,000	171.2

Study Results – 4-Hour Generation

Region	SITE NAME	Dam Height for Dependable Capacity (m)	Total Head (m)	Design Flow (m³/s)	Installed Capacity (MW)	Total Capital (Overnight)	Capacity Cost (/MW)	Annual Energy Production (GWh)
North Coast	Ball Creek	23	123	84.4	86.4	\$ 361,131,000	\$ 4,178,000	46.2
North Coast	Nass River	39	39	480.1	154.5	\$ 737,814,000	\$ 4,776,000	423.4
North Coast	Kinskuch River	10	705	13.6	80.2	\$ 320,555,000	\$ 3,995,000	200.7
North Coast	Zymoetz River	45	45	215.0	80.8	\$ 415,039,000	\$ 5,139,000	336.8
North Coast	Anudol Creek (a)	15	507	19.0	80.5	\$ 368,153,000	\$ 4,571,000	200.8
North Coast	More Creek	34	34	542.4	153.3	\$ 628,287,000	\$ 4,099,000	169.3
Van Island	Nimpkish River (b)	12	54	181.5	82.2	\$ 536,411,000	\$ 6,524,000	472.6
Van Island	Chemainus River	47	161	59.7	80.2	\$ 337,434,000	\$ 4,207,000	171.9
Lower Mainland	Freda Creek	21	348	27.6	80.1	\$ 346,536,000	\$ 4,326,000	211.4
Lower Mainland	Squamish River (b)	22	43	229.2	81.8	\$ 568,058,000	\$ 6,943,000	412.0
Lower Mainland	Elaho River	42	55	176.9	81.3	\$ 481,159,000	\$ 5,919,000	398.5
Lower Mainland	South Creek	27	625	15.5	80.9	\$ 327,681,000	\$ 4,050,000	317.0
Lower Mainland	Siwash Creek	41	437	22.8	82.9	\$ 283,244,000	\$ 3,415,000	87.6
Lower Mainland	Silverhope Creek	34	299	32.2	80.3	\$ 466,130,000	\$ 5,807,000	352.5
Lower Mainland	Nahatlatch River	20	166	60.7	83.9	\$ 416,465,000	\$ 4,963,000	442.6
Lower Mainland	Spuzzum Creek	18	419	23.1	80.8	\$ 340,367,000	\$ 4,211,000	213.7



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APPENDICES

Appendix A Study Area Maps

Appendix B Dam Site Screeing Summaries

Appendix C Site Summary Sheets



ABBREVIATIONS

AACE	American Association of Civil Engineers
	British Columbia
	British Columbia Forests, Lands, and Natural Resource Operations
	Canadian Forces Base
	Canadian Water Branch
	Energy Purchase Agreement
	Integrated Land Management Bureau
	kilometre
	kilovolt
	kilowatt hour
	Land and Resource Data Warehouse
	metres
	mean annual discharge
	millions
	north
	National Topographic System
	design flow
	reinforced concrete
	roller compacted concrete
	tailings storage facility
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1.0 INTRODUCTION

1.1 BACKGROUND

BC Hydro's Energy Planning Department has commissioned Knight Piésold Ltd. (KP) to complete a study that identifies small hydroelectric potential across three regions of BC: the North Coast, the Lower Mainland and Vancouver Island. The results of this study will be used as inputs to BC Hydro's long-term portfolio analysis that evaluates the relative merits of different resources under a variety of design scenarios.

1.2 SCOPE OF STUDY

The scope of the Small Storage Hydro Study was defined in the BC Hydro Request for Proposals (RFP) entitled Assessment of Small Storage Hydroelectric Potential and modified as necessary in consultation with BC Hydro. The study was focused on the North Coast, Lower Mainland and Vancouver Island regions of BC. Several exclusion areas within each study region were identified by BC Hydro. Further information on these exclusion zones and how they were utilized in the study is provided in Section 2.1.

The overall intention of the study was to identify potential small storage hydroelectric sites having an installed capacity of between 20 MW and 100 MW capable of providing dependable capacity of greater or equal to 20 MW. Dependable capacity was defined as the maximum sustained capacity that a plant can deliver, with 85% exceedance probability for a certain number of hours per day, 6 days a week for 2 weeks between December 1 and January 31. Generation durations for dependable capacity calculations considered 4, 8, 12, and 16 hours/day.

The study was aimed at short-listing no more than 20 sites per region that have the potential for future development, are cost effective, and meet the technical requirements noted above. A threshold of \$8 Million per Megawatt installed capacity (\$8M/MW) was chosen as the upper bound limit for final project screening. No environmental or fisheries considerations were applied to the screening process.

In order to estimate costs and determine the sites that met the maximum threshold of \$8M/MW various technical and economic attributes were determined, including estimated dam type and height, reservoir size, penstock, transmission line, and access road lengths.



2.0 SITE IDENTIFICATION

2.1 REGIONAL DELINEATION AND EXCLUSION ZONES

As defined by BC Hydro the small storage hydro study was conducted within three specific regions within BC subject to zones that would be excluded from site identification. The definition of the regional boundaries and the specific study areas are described below.

2.1.1 STUDY REGIONS

2.1.1.1 NORTH COAST

The study area for the North Coast region of British Columbia was limited to a 50 km boundary on either side of the 2L99, 2L101, and 2L102 transmission lines of BC Hydro's grid, with the most north substation being Bob Quinn (BQN). Only 138 kV and 230 kV lines were considered. GIS data of the BC Hydro transmission system within the North Coast region was provided by BC Hydro.

2.1.1.2 LOWER MAINLAND

Lower Mainland is defined as the area within mainland BC that is southwest of latitude N 51 and longitude W 121. The study area was limited to a 50 km boundary on either side of existing 138 kV and 230 kV transmission lines in this area, excluding privately owned and operated transmission lines. No islands off the coast of the Lower Mainland region were included in this study.

2.1.1.3 VANCOUVER ISLAND

The Vancouver Island study area was limited to a 50 km boundary on either side of existing 138 kV and 230 kV transmission lines on the island. No islands surrounding Vancouver Island were included in this study.

2.1.2 EXCLUSION ZONES

Exclusion zones were identified by BC Hydro as provided in Appendix B of the RFP documents. Table 2.1 below summarizes these zones.



Exclusion Zone	Source	Screening Buffer
Biodiversity Areas	Province of British Columbia, GeoBC, ILMB	No projects within 100 m of exclusion area
Wildlife Management Areas Areas for which administration and control was transferred to the Ministry of Environment via the Land Act due to the significance of their wildlife/fish values and designated as Wildlife Management Areas under the Wildlife Act	Province of British Columbia, GeoBC, LRDW	No projects within 100 m of exclusion area
Conservancy Areas Conservancy areas designated under the <i>Park Act</i> or by the <i>Protected Areas of</i> <i>British Columbia Act</i> , whose management and development is constrained by the <i>Park Act</i>	Province of British Columbia, GeoBC, LRDW	No projects within 100 m of exclusion area
National Parks	Province of British Columbia, GeoBC, LRDW	No projects within 100 m of exclusion area
Legally Protected Areas Ecological Reserves, Protected Areas, Provincial Parks, Recreation Areas	Province of British Columbia, GeoBC, LRDW	No projects within 100 m of exclusion area
Canadian Forces Bases	CFB Esquimalt (Navy) CFB Comox (Air Force)	No projects within 100 m of exclusion area
Migratory Bird Sanctuaries	Environment Canada	No projects within 100 m of exclusion area
Glaciers	Province of British Columbia, GeoBC, CWB	No projects, roads or power lines within 100 m of exclusion area
Existing and Approved Projects	Water Licenses, IPPBC	No projects within a 10 km buffer of all existing, approved, and under construction power generation projects. For the purposes of this study, "approved" refers to projects with EPAs with BC Hydro.

Table 2.1	Study Area Exclusion Zones
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All exclusion zones were mapped as defined in Table 2.1 with the exception of existing and approved projects. The 10 km screening buffer around all existing, approved and under construction power generation projects was not defined as to the specific entity or entities in which the buffer was to be applied. In consultation with BC Hydro it was agreed that KP would apply the 10 km buffer to the approved Point of Diversion (POD) that were sourced from the BC Water Licences Query website (http://a100.gov.bc.ca/pub/wtrwhse/water_licences.input). In addition, the screening buffer definition for this study was also not limited to projects with EPAs with BC Hydro since independent power projects that do not sell power to BC Hydro were seen as equally important with respect to impacts from other developments.



Maps showing the study areas and exclusion zones are provided in Appendix A.

2.2 REGIONAL HYDROLOGY ESTIMATES

An estimate of the anticipated hydrologic conditions across each region was required for the initial stages of screening such that design flows could be determined. In order to do this for such a large study area, KP utilized published regional estimates of mean annual unit area runoff from the following reports as follows:

- North Coast Inventory of Streamflow in the Skeena Region (A. Ahmed and S. Jackson 2013), and
- Vancouver Island and Lower Mainland Streamflow in the Lower Mainland and Vancouver Island (W. Obedkoff 2003).

Obedkoff (2003) and Ahmed and Jackson (2013) present hydrologic zones, which are regions of relatively homogeneous hydrologic characteristics. For each zone, plots of mean annual runoff versus median watershed elevation are presented. Because median watershed elevation was not known at this stage, an upper bound mean annual runoff was selected for each hydrologic zone. The upper bound was selected as this was considered a conservative assumption (i.e. unlikely to exclude sites that have higher runoff than estimated from this screening method). Each hydrologic zone was delineated in ArcGIS and the mean annual runoff estimates were used to determine the estimated Mean Annual Discharge (MAD) for each catchment area.

2.3 SITE SCREENING

The screening assessment included four levels of screening in order to first identify all potential dam sites across each region and then systematically screen candidate sites to identify a short-list of sites that have the greatest potential for future development. It should be noted that each screening level was limited to the data sources available and the number of specific attributes that could be realistically assessed at each stage. A summary of the assumptions made and the data sources available is provided with a description of each Screen in the sections to follow.

2.3.1 SCREEN 1 – DRAINAGE AREA MAPPING

A series of maps were prepared for each study region using ArcGIS software to aid in identifying candidate sites. The maps were prepared by first delineating study regions, then amending study regions to include all exclusion zones described in Section 2.1.2 above.

Drainage areas were then mapped for each stream confluence that met the minimum and maximum catchment area requirements as follows:

• A minimum drainage area was defined for each hydrologic zone such that in order for a project to meet the minimum 20 MW installed capacity threshold a maximum design gross head of 1,000 m could not be exceeded. 1,000 m gross head was seen as the anticipated upper limit for a feasible 20 MW facility, and if a drainage area was small enough that more than 1,000 m of head would be required, the drainage area was too small for further consideration.



A maximum drainage area was defined for each hydrologic zone such that the design flow would be
reasonably limited to 0.5 times the Mean Annual Discharge and the project would not exceed the
maximum 100 MW installed capacity criteria. In this case, if a project was to have diversion facilities
that divert a greater proportion of the annual flows for a particular site than would be used for power
generation, the cost for developing the diversion facilities (i.e. Spillway) would be an overwhelming cost
to the project.

2.3.1.1 DATA SOURCES AND ASSUMPTIONS

Drainage Area Mapping

All drainage areas and contour data were developed using NTS mapping data. NTS mapping was used since these data were freely obtained and provided coverage across all project regions. The limitation of these data was that they are based on historic mapping techniques that are inferior to more modern techniques. The resulting data set provided contour data with intervals of between 30 and 33 m.

Mean Annual Discharge

MAD estimates were determined for this stage as described in Section 2.2. The defined hydrologic zones were found to cross drainage areas. In these instances, MAD was based on the hydrologic zone that the intake was located in. For larger watersheds this assumption may not be very representative; however it was assumed that these estimates are sufficient for initial screening.

Design Flow

For the initial screening it was assumed that a design flow equal to MAD was a reasonable estimate for identifying storage hydro sites.

2.3.2 SCREEN 2 – DAM SITE IDENTIFICATION

Google Earth was used to conduct a visual assessment for each region to identify suitable dam sites that had the following characteristics:

- Cross sections that were along reasonably confined reaches of subject rivers/creeks, resulting in efficient and cost effective dam construction.
- Upstream reaches that would allow a large volume of water to be held upstream of the dam, helping to minimize dam heights and construction costs. Long, wide, flat reaches tend to be more efficient than short, narrow, steep reaches.

The terrain data provided by Google Earth was used to identify potential dam sites. It was assumed that these data were fit for the purpose of this assessment and were either comparable to or better than the NTS mapping data. It should be noted that no assessment of data accuracy was completed as part of this study.

The total number of potential dam sites identified in this Screen is as follows:

- North Coast 50 sites
- Vancouver Island 95 sites, and
- Lower Mainland 96 sites.



These sites are shown on Figures A-1 (North Coast) and A-2 (Vancouver Island and Lower Mainland) in Appendix A. A list of these sites is provided on Table B-1 in Appendix B for reference.

2.3.3 SCREEN 3 – GROSS GENERATION HEAD REQUIREMENT

In order to refine the number of candidate sites to those that meet the minimum installed capacity requirements, as set out in Section 1.2 – Scope of Study, all sites identified during Screen 2 were assessed for minimum head requirements. Gross generation head was determined as a sum of the head available from the dam as well as head available from a penstock.

Drainage areas and MAD estimates were refined based on the dam site locations identified in Screen 2. Following from assumptions noted above for initial design flow estimates the minimum head required for each site to achieve the minimum capacity of 20 MW was calculated, assuming an overall system efficiency of 85 percent. Dam storage volumes to satisfy the dependable capacity definition were minimized, as it was assumed that minimizing dam construction costs would yield the best project economics. This is to say that the development of a penstock, where the gradient downstream of a dam permits, would be more economic than constructing a higher dam.

Google Earth was used to delineate stream reaches downstream of each dam site. These delineations were used to determine the available generation head downstream of each dam site. Distances were initially limited to 10 km where estimated gradients were too flat. Penstocks at less than approximately 5 percent grade are marginal in value, as the penstock costs counteract the added benefit of developing the additional head downstream of a dam rather than constructing a larger dam. However, final screening of sites considered a maximum capacity cost metric of \$8M/MW of installed capacity, therefore in cases where a reduced capacity cost can be achieved utilizing less efficient penstocks (i.e. Less than 5% grade) to increase the installed capacity such arrangements were considered. This is described further in the following section.

Each site was evaluated based on the minimum dam height required to achieve 20 MW dependable capacity storage volumes and available penstock head. Sites not capable of achieving minimum gross head requirements were eliminated from further assessment.

The total number of potential dam sites passing this Screen were as follows:

- North Coast 19 sites
- Vancouver Island 4 sites, and
- Lower Mainland 13 sites.

A list of these sites including map coordinates is provided on Table B-2 in Appendix B for reference.

2.3.4 SCREEN 4 – DAM GEOMETRY AND CAPITAL COSTS

Conceptual facility geometry was developed for those sites passing Screen 3 in order to provide further definition to each potential project. A spreadsheet based model that allowed user input of various calculated project data was used to estimate facility geometry, provide dependable capacity, installed capacity, monthly energy estimates for average and firm flow conditions, capital cost estimates and other related



project outputs that would be required for assessing the sites. The process for developing facility geometry using this spreadsheet model is described in further detail below.

2.3.4.1 DAM GEOMETRY FOR DEPENDABLE CAPACITY

Site-specific monthly average hydrology estimates and reservoir depth-area-curve data was compiled for each dam site to allow for an assessment of dam storage potential and height requirements. The storage volume to provide the minimum dependable capacity of 20 MW for the two week period between December 1 and January 31 was calculated, and storage volume estimates were adjusted (reduced) to account for winter inflows during the dependable capacity generation period. Initial dam heights were then adjusted upwards to account for a 50 percent dead storage capacity, to reduce reservoir operating level variability and to ensure capacity for the 85th percentile flow case. All dams were sized to accommodate the 16-hour generation case as this would require the greatest storage volumes to meet the 20 MW dependable capacity definition.

2.3.4.2 DAM TYPE SELECTION

A preliminary assessment of dam type that would be utilized at each project site was completed. Dam types were limited to the following:

- Concrete Faced Rockfill Dam (CFRD)
- Roller Compacted Concrete (RCC), and
- Reinforced Concrete (RC).

Dam type was selected based initially on dam height and crest length. RC dams were specified for dam heights of 15 m or less considering concrete volumes could be optimized with the integration of intake facilities. In most cases, the remaining sites were specified as CFRD as they would be more cost effective than RCC or RC. In some instances RCC dams were specified where diversion flows were likely to be significantly larger than design flows. Such sites would require costly gated spillway facilities if a CFRD was specified. RCC dams in these cases would be designed with an integral ungated overflow section to help reduce gated spillway costs. No attempt at optimizing dam type and or geometry has been completed at this stage. It is anticipated that a more detailed options study should be undertaken at each site in order to determine the optimum dam/spillway/intake arrangement.

2.3.4.3 TURBINE SELECTION

For the purposes of this study only two types of turbines were assumed; Francis for low head facilities and Pelton for high head facilities. A gross head of 250 m was selected as the limit for Francis turbines. It should be noted that no attempt to optimize the turbine type or number of turbines has been made and that final selection will take into account other facility parameters including design flow, ramping requirements, etc. The energy modelling completed for this study was based on overall assumed system efficiencies and did not draw specifically on unique turbine parameters.

2.3.4.4 PENSTOCK LENGTH REFINEMENT



As noted in Section 2.3.3 penstock lengths required some amount of optimization to assess whether or not the project would benefit from the additional capacity and energy gained by developing head below the dam site. Penstock lengths that were determined in Screen 3 were initially eliminated if the overall penstock grade was less than 5%. In several cases, the penstock contributes to a significant portion of the overall facility head and elimination of the penstock resulted in some facilities having higher capacity costs. For these sites, a high level assessment using Google Earth was completed to determine the optimum penstock length that would retain as much head as possible.

2.3.4.5 TRANSMISSION AND ROAD ACCESS

An estimation of transmission line length and main access road requirements was made using Google Earth. Transmission lines were assumed to interconnect with BC Hydro's transmission system at the nearest substation to the dam site. Access roads were assumed to be required only to the nearest existing road, presumed to be actively maintained either by BC MOTI or BC FLNRO.

2.3.4.6 ASSUMPTIONS

In order to complete Screen 4 and establish a final set of potential small storage hydroelectric projects several assumptions were made. These are listed below.

- 1. Depth-Area-Curve data based on NTS contour data were sufficient for estimating storage volume requirements. Due to the contour interval being 30-33 m, only 2 contours were available for most sites to delineate reservoir areas. Therefore, linear interpolation and extrapolation were performed in the spreadsheet model to estimate dam heights and reservoir volumes.
- 2. Penstock, transmission line and access road alignments were only estimated in Google Earth and were simply considered on linear length. No actual designs for these components were completed. Penstocks and roads were assumed to follow stream gradients. Transmission line routes were assumed to follow as direct a path as possible to the BC Hydro grid, while considering constructability (e.g. follow valleys where suitable, avoid high elevation passes where snow and ice loading would be high etc.).
- 3. Dam height and dam construction costs and technical challenges were a major consideration, and for a relatively small hydropower output (20 MW to 100 MW), it was subjectively decided that dam heights exceeding 90 metres would be too expensive or technically challenging to construct.
- 4. No consideration of variable geotechnical or terrain conditions was made for any of the sites.
- 5. Installed capacity was based on the total system head (dam height + penstock head).
- 6. Reservoirs were sized such that dependable capacity of 20 MW of power output was achieved, assuming at the minimum reservoir operating level.
- 7. No freeboard on dam crests was included in the model due to the extremely course nature of the mapping data.

2.3.4.7 CAPITAL COST ESTIMATES

Capital cost estimates were completed to an AACE Class 5 estimate (-50% to +100%) for the remaining projects (those satisfying the dependable capacity definition and dam height limitation) using a combination of site-specific technical considerations (estimated dam height, crest length, and volume, reservoir area,



transmission line, access road, and penstock length), and scaled input parameters (design flow and installed capacity). The unit rates were derived from actual hydropower construction costs for comparable projects and although very high level, are considered to be a reasonable basis for cost-based screening. Capital costs are described in more detail in Section 3 – Project Definition.

2.3.4.8 CAPACITY COST SCREENING

Capacity cost (\$/MW) was calculated for each site using the capital cost estimate and the installed capacity calculated for each site. Sites that fell above \$8M/MW were assumed too costly to develop as capacity projects at this time. The total number of projects from each region passing the cost screening were as follows:

- North Coast: 6
- Vancouver Island: 2, and
- Lower Mainland: 8.

The full list of sites passing the cost-screening assessment are provided on Table B-3 in Appendix B for reference. Site-specific data sheets for each site, including hydrology data, technical design parameters, cost estimates, energy models, and unit capacity and energy cost metrics are included in Appendix C.

Further details with respect to site definition for the final list of projects is provided in Section 3.



3.0 SITE DEFINITION

3.1 SITE CHARACTERISTICS

Following from specification of dam and facility geometry completed in Screen 4 each site was characterized based on the following attributes:

- Site Hydrology (see Section 3.2 below)
- Plant design flow
- Dam height, crest length and type
- Reservoir area and volume
- Total gross generation head
- Penstock, transmission line and access road lengths, and
- Project footprint.

These site characteristics are provided on the site summary sheets provided in Appendix C.

3.2 SITE HYDROLOGY

For the short-listed sites, passing Screen 4, site specific daily flow series were developed by drainage area proration of a representative Water Survey of Canada (WSC) gauging station. Key criteria in selecting a suitable WSC station include:

- Proximity
- Watershed area and elevation
- Glaciation
- Lake content
- Existing regulation
- Aspect, and
- Period of record.

The key factors governing the differences in timing and magnitude of unit discharge (discharge per unit area) are elevation, glacier cover, distance from the coast, and location relative to the Coast Mountain drainage divide, which dictates maritime/continental and windward/leeward effects. The hydrologic zones on the west coast of British Columbia are generally oriented on a northwest-southeast alignment parallel to the Coast Mountain ranges. The relatively narrow width of the zones is indicative of strong climatic gradients perpendicular to the mountain range and coastline. In general, precipitation decreases, and temperature extremes increase at a given elevation in a landward direction from the coast. Strong orographic enhancement of precipitation occurs on the windward side of the mountains. For these reasons, the closest station may not be the most representative of conditions at the proposed intake locations.

This spatial variability, when combined with the temporal and spatial scarcity of data coverage, presents a significant challenge for estimating the hydrology for an ungauged location. Despite these limitations, a



WSC station was selected for each potential site to estimate inflow conditions. In many cases, WSC has collected data on the rivers in question and the scaled flow series likely provides a good estimate of inflows to the dam. In other cases, KP had completed hydrology studies previously for the rivers in question. The flow series developed for these studies cannot be provided to BC Hydro, but regional analysis and WSC surrogate stations used in these studies was reviewed. However, in many cases, paucity of WSC stations and large variability in hydrologic conditions mean that there may be significant uncertainty in the hydrologic estimates.

Stations with less than 10 complete years of record were excluded as the RFP notes that "inflow conditions from a minimum of 10 years of record should be considered, with a broad variability of water conditions covered". Additionally, stations with very old records (before approximately 1950) have been excluded as the records are often seasonal, based on infrequent manual observation and/or incomplete. For energy modelling, approximately 20 years of streamflow data have been used to estimate average and firm conditions and where possible the period 1995-2015 was selected as the standard period. In some cases alternative periods were used to accommodate as much as practical a continuous 20 year data set. Not all stations had complete records for this period (i.e. Nahatlatch) or a full 20 year data set. In these cases gaps were left in the data or shorter timeframes were used in order to develop the appropriate flow data. Dam sites and surrogate WSC stations are summarized in Table 3.1.



	Dam Site	9	WSC Sta	tion	n Drainage	
Region	River	Drainage Area (km²)	River	ID	Drainage Area (km²)	
	Ball	336	Iskut at Kinaslan Lk.	08CG003	1 250	
	Iskut River	3,789	ISKUL AL MINASIAN EK.	0000000	1,200	
	Nass River	5,333	Skeena ab. Babine	08EB005	12,400	
North	Kinskuch River	57	Surprise nr. Mouth	08DA005	218	
Coast	Zymoetz River	2,963	Zymoetz ab. OK Ck.	08EF005	Area (km²) 03 1,250 05 12,400 05 218 05 2,850 05 2,850 05 2,850 05 2,850 05 2,850 05 783 34 676 01 355 71 1,200 01 173 71 1,200 26 90 71 1,200	
obasi	Anudol Creek (b)	99				
	Anudol Creek (a)	70	Surprise nr. Mouth	08DA005	218	
	More Creek	889				
	Clore River	772	Zymoetz ab. OK Ck.	08EF005	2,850	
	Nimpkish River	1,751	Nimpkich ch. Wass		700	
Vancouver	Nimpkish River	1,163	Nimpkish ab. Woss	08HF005	783	
Island	Nanaimo River	658	Nanaimo nr. Cassidy	08HB034	676	
	Chemainus River	293	Chemanis nr. Westholme	08HA001	355	
	Bear River	286				
	Orford River	282		0000074	1 000	
	Tahumming	233	Elaho nr mouth	08GA071	1,200	
	Brem River	144				
	Freda Creek	70	Capilano above intake	08GA001	173	
	Squamish River	1,722				
	Elaho River	1,263	Elaho nr. mouth	08GA071	1,200	
Lower	Squamish River	325				
Mainland	Soo River	174	Fitzsimmons bl. Blackcomb	08MG026	90	
Mannana	South Creek	79	Elaho nr. mouth	08GA071	1,200	
	Siwash Creek	61		08MF062	00	
	Sowaqua Creek	140	Coquihalla bl. Needle	08101-062	80	
	Silverhope Creek	235	Slesse nr. Vedder Crossing	08MH056	160	
	Cogburn Creek	78	Coquihalla bl. Needle	08MF062	86	
	Pitt River	437	Pitt nr. Alvin	08MH017	515	
	Nahatlatch River	930	Nahatlach bl. Tachewana	08MF065	712	
	Spuzzum Creek	160	Coquihalla bl. Needle	08MF062	86	

Table 3.1Surrogate WSC Stations



3.3 CAPACITY AND ENERGY ESTIMATES

BC Hydro requested that the facilities be assessed for dependable capacity. BC Hydro defined dependable capacity in this study as "the maximum sustained capacity (MW) that a plant can deliver, with 85% exceedance probability, for a certain number of hours per day, 6 days a week (Monday – Saturday) for 2-weeks between December 1 and January 31. The dependable capacity for 4, 8, 12, and 16 hours per day should be considered, thereby determining four different optimal designs per site. Each facility has been sized with sufficient storage to meet this requirement, assuming mean monthly inflow. Our assessment was based on mean monthly discharge, as this metric could be readily estimated for many sites. In order to design the facility for dependable capacity, the 85th percentile inflow would be calculated, and the required reservoir storage capacity assessed. This resizing was not considered explicitly, as it was considered beyond the resolution of the screening level assessment, given the precision of the hydrology and reservoir storage-elevation data.

In order to estimate annual energy generation, a simple energy model was developed. The basis of the energy model is a run-of-river concept, which assumes that the facility operates at full-pool and energy generating flow equals inflow up to the design flow. The exception to this is during January when the reservoir dewaters to meet the dependable capacity requirement (see point 1. below) and in the subsequent period until the reservoir returns to full-pool, and one additional reservoir drawdown at the onset of spring freshet (in order to capture more of the freshet). Key assumptions in the energy model are as follows:

- 1. The facility operates in run-of-river mode for the first 17 days of January. The reservoir is then dewatered during the last 14 days of January to meet the dependable capacity requirement.
- 2. The facility does not operate again until the reservoir is refilled. Several of the facilities fill rapidly and operate again in February, others are not full until March or April. During facility optimization, plants that take a long time to refill the reservoir would likely be designed to operate with a dewatered reservoir though winter and refill the reservoir during freshet.
- 3. The facility operates in run-of-river mode at full pool for the remainder of the year. No allowance has been included for utilizing storage to increase capacity except for one draw-down at the onset of freshet (after winter refilling). This assumption leads to underestimation of annual energy generation potential, and it is conceivable that most sites may achieve higher performance than is presented in this study.
- 4. The model is based on monthly flows. If monthly inflow is less than the design flow (Qd), the facility is assumed to operate all month at the average inflow rate. If monthly inflow exceeds Qd, the facility is assumed to operate all month at Qd (design flow). This assumption has the potential to overestimate annual energy generation because in months with average inflow less than Qd there may be periods of flow exceeding Qd that have to be spilled. In months with average inflow greater than Qd there may be periods of flow less than Qd, leading to an average generation flow less than Qd. Optimized storage operation may be able to minimize "lost" generation.

The energy model was used to assess average annual and monthly energy estimates for each facility. This model is based on average monthly inflow at each facility (i.e. the model does not use a hydrology timeseries, it simply calculates energy in each month based on the average monthly inflows).

A "firm energy" model was also developed. BC Hydro defined firm energy as "total energy generated in lowest flow water year in period of record". The energy model was run using monthly average inflow for the year with the lowest annual mean discharge. No consideration was given to which months had low flow and



how this influenced annual total energy generation. In a time-series based energy model, the year with the lowest energy generation could be determined. This may not coincide with the lowest flow year.

3.4 CAPITAL COST ESTIMATES

Capital cost estimates have been developed for each project site initially for a dependable generation period of 16-hours per day. Once the initial estimates were refined capital cost estimates were developed for dependable generation periods of 4, 8, and 12-hour per day generation periods. KP has developed a capital cost estimating model that takes into account the various components of a particular hydroelectric facility.

Where quantity estimates could easily be measured appropriate industry unit rates were applied. Measured quantities for this study included:

- Dam volumes
- Reservoir clearing area
- Transmission line length
- Penstock length, and
- Access road length.

In other cases where quantities are not as easily determined KP utilizes proprietary cost curves that aid in estimating costs based on specific design criteria such as design flow, gross penstock head, installed capacity, etc. Capital cost estimates include the following major cost categories:

- 1. Mobilization, Demobilization, Insurance, Bonds, Overhead, Contractor's Profits (25% of subtotal of items 2-7)
- 2. Access and Site Preparation
- 3. Cofferdams and Construction Water Management
- 4. Intake, Headrace, and Forebay
- 5. Dam Construction
- 6. Water Conveyance System
- 7. Powerhouse Construction
- 8. Switchyard and Transmission
- 9. Engineering, Procurement and Construction Management (EPCM) Costs (8% of subtotal of items 1-7), and
- 10. Contingency (30% of subtotal of items 1-7).

In order to develop capital cost estimates for generation periods of 4, 8, and 12-hours per day it was assumed that only the design flow (and installed capacity) would change such that all measured quantities relating to the dam would not need to be re-calculated and only cost curves that use design flow, such as for intakes, penstocks, and powerhouses would be used to develop the adjusted capital cost estimates. It should be noted that if the screening assessment was completed for each generation period it is possible that more cost effective project arrangements could be realized. Cost estimates for each dam site across the range of generation periods is provided in the site summary tables provided in Appendix C.

3.5 **OPERATING COSTS**



A high level estimation of operation costs has been made for each facility arrangement. For planning purposes these costs have been estimated as follows:

- Fixed Operating Costs 2% of initial capital cost per year of operation, and
- Variable Operating Costs \$0.005/kWh of energy generation.

Fixed Operating Costs are assumed to include but not be limited to the following:

- Permanent Staff
- Fixed oveheads including corporate costs, long-term leases, etc.
- Regular scheduled maintenance
- Major equipment replacement, refurbishment (future costs assumed to be averaged over life of facility), and
- Etc.

Operating cost estimates are provided on the site summary sheets provided in Appendix C. Operating costs do not include Water Rentals payable to the BC Provincial Government.

3.6 ECONOMIC ASSESSMENT

Outputs from the capital cost estimates and energy estimates described above were used to complete an economic assessment for each facility. As noted above the capacity cost calculation was used as the basis for selecting preferred project sites. However, other economic metrics were calculated to provide a broader understanding of the economics of each site. The economic assessment metrics calculated include:

- Installed Capacity Cost
- Dependable Capacity Cost
- Energy Cost (Average Hydrology), and
- Energy Cost (Firm Hydrology).

A summary of these economic measures is provided for each site on the site summary tables provided in Appendix C.

A detailed assessment of project economics has not been included in this study. However, an assumed generic payment schedule is provided for information. This generic payment schedule based on KP's experience developing similar hydroelectric facilities, assuming a development duration of 6 years. The development period assumes the first 2 years are required for permitting and initial studies with the last 4 years for construction.

Construction Payment Schedule

Year 1 – 0% Year 2 – 0% Year 3 – 15% Year 4 – 35% Year 5 – 35% Year 6 – 15%



4.0 REFERENCES

- Ahmed, A. and Jackson, S. 2013. Inventory of Streamflow in the Skeena Region Knowledge Management Branch, British Columbia Ministry of Environment, Victoria, B.C.
- Obedkoff, W. 2003. Streamflow in the Lower Mainland and Vancouver Island. BC Ministry of Sustainable Resource Management.



5.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared:

Scott Rees, P.Eng. Senior Engineer



Reviewed:

Keith Ainsley, P.Eng. Senior Civil Engineer | Associate

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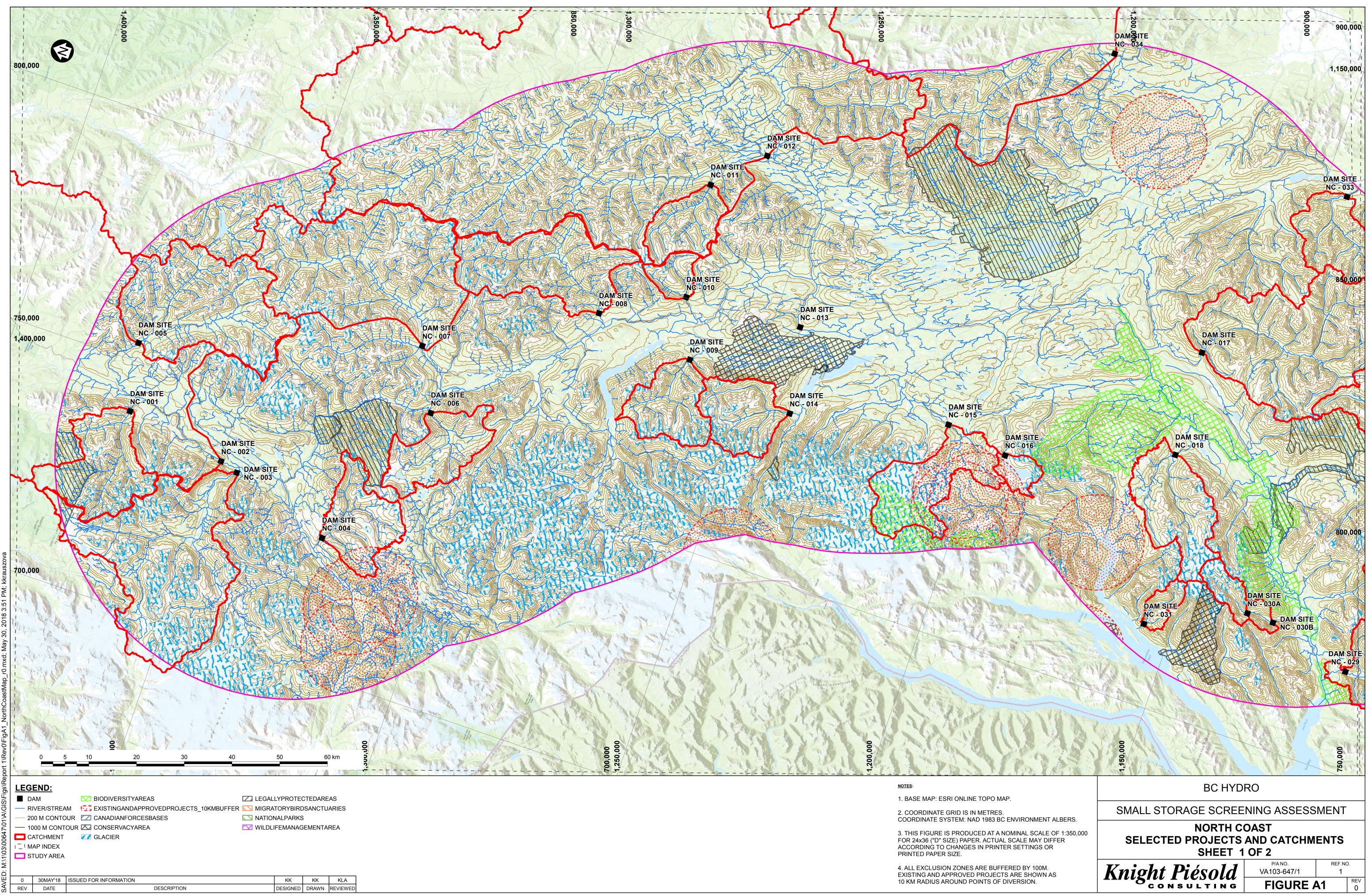
APPENDIX A

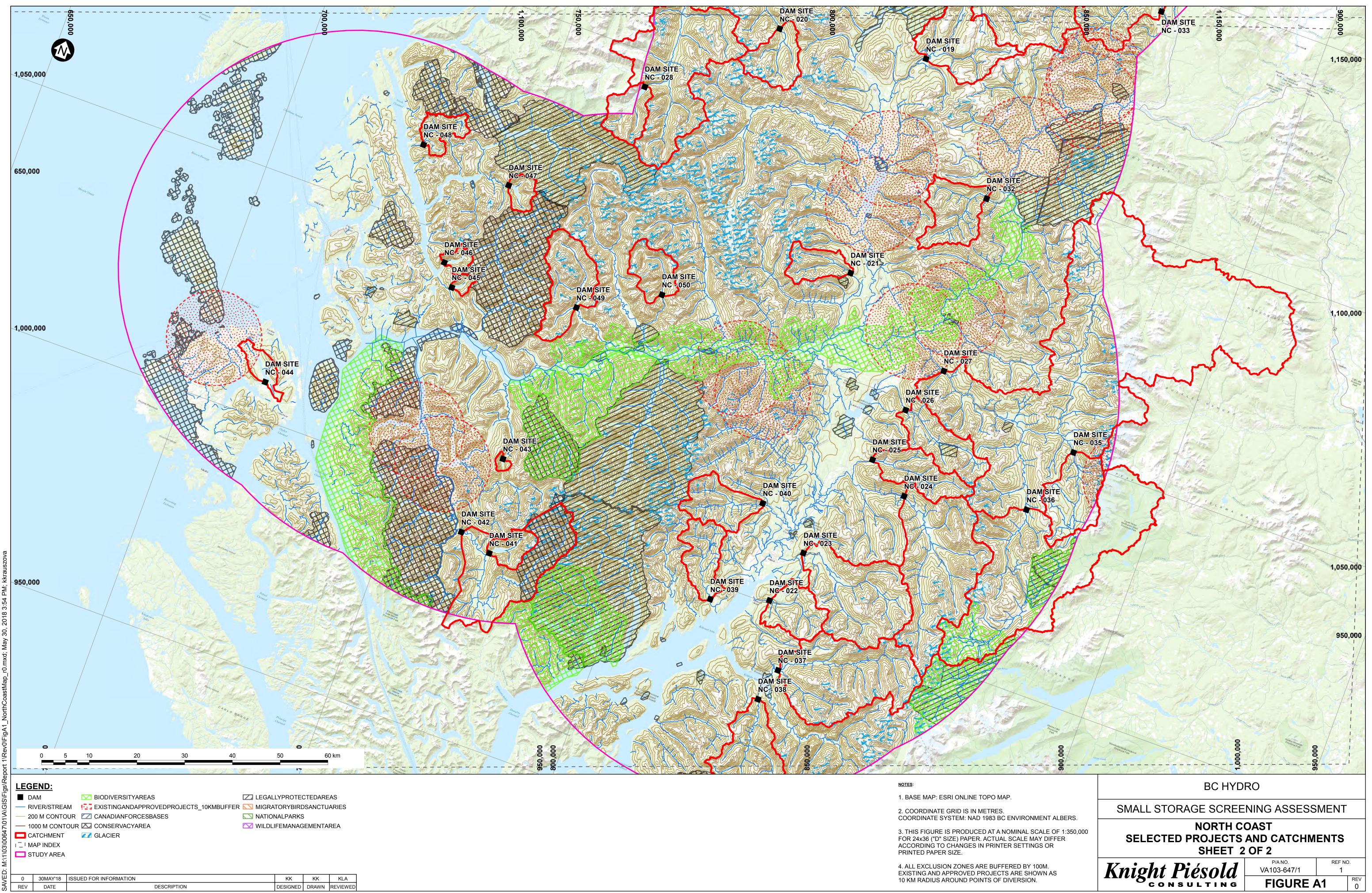
Study Area Maps

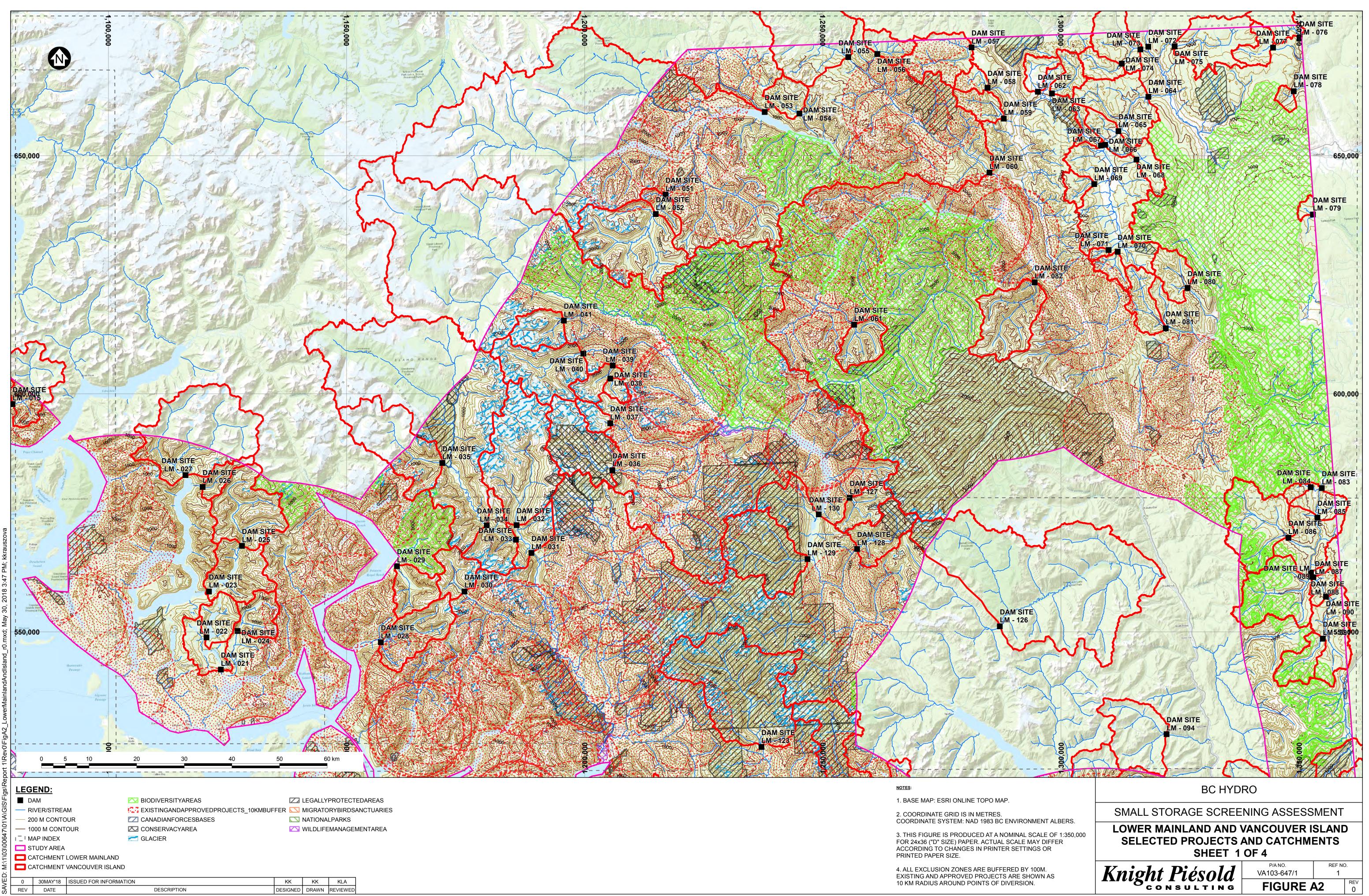
(Figures A1 and A2)

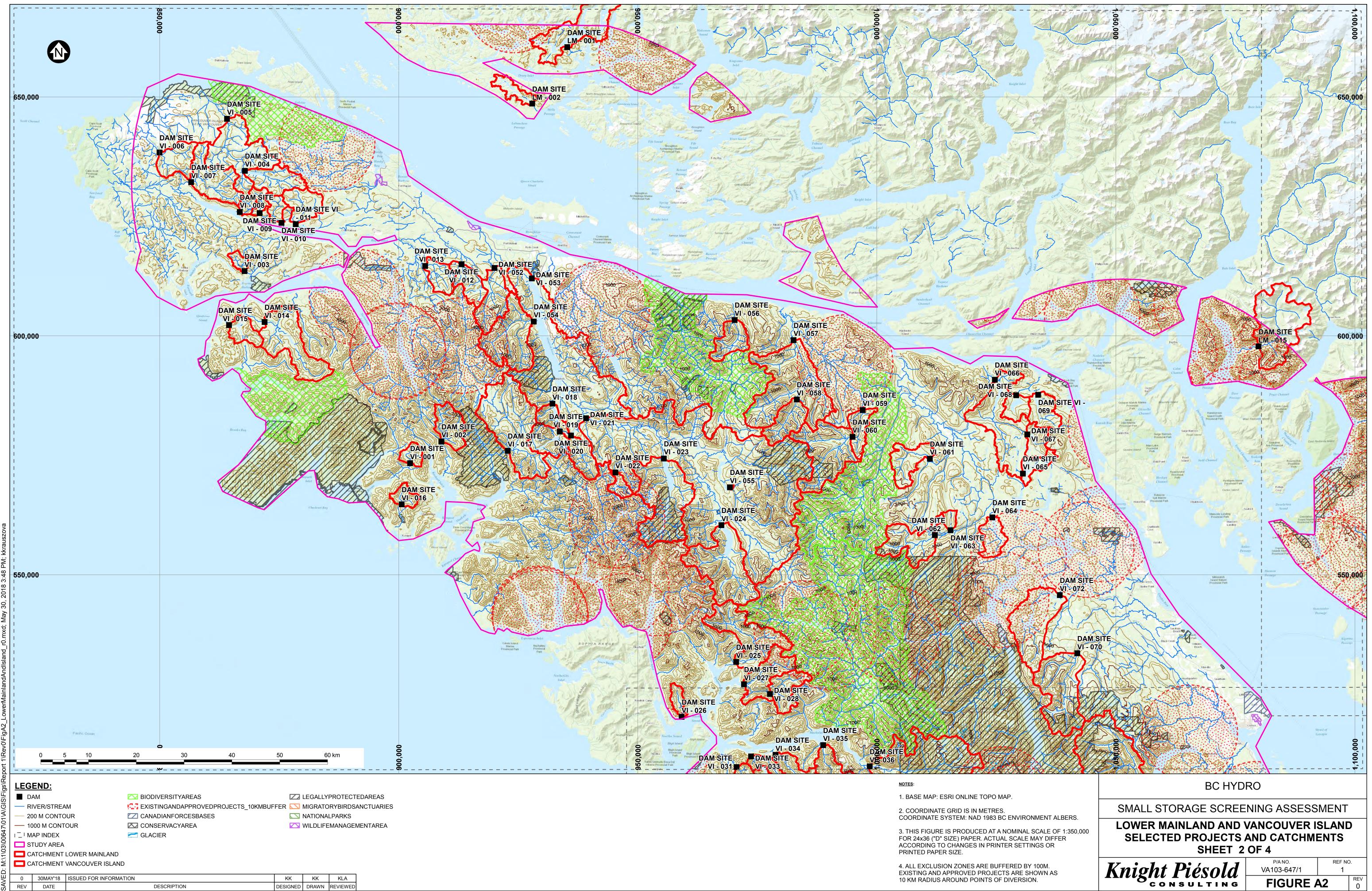


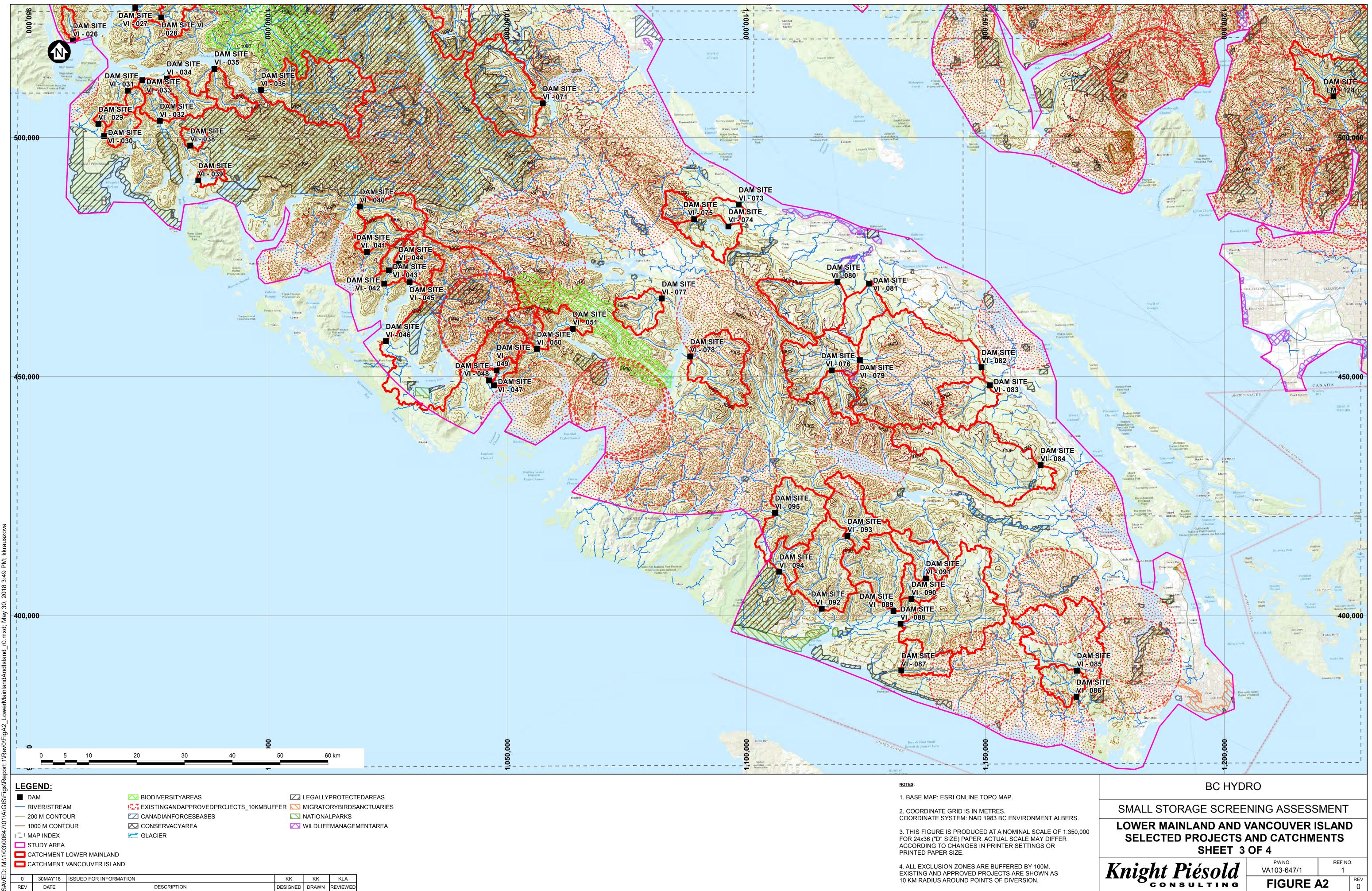
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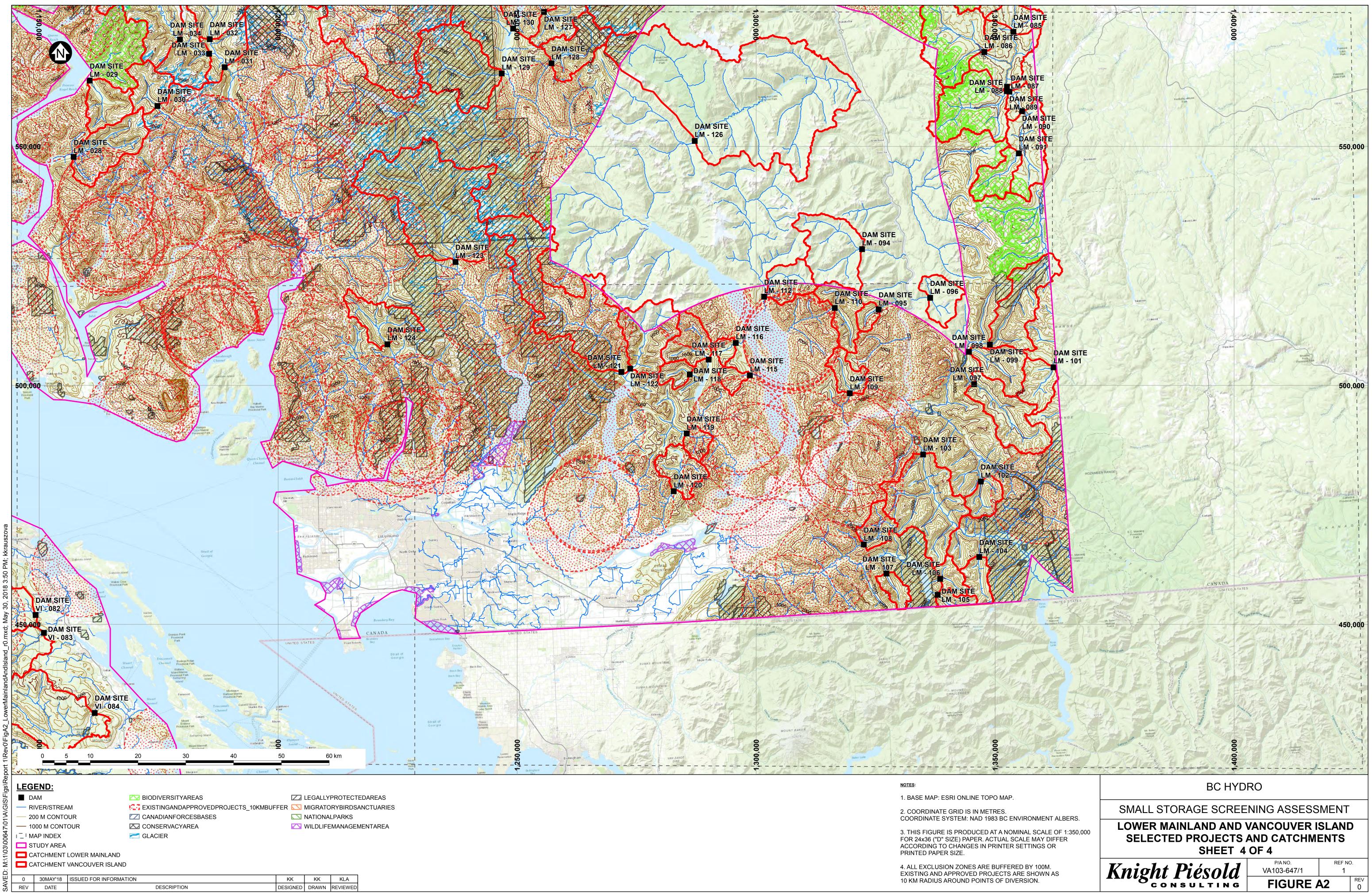












APPENDIX B

Dam Site Screeing Summaries

(Tables B-1 to B-3)



VA103-647/1-1 Rev 1 July 12, 2018



TABLE B-1

BC HYDRO SMALL STORAGE HYDRO ASSESSMENT

SCREEN 2 - DAM SITE IDENTIFICATION SELECTED DAM SITES

NORTH COAST		VAN	COUVER ISLAND	LOWER MAINLAND		
Site #	Watershed Name	Site #	Watershed Name	Site #	Watershed Name	
NC - 001	Ball Creek	VI - 001	Malksope River	LM - 001	Embley Creek	
IC - 002 IC - 003	Iskut River More Creek	VI - 002 VI - 003	Kauwinch River Koprino River	LM - 002 LM - 015	Kenneth River Quatam River	
IC - 003	Estshi Creek	VI - 004	Nahwitti River	LM - 013	Horseshoe River	
NC - 005	Burrage Creek	VI - 005	Nahwitti River	LM - 022	Horseshoe River	
NC - 006	Teigen Creek	VI - 006	Strandby River	LM - 023	Eldred River	
NC - 007	Bell-Irving River	VI - 007	Goodspeed River	LM - 024	Freda Creek	
NC - 008	Taft Creek	VI - 008	Clesklagh Creek	LM - 025	Eldred River	
NC - 009	Surveyors Creek	VI - 009	Hushamu Creek	LM - 026	Jim Brown Creek	
NC - 010	Bell Creek	VI - 010	Youghpan Creek	LM - 027	Powell River	
NC - 011	West Taylor River	VI - 011	Wanokana Creek	LM - 028	Vancouver River	
NC - 012 NC - 014	Nass River Surprise Creek	VI - 012 VI - 013	Keogh River Waukwaas Creek	LM - 029 LM - 030	Stakawus Creek Ashlu Creek	
NC - 015	White River	VI - 013	Mahatta Creek	LM - 030	Squamish River	
NC - 016	Kinskuch River	VI - 015	Culleet Creek	LM - 033	Elaho River	
NC - 017	Kiteen River	VI - 016	Clanninick Creek	LM - 034	Elaho River	
IC - 018	Ksi Gwinhat'al	VI - 017	Tahsish River	LM - 035	Squamish River	
NC - 019	Cedar River	VI - 018	Atluck Creek	LM - 036	Sims Creek	
NC - 020	Ksi Mat'in	VI - 019	Atluck Creek	LM - 037	Soo River	
NC - 021	Erlandsen Creek	VI - 020	Atluck Creek	LM - 038	Rutherford Creek	
NC - 022	Wathl Creek	VI - 021	Nimpkish River	LM - 039	Petersen Creek	
NC - 023 NC - 024	Hirsch Creek Kitimat River	VI - 022 VI - 023	Kaipit Creek Woss River	LM - 040 LM - 041	Petersen Creek Ryan River	
NC - 024 NC - 025	Chist Creek	VI - 023 VI - 024	Sebalhall Creek	LM - 041 LM - 051	South Creek	
NC - 025	Williams Creek	VI - 025	Conuma River	LM - 051 LM - 052	Hurley River	
NC - 027	Zymoetz River	VI - 026	Hoiss Creek	LM - 053	Hurley River	
NC - 028	Amoth Creek	VI - 027	Tlupana River	LM - 054	Tyaughton Creek	
IC - 029	Ksi Hlginx	VI - 028	Nesook River	LM - 055	Marshall Creek	
NC - 030a	Anudol Creek	VI - 029	Escalante River	LM - 056	Yalakom River	
NC - 030b	Anudol Creek	VI - 030	Escalante River	LM - 057	Junction Creek	
NC - 031	Kelskiist Creek	VI - 031	Mooyah River	LM - 058	Leon Creek	
NC - 032	Fiddler Creek	VI - 032	Sydney River	LM - 059	McKay Creek	
NC - 033	Kitwancool Creek	VI - 033	Silverado Creek	LM - 060	Slok Creek	
NC - 034 NC - 035	Skeena River Kitnayakwa River	VI - 034 VI - 035	Houston River Jacklah River	LM - 061 LM - 062	Bridge River Haylmore Creek	
NC - 035 NC - 036	Clore River	VI - 035 VI - 036	Burman River	LM - 062 LM - 063	Gillon Creek	
IC - 037	Dala River	VI - 038	Ice River	LM - 064	Pavilion Creek	
IC - 038	Falls River	VI - 039	Cecilia Creek	LM - 065	Hat Creek	
NC - 039	Bish Creek	VI - 040	Ursus Creek	LM - 066	Hat Creek	
NC - 040	Little Wedeene River	VI - 041	Bulson Creek	LM - 067	Hat Creek	
NC - 041	Johnston Creek	VI - 042	Tranquil Creek	LM - 068	Hat Creek	
NC - 042	Ecstall River	VI - 043	Tranquil Creek	LM - 069	Medicine Creek	
NC - 043	Scotia River	VI - 044	Tranquil Creek	LM - 070	Anderson Creek	
NC - 044	Lagoon	VI - 045	Tofino Creek	LM - 071	Hat Creek	
NC - 045 NC - 046	Lachmach River Leverson Creek	VI - 046 VI - 047	Kennedy River Toquart River	LM - 072 LM - 073	Colley Creek Maiden Creek	
NC - 040 NC - 047	Toon River	VI - 047	Little Toquart Creek	LM - 073	Maiden Creek	
NC - 048	Ensheshese River	VI - 049	Toquart River	LM - 075	Scottie Creek	
NC - 049	Kasiks River	VI - 050	Effingham River	LM - 076	Gorge Creek	
NC - 050	Exchamsiks River	VI - 051	Clemens Creek	LM - 077	Barricade Creek	
		VI - 052	Cluxewe River	LM - 078	Charette Creek	
		VI - 053	Nimpkish River	LM - 079	Guichon Creek	
		VI - 054	Kilpala River	LM - 080	Twaal Creek	
		VI - 055	Davie River	LM - 081	Murray Creek	
		VI - 056	Naka Creek	LM - 082	Texas Creek	
		VI - 057	Eve River	LM - 083	Spius Creek	
		VI - 058 VI - 059	Kunnum Creek Adam River	LM - 084 LM - 085	Roberts Creek Spius Creek	
		VI - 060	Adam River	LM - 085	Prospect Creek	
	1	VI - 061	North Memekay River		Spius Creek	
		VI - 062	Grilse Creek	LM - 088	Spius Creek	
		VI - 063	Grilse Creek	LM - 089	Maka Creek	
		VI - 064	Salmon River	LM - 090	Maka Creek	
		VI - 065	Amor De Cosmos Cre		Maka Creek	
		VI - 066	Amor De Cosmos Cre		Spuzzum Creek	
	-	VI - 067	Roberts Creek	LM - 095	Yale Creek	
		VI - 068	Pye Creek	LM - 096	Siwash Creek	
		VI - 069	Pye Creek Ovster River	LM - 097	Sowaqua Creek	
		VI - 070 VI - 071	Oyster River Cruickshank River	LM - 098 LM - 099	Dewdney Creek Coquihalla River	
		VI - 071 VI - 072	Quinsam River	LM - 099 LM - 101	Vuich Creek	
		VI - 072	Qualicum River	LM - 101	Sumallo River	
	1	VI - 074	Qualicum River	LM - 102	Silverhope Creek	
		VI - 075	Qualicum River	LM - 104	Maselpanik Creek	
		VI - 076	Green Creek	LM - 105	Depot Creek	
		VI - 077	Cous Creek	LM - 106	Paleface Creek	
		VI - 078	Franklin River	LM - 107	Centre Creek	
		VI - 079	Nanaimo River	LM - 108	Foley Creek	
		VI - 080	Englishman River	LM - 109	Garnet Creek	
		VI - 081	South Englishman Riv		Cogburn Creek	
	+	VI - 082	Nanaimo River	LM - 112	Hornet Creek	
		VI - 083	Haslam Creek	LM - 115 LM - 116	Walian Creek	
	-	VI - 084 VI - 085	Chemainus River Sooke River	LM - 116 LM - 117	Mystery Creek Chehalis River	
		VI - 085 VI - 086	Sooke River	LM - 117 LM - 118	Skwellepil Creek	
		VI - 086 VI - 087	Loss Creek	LM - 118 LM - 119	Statlu Creek	
		VI - 087	San Juan River	LM - 119 LM - 120	Norrish Creek	
	1	VI - 089		LM - 120 LM - 121	Stave River	
		VI - 090	Lens Creek	LM - 121	Winslow Creek	
		VI - 091	Lens Creek	LM - 123	Pitt River	
		VI - 092	Gordon River	LM - 124	Indian River	
		VI - 093	Gordon River	LM - 126	Nahatlatch River	
		VI - 094	Walbran Creek	LM - 127	Lizzie Creek	
		VI - 095	Caycuse River	LM - 128	Rogers Creek	

M:\1\03\00647\01\A\Report\Rev 0\Appendices\B\[Appendix B - Tables B-1 to B-3.xlsx]Table B-1

NOTES:

1. GAPS IN SITE NUMBERING EXIST AS A RESULT OF SITE ELIMINATION DURING SCREEN 2.

2. SITES LISTED MAY NOT BE AN EXHAUSTIVE LIST. OTHER SITES MAY EXIST WITHIN THE SAME CATCHMENTS.

0		30MAY'18	ISSUED WITH REPORT VA103-647/1-1	KLA	TJP
RE	V	DATE	DESCRIPTION	PREP'D	RVW'D



TABLE B-2

BC HYDRO SMALL STORAGE HYDRO ASSESSMENT

SCREEN 3 - GROSS GENERATION HEAD REQUIREMENT SELECTED DAM SITES

Site #	Watershed Name	Longitude	Latitude
	NORTH (COAST	
NC - 001	Ball Creek	-130.32	57.26
NC - 002	Iskut River	-130.36	57.06
NC - 005	Burrage Creek	-130.09	57.29
NC - 012	Nass River	-128.69	56.33
NC - 016	Kinskuch River	-129.34	55.71
NC - 017	Kiteen River	-128.78	55.43
NC - 018	Ksi Gwinhat'al	-129.13	55.41
NC - 023	Hirsch Creek	-128.55	54.09
NC - 024	Kitimat River	-128.32	54.26
NC - 026	Williams Creek	-128.42	54.41
NC - 027	Zymoetz River	-128.35	54.50
NC - 029	Ksi Hlginx	-129.59	54.96
NC - 030B	Anudol Creek (b)	-129.53	55.17
NC - 030A	Anudol Creek (a)	-129.53	55.12
NC - 034	Skeena River	-127.96	55.79
NC - 036	Clore River	-127.94	54.32
NC - 003	More Creek	-130.38	57.03
NC - 007	Bell-Irving River	-129.73	56.80
NC - 008	Taft Creek	-129.40	56.51
	VANCOUVE	RISLAND	
VI - 053	Nimpkish River (b)	-127.02	50.52
VI - 021	Nimpkish River (a)	-126.85	50.26
VI - 082	Nanaimo River	-123.96	49.06
VI - 084	Chemainus River	-123.80	48.88
	LOWER MA	AINLAND	
LM - 024	Freda Creek	-124.23	49.95
LM - 031	Squamish River (b)	-123.36	50.08
LM - 033	Elaho River	-123.40	50.11
LM - 034	Squamish River (a)	-123.49	50.14
LM - 036	Soo River	-123.11	50.23
LM - 041	South Creek	-123.24	50.52
LM - 096	Siwash Creek	-121.35	49.58
LM - 097	Sowaqua Creek	-121.24	49.41
LM - 103	Silverhope Creek	-121.40	49.29
LM - 110	Cogburn Creek	-121.62	49.57
LM - 123	Pitt River	-122.71	49.70
LM - 126	Nahatlatch River	-122.00	49.90

M:\1\03\00647\01\A\Report\Rev 0\Appendices\B\[Appendix B - Tables B-1 to B-3.xlsx]Table B-2

NOTES:

1. SITE COORDINATES ARE APPROXIMATE.

2. DAM SITE OPTIMIZATION HAS NOT BEEN UNDERTAKEN AS PART OF THIS STUDY.

0	30MAY'18	ISSUED WITH REPORT VA103-647/1-1	KLA	TJP
REV	DATE	DESCRIPTION	PREP'D	RVW'D



TABLE B-3

BC HYDRO SMALL STORAGE HYDRO ASSESSMENT

SCREEN 4 - DAM GEOMETRY SELECTED DAM SITES

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				Print May/30/18 15:54:10
Site #	Watershed Name	Longitude	Latitude	Capacity Cost (\$M/MW)
		NORTH COAST		
NC - 001	Ball Creek	-130.32	57.26	7,800,000
NC - 012	Nass River	-128.69	56.33	7,408,000
NC - 016	Kinskuch River	-129.34	55.71	6,519,000
NC - 027	Zymoetz River	-128.35	54.50	6,459,000
NC - 030A	Anudol Creek (a)	-129.53	55.12	7,611,000
NC - 003	More Creek	-130.38	57.03	6,833,000
	VA	NCOUVER ISLAND		
VI - 053	Nimpkish River (b)	-127.02	50.52	6,683,000
VI - 084	Chemainus River	-123.80	48.88	7,100,000
	L	OWER MAINLAND		
LM - 024	Freda Creek	-124.23	49.95	6,319,000
LM - 031	Squamish River (b)	-123.36	50.08	7,481,000
LM - 033	Elaho River	-123.40	50.11	6,696,000
LM - 041	South Creek	-123.24	50.52	5,382,000
LM - 096	Siwash Creek	-121.35	49.58	6,388,000
LM - 103	Silverhope Creek	-121.40	49.29	7,301,000
LM - 126	Nahatlatch River	-122.00	49.90	4,963,000
LM - 094	Spuzzum Creek	-121.53	49.68	6,116,000

M:\1\03\00647\01\A\Report\Rev 0\Appendices\B\[Appendix B - Tables B-1 to B-3.xlsx]Table B-3

NOTES:

1. SITE COORDINATES ARE APPROXIMATE.

2. DAM SITE OPTIMIZATION HAS NOT BEEN UNDERTAKEN AS PART OF THIS STUDY.

3. CAPACITY COST CALCULATED AS \$CAD MILLIONS PER MW OF INSTALLED CAPACITY.

REV DATE DESCRIPTION PREP'D F	RVW'D

APPENDIX C

Site Summary Sheets

(Pages C-1 to C-34)



VA103-647/1-1 Rev 1 July 12, 2018

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET BALL CREEK

				BASI	C SITE PARAMET						
0	N	-130.32					nt Area at Intake			km ²	336
Easting I	E	57.26				Estimate	d Mean Annual Unit	Runoff		L/s/km ²	14
Region		North Coast				Mean An	nual Discharge (MA	D)		m³/s	2.
Estimated Footprint	ha	410									
			ESTIMATED N	IONTHLY	FLOWS TO RES	ERVOIR/	NTAKE (m ³ /s)				
Month	Jan	Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Firm (Low Flow)	1.3 0.6	1.1 0.5	1.0 1.2 0.7 1.1	3.7 1.3	12.0 6.5	13.3 6.7	8.3 5.4	5.6 3.8	4.7 3.0	2.8 2.8	1.7 1.6
	0.0	0.5	0.7 1.1	1.5	0.5	0.7	5.4	5.0	5.0	2.0	1.0
					SIGN PARAMETE	RS					
Dependable Capacity			MW		16-Hour 20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity			MW		20		29		43		86
Gross Head			m		123		123		123		123
Design Flow, Qd			m³/s		21		28		42		84
MAD Multiplier at Qd			2		7.4		9.9		14.8		29.6
Reservoir Storage Volu	ume		m ³		19,478,500		19,478,500		19,478,500		19,478,500
Live Storage Volume Dam Height at Minimur	m Oporatiu		m ³ m		12,797,000 14		12,797,000 14		12,797,000 14		12,797,000 14
Dam Height at Full Sup	operatil		m		23		23		23		23
Dam Type					CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m		124		124		124		124
Reservoir Surface Area	а		m²		1,393,000		1,393,000		1,393,000		1,393,000
Penstock Length Transmission Line Len	ath		km km		3 42		3 42		3 42		3 42
Access Road Length	igin		km		6		6		6		6
3							-		-		-
					ATED CAPITAL C 16-Hour	0515	12-Hour		8-Hour		4-Hour
Mob, Demob, Insuranc	e, Bonds.	Overhead, Cont	tractor's Profits	\$	24,432,000	\$	27,743,000	\$	34,125,000	\$	52,338,000
Access and Site Prepa				\$	18,322,000	\$	18,322,000	\$	18,322,000	\$	18,322,00
Cofferdams and Const		ater Managemer	nt	\$	521,000	\$	521,000	\$	521,000	\$	521,00
Intake, Headrace, and Dam Construction	Forebay			\$ ¢	3,492,000 7,871,000	\$ \$	4,656,000 7,871,000	\$ \$	6,984,000 7,871,000	\$ \$	13,969,00 7,871,00
Water Conveyance Sys	stem			φ \$	22,873,000	Ψ \$	27,040,000	\$	34,408,000	φ \$	52,780,00
Powerhouse Construct				\$	22,667,000	\$	30,222,000	\$	45,333,000	\$	90,666,00
Switchyard and Transn	nission			\$	21,981,000	\$	22,341,000	\$	23,061,000	\$	25,222,00
SUB-TOTAL	Cubtotal			\$	122,159,000	\$ \$	138,716,000	\$ \$	170,625,000	\$ \$	261,689,00
EPCM Costs (8% of Contingency (30% of				Դ Տ	9,773,000 36,648,000	ъ \$	11,097,000 41,615,000	э \$	13,650,000 51,188,000	ъ \$	20,935,000 78,507,000
TOTAL ESTIMATED (HT CAPITAL CO	OST	\$	168,580,000	\$	191,428,000	\$	235,463,000	\$	361,131,000
			EST		ANNUAL OPERA		STS				
	(0)((0)			<u>^</u>	16-Hour	<u>,</u>	12-Hour		8-Hour	•	4-Hour
Fixed Operating Costs Variable Operating Cos				\$ ¢	3,372,000 231,000	\$ \$	3,829,000 231,000	\$ \$	4,709,000 231,000	\$ \$	7,223,000 231,000
TOTAL ESTIMATED				\$	3,603,000	\$	4,060,000	φ \$	4,940,000	\$	7,454,000
			ENERGY O		NDER AVERAGE	FLOW C	ONDTIONS				
Month			Units		16-Hour				0.11		4-Hour
Jan					i e nieun		12-Hour		8-Hour		4 Hour
Feb			MWh		4,410		4,410		4,410		4,410
			MWh		4,410 0				4,410 0		
Mar			MWh MWh		4,410 0 0		4,410		4,410 0 0		
Mar Apr			MWh		4,410 0		4,410		4,410 0		4,41((((
Mar Apr May Jun			MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840		4,410 0 0 5,356 8,840		4,410 0 0 5,356 8,840		4,41(((5,356 8,84(
Mar Apr May Jun Jul			MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152		4,410 0 0 5,356 8,840 10,152		4,410 0 0 5,356 8,840 10,152		4,410 () 5,356 8,840 10,152
Mar Apr May Jun Jul Aug			MWh MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152 6,316		4,410 0 0 5,356 8,840 10,152 6,316		4,410 0 0 5,356 8,840 10,152 6,316		4,410 (5,356 8,840 10,152 6,310
Mar Apr May Jun Jul Aug Sep			MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152		4,410 0 0 5,356 8,840 10,152		4,410 0 0 5,356 8,840 10,152		4,410 () 5,356 8,840 10,152 6,310 4,155
Mar Apr May Jun Jul Aug Sep Oct Nov			MWh MWh MWh MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060		$\begin{array}{r} 4,410\\ 0\\ 0\\ 5,356\\ 8,840\\ 10,152\\ 6,316\\ 4,155\\ 3,577\\ 2,060\\ \end{array}$		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060		4,410 (0 5,356 8,840 10,152 6,316 4,155 3,577 2,060
Mar Apr May Jun Jul Aug Sep Oct Nov Dec	VEDAGE		MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317		4,410 (0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317
Mar Apr May Jun Jul Aug Sep Oct Nov Dec	VERAGE))	MWh MWh MWh MWh MWh MWh MWh MWh MWh		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060		$\begin{array}{r} 4,410\\ 0\\ 0\\ 5,356\\ 8,840\\ 10,152\\ 6,316\\ 4,155\\ 3,577\\ 2,060\\ \end{array}$		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060		4,410 (0 5,356 8,840 10,152 6,316 4,155 3,577 2,060
Mar Apr May Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (A	VERAGE;)	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2		4,410 (0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2
Mar Apr May Jun Jul Aug Sep Oct Nov Dec	VERAGE))	MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317		4,410 (0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317
Mar Apr May Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb	VERAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0		4,410 (0) 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2
Mar Apr May Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar	VERAGE;)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0		4,410 () 5,356 8,840 10,152 6,310 4,155 3,577 2,060 1,317 46.2
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr	VERAGE;)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 0 0		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0		4,410 () 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 4-Hour 4,088
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May	VERAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 0 3,840		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840		4,410 () 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 4-Hour 4,088 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul	VERAGE))	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 0 0		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0		4,410 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug	VERAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112		4,410 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep	VERAGE;)	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112 2,815		4,410 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A BARGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	VERAGE)	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIF 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285		4,410 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jun Jul Aug Sep	VERAGE))	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815		4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112 2,815		4,410 () () () () () () () () () () () () ()
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun)	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIF 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069		4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069		4,410 5,350 8,840 10,155 6,310 4,155 3,577 2,060 1,317 46.3 4.Hour 4,080 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun)	MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIF 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4		4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250		4,41 5,35 8,84 10,15 6,31 4,15 3,57 2,06 1,31 46. 4.Hour 4,08 3,84 3,84 5,11 4,11 2,81 2,28 2,06 1,25 (1,25)
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (Fi ENERGY OUTPUT (Fi	IRM)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ND ENERGY COS 16-Hour	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ICS 12-Hour		4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 8-Hour 8-Hour		4,411 5,35 8,84 10,15 6,310 4,15 3,57 2,060 1,31 46 . 4-Hour 4,08 3,84 3,84 5,110 4,112 2,81 2,28 2,063 1,250 29.
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (Fl ENERGY OUTPUT (Fl Metric Capacity Cost, Depend	IRM) dable Capa	acity	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UNDI	4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ND ENERGY COS 16-Hour 8,429,000	ST METR	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ICS 12-Hour 7,179,000	\$	4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 8-Hour 8-Hour 5,887,000	\$	4,411 5,35 8,84 10,15 6,310 4,15 3,57 2,060 1,31 46. 4-Hour 4,08 3,84 3,84 5,110 4,112 2,81 2,28 2,063 1,250 29. 4-Hour 4,514,000
Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (Fi	IRM) dable Capa d Capacity	acity	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PUT UND	4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 ER MINIMUM (FIR 16-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ND ENERGY COS 16-Hour	M) FLOV	4,410 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 V CONDTIONS 12-Hour 4,088 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 ICS 12-Hour	\$	4,410 0 0 0 5,356 8,840 10,152 6,316 4,155 3,577 2,060 1,317 46.2 8-Hour 4,088 0 0 0 0 0 3,840 3,841 5,116 4,112 2,815 2,285 2,069 1,250 29.4 8-Hour 8-Hour	\$	4,410 () () () () () () () () () () () () ()

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]BALL CREEK

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

[0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
I	REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET ISKUT RIVER

N		BASIC SITE PARA					1	
Northing N -130.36				nt Area at Intake			km ²	3,78
Easting E 57.06				d Mean Annual Unit			L/s/km ² m ³ /s	1
Region North Coast Estimated Footprint ha 290			Mean Ann	nual Discharge (MA	D)		m'/s	32.
		IONTHLY FLOWS TO		· /	-			_
Month Jan Feb Average 14.5 12.3	Mar Apr 11.3 13.0	May Jun 41.4 135.2	Jul 2 150.2	Aug 93.5	Sep 63.5	Oct 52.9	Nov 31.5	Dec 19.5
Firm (Low Flow) 6.3 6.0	7.4 12.2	15.0 73.4		60.9	43.0	33.8	31.6	18.5
			ETERO					
		DESIGN PARAM 16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity	MW	20		27		40		80
nstalled Capacity	MW	32		41		62		124
Gross Head	m 3,	58		58		58		58
Design Flow, Qd MAD Multiplier at Qd	m³/s	67 2.1		86 2.7		130 4.0		259 8.1
Reservoir Storage Volume	m³	36,445,50	00	36,445,500		36,445,500		36,445,500
ive Storage Volume	m ³	20,923,00		20,923,000		20,923,000		20,923,000
Dam Height at Minimum Operating Level	m	25		25		25		25
Dam Height at Full Supply Level	m	46		46		46		46
Dam Type		CFRD		CFRD		CFRD		CFRD
Dam Crest Length Reservoir Surface Area	m m²	376 1,693,000	h	376 1,693,000		376 1,693,000		376 1,693,000
Penstock Length	km	1,693,000	,	1,693,000		1,693,000 2		1,693,000 2
Fransmission Line Length	km	19		19		19		19
Access Road Length	km	1		1		1		1
		ESTIMATED CAPIT	AL COSTS					
	tractaria Destit	16-Hour		12-Hour	•	8-Hour	*	4-Hour
Nob, Demob, Insurance, Bonds, Overhead, Cor Access and Site Preparation	uractor's Profits	\$ 46,043 \$ 13,247	, · · ·	50,926,000 13,247,000	\$ \$	61,403,000 13,247,000		91,743,00 13,247,00
Cofferdams and Construction Water Manageme	ent	\$ 13,247	, ,	5,880,000	э \$	5,880,000		5,880,00
ntake, Headrace, and Forebay		\$ 11,059	, · · ·	14,311,000	\$	21,467,000		42,933,0
Dam Construction		\$ 75,835	,000 \$	75,835,000	\$	75,835,000	\$	75,835,0
Vater Conveyance System		\$ 30,612		36,019,000	\$	46,838,000		74,935,00
Powerhouse Construction Switchyard and Transmission		\$ 35,386		45,790,000 12,623,000	\$	68,685,000		137,370,00
		\$ 12,152 \$ 230,214	, ,	254,631,000	\$ \$	13,660,000 307,015,000		16,770,00 458,713,0 0
EPCM Costs (8% of Subtotal)		\$ 18,417	•	20,370,000	\$	24,561,000		36,697,00
Contingency (30% of Subtotal)		\$ 69,064		76,389,000	\$	92,105,000		137,614,00
TOTAL ESTIMATED OVERNIGHT CAPITAL C	OST	\$ 317,695	,000 \$	351,390,000	\$	423,681,000	\$	633,024,00
	EST	IMATED ANNUAL OP						
Fixed Operating Costs (2% of Capital)		16-Hour \$		12-Hour 7,028,000	\$	8-Hour 8.474.000	\$	4-Hour 12,660,00
Variable Operating Costs (\$0.005/kWh)			,000 \$	927,000	\$	1,091,000	•	1,137,00
TOTAL ESTIMATED OPERATING COST		\$ 7,177		7,955,000	\$	9,565,000		13,797,00
	ENERGY O	UTPUT UNDER AVER	AGE FLOW CO	ONDTIONS				
Month	Units	16-Hour		12-Hour		8-Hour		4-Hour
lan Feb	MWh MWh		,849 ,167	6,849 1,167		6,849 1,167		6,84 1,16
Aar ahaa ahaa ahaa ahaa ahaa ahaa ahaa a	MWh		,029	4,029		4,029		4,02
Npr	MWh		,479	4,479		4,479		4,4
lay	MWh		,604	18,604		18,604		18,6
un	MWh		,072	29,856		44,784		46,6
ul ug	MWh MWh		,841 ,841	30,851 30,851		46,277 33,348		53,6 33,3
Sep	MWh		,041 ,938	21,938		21,938		21,9
Dct	MWh	18	,885	18,885		18,885		18,88
lov	MWh		,878	10,878		10,878		10,87
Dec ENERGY OUTPUT (AVERAGE)	MWh GWh/yr		,954 64.5	6,954 185.3		6,954 218.2		6,9 227
	-					210.2		
Month	ENERGY OUTI Units	PUT UNDER MINIMUM 16-Hour		/ CONDTIONS 12-Hour		8-Hour		4-Hour
an	MWh		,150	5,150		5,150		5,15
eb	MWh		0	0		0		
Aar Dor	MWh MWh		,786 ,217	1,786 4,217		1,786 4,217		1,78 4,21
∖pr ∕lay	MWh		,217 ,204	4,217 9,204		4,217 9,204		4,2 9,20
un	MWh		,072	25,350		25,350		25,3
ul	MWh	23	,841	27,012		27,012		27,01
lug	MWh		,713	21,713		21,713		21,7
Sep Det	MWh MWh		,861 064	14,861 12.064		14,861		14,80
Det Iov	MWh		,064 ,926	12,064 10,926		12,064 10,926		12,00 10,92
·•·	MWh		,599	6,599		6,599		6,59
	GWh/yr		33.4	138.9		138.9		138
	•••••j·							
	-	PACITY AND ENERGY	COST METRI	CS				
NERGY OUTPUT (FIRM) Metric	CAF	16-Hour		12-Hour	*	8-Hour	٨	4-Hour
Metric Capacity Cost, Dependable Capacity	CAF Units \$/MW	16-Hour \$ 15,885	,000 \$	12-Hour 13,177,000	\$	10,592,000		7,913,0
Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable Capacity Capacity Cost, Installed Capacity Energy Cost (Average)	CAF	16-Hour	,000 \$,000 \$	12-Hour	\$ \$ \$		\$	4-Hour 7,913,00 5,089,00 2,784,00

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]ISKUT RIVER

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET BURRAGE CREEK

					BASI	C SITE PARAME	TERS					
Northing N		-130.09						ent Area at Intake			km ²	65
Easting E		57.29						d Mean Annual Unit			L/s/km ²	4
Region Estimated Footprint h	2	North Coast 680					Mean An	nual Discharge (MA	D)		m³/s	28.
	d	000										
Marsth	le a	F -h				FLOWS TO RES			0.5.5	Oct	New	Dee
Month Average	Jan 3.8	Feb 2.2	Mar 2.2	Apr 4.5	May 45.3		Jul 73.4	Aug 52.0	Sep 33.4	Oct 18.8	Nov 8.5	Dec 4.7
Firm (Low Flow)	3.8	2.2	2.2	4.5	45.3	89.9	73.4	52.0	33.4	18.8	8.5	4.7
					DE	SIGN PARAMETE	ERS					
						16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity				MW MW		20 42		27 56		40 84		80 168
Gross Head				m		70		70		70		70
Design Flow, Qd				m³/s		72		96		143		287
MAD Multiplier at Qd				m ³		2.5		3.4		5.1		10.1
Reservoir Storage Volu Live Storage Volume	me			m ³		55,279,500 31,744,000		55,279,500 31,744,000		55,279,500 31,744,000		55,279,500 31,744,000
Dam Height at Minimum	n Operatin	g Level		m		34		34		34		34
Dam Height at Full Sup	ply Level	-		m		70		70		70		70
Dam Type Dam Crest Length				m		RCC 391		RCC 391		RCC 391		RCC 391
Reservoir Surface Area				m ²		3,254,000		3,254,000		3,254,000		3,254,000
Penstock Length				km		0		0		0		0
Transmission Line Leng Access Road Length	gth			km km		55 10		55 10		55 10		55 10
Access Road Length				КШ		10		10		10		10
					ESTIM			12 Hour		9 Hour		4 Hour
Mob, Demob, Insurance	e, Bonds. (Overhead. Contra	actor's Prof	its	\$	16-Hour 72,146,000		12-Hour 77,160,000	\$	8-Hour 87,186,000	\$	4-Hour 117,268,00
Access and Site Prepar	ation				\$	30,312,000) \$	30,312,000	\$	30,312,000	\$	30,312,00
Cofferdams and Construct		iter Management			\$	3,116,000		3,116,000	\$	3,116,000	\$	3,116,00
Intake, Headrace, and F Dam Construction	-orebay				\$ \$	11,862,000 168,245,000		15,816,000 168,245,000	\$ \$	23,724,000 168,245,000	\$ \$	47,449,00 168,245,00
Water Conveyance Sys					\$	717,000) \$	956,000	\$	1,433,000	\$	2,867,00
Powerhouse Construction					\$	45,488,000		60,650,000	\$	90,975,000	\$	181,951,00
Switchyard and Transm SUB-TOTAL	ISSION				э \$	28,845,000 360,731,000		29,544,000 385,799,000	\$ \$	30,940,000 435,931,000	\$ \$	35,131,00 586,339,00
EPCM Costs (8% of S					\$	28,858,000		30,864,000	\$	34,874,000	\$	46,907,00
Contingency (30% of 3 TOTAL ESTIMATED O			ет		\$ ¢	108,219,000 497,808,000		115,740,000 532,403,000	\$ \$	130,779,000 601,584,000	\$ \$	175,902,00 809,148,00
TOTAL LOTIMATED O			51		Ψ		•		Ψ	001,004,000	Ψ	003,140,00
				EST	IMATED	ANNUAL OPERA 16-Hour	TING CO	STS 12-Hour		8-Hour		4-Hour
Fixed Operating Costs (\$	9,956,000		10,648,000	\$	12,032,000	\$	16,183,00
Variable Operating Cost TOTAL ESTIMATED O					\$ \$	694,000 10,650,000		736,000 11,384,000	\$ \$	736,000 12,768,000	\$ \$	736,00 16,919,00
					Ŧ		•	, ,	Ŷ	12,700,000	Ŷ	10,010,00
Month				ENERGY O Units	UTPUT U	NDER AVERAGE 16-Hour		ONDTIONS 12-Hour		8-Hour		4-Hour
Jan				MWh		4,800		4,800		4,800		4,80
Feb Mar				MWh MWh		0)	0		0		
Apr				MWh		()	0		0		
Мау				MWh		22,104		22,104		22,104		22,10
Jun Jul				MWh MWh		30,171 31 177		37,843 31 927		37,843		37,84 31,92
Jui Aug				MWh		31,177 22,619		31,927 22,619		31,927 22,619		31,92 22,61
Sep				MWh		14,059	9	14,059		14,059		14,05
Oct Nov				MWh MWh		8,177 3,578		8,177 3,578		8,177 3,578		8,17 3,57
Dec				MWh		2,044		2,044		2,044		2,04
ENERGY OUTPUT (AV	/ERAGE)			GWh/yr		138.7		147.2		147.2		147.
			EN	ERGY OUT	PUT UND	ER MINIMUM (FI	RM) FLOV	VCONDTIONS				
Month				Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan Feb				MWh MWh		4,800 C		4,800 0		4,800 0		4,80
Mar				MWh		C	•	0		0		
Apr				MWh		0		0		0		6- / -
May Jun				MWh MWh		22,104 30,171		22,104 37,843		22,104 37,843		22,10 37,84
Jul				MWh		31,177	7	31,927		31,927		31,92
Aug				MWh		22,619		22,619		22,619		22,61
Sep Oct				MWh MWh		14,059 8,177		14,059 8,177		14,059 8,177		14,05 8,17
Nov				MWh		3,578		3,578		3,578		3,57
Dec				MWh		2,044	ł	2,044		2,044		2,04
ENERGY OUTPUT (FIF	≺WI)			GWh/yr		138.7	,	147.2		147.2		147.
					PACITY A	ND ENERGY CO 16-Hour				0 Ha		4-Hour
N = 4 x -								12-Hour		8-Hour		4-HOUL
Metric Capacity Cost, Dependa	able Capa	city		Units \$/MW	\$	24,837,000			\$		\$	
Metric Capacity Cost, Dependa Capacity Cost, Installed Energy Cost (Average)	able Capa Capacity	city			\$ \$ \$) \$) \$	19,923,000 9,529,000 3,618,000	\$ \$ \$	15,008,000 7,178,000 4,088,000	\$ \$ \$	10,093,00 4,827,00 5,499,00

 $M:\label{eq:linear} M:\label{eq:linear} M:\l$

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET NASS RIVER

		-			BASIC	SITE PARAMET	ERS				0	:: May/31/18 14:04:
Northing	Ν	-128.69						t Area at Intake			km ²	5,33
Easting	E	56.33						Mean Annual Unit			L/s/km ²	:
Region Estimated Footprint	ha	North Coast 720					Mean Ann	ual Discharge (MA	D)		m³/s	129
stimated Footprint	na	720										
Marath	1.5.5	E-h				LOWS TO RESI			0.5.5	0.4	New	Dee
Month Average	Jan 21.4	Feb 19.5	Mar 20.4	Apr 56.9	May 336.8	Jun 533.5	Jul 324.2	Aug 150.9	Sep 131.8	Oct 145.3	Nov 68.7	Dec 28.4
Firm (Low Flow)	17.6	14.7	17.2	74.8	453.6	376.6	188.5	157.7	97.2	87.9	44.9	19.0
					DESI	GN PARAMETE	RS					
						6-Hour		2-Hour		8-Hour		4-Hour
Dependable Capacity	/			MW		20		27		40		80
nstalled Capacity Gross Head				MW m		62 39		62 39		77 39		154 39
Design Flow, Qd				m ³ /s		192		192		240		480
AD Multiplier at Qd						1.5		1.5		1.8		3.7
Reservoir Storage Vo	olume			m ³		66,034,500		66,034,500		66,034,500		66,034,500
ive Storage Volume				m ³		35,513,000		35,513,000		35,513,000		35,513,000
Dam Height at Minim		ng Level		m		20		20		20		20
Dam Height at Full Sເ Dam Type	upply Level			m		39 RCC		39 RCC		39 RCC		39 RCC
Dam Crest Length				m		206		206		206		206
Reservoir Surface Are	ea			m ²		3,478,000		3,478,000		3,478,000		3,478,000
Penstock Length				km		0		0		0		0
ransmission Line Le	ength			km		46		46		46		46
Access Road Length				km		46		46		46		46
					_	TED CAPITAL C						
/lob, Demob, Insuran	nce Ronde	Overhead Castr	actor's Pro	fite	1 \$	6-Hour 66,365,000	1 \$	2-Hour 66,365,000		8-Hour 73,120,000		4-Hour 106.930.0
Access and Site Prep		Svemeau, Contr	autor 5 M10		ծ Տ	47,199,000	ծ \$	47,199,000	\$ \$	47,199,000	\$ \$	47,199,0
Cofferdams and Cons		ater Management	:		\$	16,904,000	\$	16,904,000	\$	16,904,000	\$	16,904,0
ntake, Headrace, and	d Forebay	-			\$	31,790,000	\$	31,790,000	\$	39,728,000	\$	79,455,0
Dam Construction					\$	70,437,000	\$	70,437,000	\$	70,437,000	\$	70,437,0
Vater Conveyance S Powerhouse Construe					\$ ¢	1,921,000 71,417,000	\$ \$	1,921,000 71,417,000	\$	2,400,000 89,249,000	\$ \$	4,801,0 178,497,0
Switchyard and Trans					э \$	25,791,000	φ \$	25,791,000	\$ \$	26,562,000	э \$	30,425,0
SUB-TOTAL					\$	331,824,000	\$	331,824,000	\$	365,599,000	\$	534,648,0
EPCM Costs (8% o					\$	26,546,000	\$	26,546,000	\$	29,248,000	\$	42,772,0
Contingency (30% of			о т		\$	99,547,000	\$	99,547,000	\$	109,680,000	\$	160,394,0
TOTAL ESTIMATED	OVERNIG		51		\$	457,917,000	\$	457,917,000	\$	504,527,000	\$	737,814,0
				EST		NNUAL OPERAT 6-Hour		TS 2-Hour		8-Hour		4-Hour
Fixed Operating Cost	ts (2% of Ca	apital)			\$	9,158,000	\$	9,158,000	\$	10,091,000	\$	14,756,0
/ariable Operating Co					\$	1,452,000	\$	1,452,000	\$	1,623,000	\$	2,117,0
FOTAL ESTIMATED	OPERATI	NG COST			\$	10,610,000	\$	10,610,000	\$	11,714,000	\$	16,873,0
						DER AVERAGE						
Month				Units MWh	10	6,808	1	2-Hour 6,808	;	8-Hour 6,808		4-Hour 6,8
lan ⁻eb				MWh		1,045		1,045		1,045		0,0 1,0
/ar				MWh		4,893		4,893		4,893		4,8
Apr				MWh		13,194		13,194		13,194		13,1
lay				MWh		49,829		49,829		61,311		84,4
un				MWh MWh		44,505 45,989		44,505 45,989		55,617 57,471		111,2 77,6
ul Nug				MWh		36,137		36,137		36,137		36,1
Sep				MWh		30,527		30,527		30,527		30,5
Dct				MWh		34,792		34,792		34,792		34,7
lov				MWh		15,919		15,919		15,919		15,9
Dec E NERGY OUTPUT (/)		MWh GWh/yr		6,798 290.4		6,798 290.4		6,798 324.5		6,7 42 :
	,			-								
Month			EN	Units		R MINIMUM (FIR 6-Hour		2-Hour		8-Hour		4-Hour
an				MWh		6,292		6,292		6,292		6,2
eb				MWh		15		15		15		4.4
/ar \pr				MWh MWh		4,119 17,327		4,119 17,327		4,119 17,327		4,1 17,3
nay				MWh		49,829		49,829		61,311		17,3
un				MWh		44,505		44,505		55,617		87,2
ul				MWh		45,120		45,120		45,120		45,1
lug				MWh		37,766		37,766		37,766		37,7
Sep Oct				MWh MWh		22,514		22,514 21.052		22,514		22,5
Dct Iov				MWh		21,052 10,412		21,052 10,412		21,052 10,412		21,0 10,4
Dec				MWh		4,542		4,542		4,542		4,5
ENERGY OUTPUT (I	FIRM)			GWh/yr		263.5		263.5		286.1		36
				CA	PACITY AN	D ENERGY COS						
				Units		6-Hour	1	2-Hour		8-Hour		4-Hour 9,223,0
Metric	adable O-	noitu /		¢/\\\\\	¢		¢.				r .	
Capacity Cost, Deper				\$/MW \$/MW	\$ \$	22,897,000 7 408 000	\$ \$	17,173,000 7 408 000	\$ \$	12,614,000 6,531,000	\$ \$	
Metric Capacity Cost, Deper Capacity Cost, Install Energy Cost (Average	ed Capacity			\$/MW \$/MW \$/GWh	\$ \$ \$	22,897,000 7,408,000 1,577,000	\$ \$ \$	17,173,000 7,408,000 1,577,000	\$ \$ \$	12,614,000 6,531,000 1,555,000	\$	9,223,0 4,776,0 1,742,0

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]NASS RIVER

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
E	REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET KINSKUCH RIVER

Northing				DASI	C SITE PARAMET					. 2	
-	N	-129.34					nt Area at Intake	- "		km ²	5
Easting	E	55.71 North Coast					d Mean Annual Unit			L/s/km ² m ³ /s	7 3.
Region Estimated Footprint	ha	1,460				Mean An	nual Discharge (MA	U)		III /S	3
	na	1,100									
Month	lon	Feb			FLOWS TO RES	ERVOIR/I Jul		Son	Oct	Nov	Dee
Montn Average	Jan 0.4	Гер 0.3	Mar Apr 0.3 1.3	May 6.8	Jun 12.6	Jui 11.2	Aug 8.1	Sep 5.9	3.3	NOV 1.0	Dec 0.5
Firm (Low Flow)	0.3	0.1	0.3 1.3	4.8	11.5	11.2	8.3	4.1	3.2	0.8	0.4
						5 0					
					SIGN PARAMETE 16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity	/		MW		20		27		40		80
nstalled Capacity			MW		32		32		40		80
Gross Head			m 3,		705		705		705		705
Design Flow, Qd MAD Multiplier at Qd			m³/s		5 1.4		5 1.4		7 1.8		14 3.5
Reservoir Storage Vo	olume		m ³		18,947,500		18,947,500		18,947,500		18,947,500
_ive Storage Volume			m ³		17,931,000		17,931,000		17,931,000		17,931,000
Dam Height at Minim		ing Level	m		8		8		8		8
Dam Height at Full Su	upply Level	l	m		10		10		10		10
Dam Type					RC		RC		RC		RC
Dam Crest Length Reservoir Surface Are	~~		m m²		82		82		82 9.888.000		82 9.888.000
Penstock Length	ea		km		9,888,000 6		9,888,000 6		9,000,000		9,000,000 6
Transmission Line Le	ength		km		60		60		6 0		60
Access Road Length	0		km		50		50		50		50
				ESTIM	ATED CAPITAL C	OSTS					
Mob Domeh In-	Do Dord	Overhead Orac	contoria Drafita		16-Hour		12-Hour	¢	8-Hour	ŕ	4-Hour
Mob, Demob, Insuran Access and Site Prep		, Overnead, Contr	actor S Pronts	\$ \$	30,045,000 22,159,000	\$ \$	30,045,000 22,159,000	\$ \$	32,972,000 22,159,000		46,457,00 22,159,00
Cofferdams and Cons		/ater Management	t	Ψ \$	476,000	Ψ \$	476,000	φ \$	476,000		476,00
ntake, Headrace, and				\$	6,124,000	\$	6,124,000	\$	6,157,000		6,314,00
Dam Construction				\$	7,410,000	\$	7,410,000	\$	7,410,000		7,410,00
Nater Conveyance S	System			\$	21,350,000	\$	21,350,000	\$	24,222,000		35,547,00
Powerhouse Construe Switchyard and Trans				¢ ¢	32,070,000 30,590,000	\$ \$	32,070,000 30,590,000	\$ \$	40,456,000 31,006,000		80,912,00 33,011,00
SUB-TOTAL	5111351011			\$	150,224,000	\$	150,224,000	\$	164,858,000		232,286,00
EPCM Costs (8% o	of Subtotal)			\$	12,018,000	\$	12,018,000	\$	13,189,000		18,583,00
Contingency (30% of				\$	45,067,000	\$	45,067,000	\$	49,457,000		69,686,00
TOTAL ESTIMATED	OVERNIG	GHT CAPITAL CO	151	\$	207,309,000	\$	207,309,000	\$	227,504,000	\$	320,555,00
			EST		ANNUAL OPERA		878				
									8-Hour		4-Hour
Fixed Operating Cost	ts (2% of C	apital)			16-Hour 4,146,000		12-Hour 4,146,000	\$	8-Hour 4,550,000	\$	4-Hour 6,411,00
Fixed Operating Cost Variable Operating Co	osts (\$0.00)5/kWh)			16-Hour 4,146,000 648,000	\$ \$	12-Hour 4,146,000 648,000	\$ \$	4,550,000 759,000	\$	6,411,00 1,004,00
Variable Operating Co	osts (\$0.00)5/kWh)			16-Hour 4,146,000	\$	12-Hour 4,146,000		4,550,000	\$	6,411,00
Variable Operating Co TOTAL ESTIMATED	osts (\$0.00)5/kWh)		\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS	\$	4,550,000 759,000 5,309,000	\$	6,411,00 1,004,00 7,415,00
Variable Operating Co	osts (\$0.00)5/kWh)	ENERGY O Units MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour	\$	4,550,000 759,000 5,309,000 8-Hour	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour
Variable Operating Co TOTAL ESTIMATED Month	osts (\$0.00)5/kWh)	Units	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS	\$	4,550,000 759,000 5,309,000	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar	osts (\$0.00)5/kWh)	Units MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 0	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,7
Variable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 0 10,523	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75
Variable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 0 10,523 22,896	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 0 12,214 28,883	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ⁻ 53,15
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 0 10,523	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ⁻ 53,15 49,02
Variable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ⁻ 53,15 49,02 35,33 25,00
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066 14,404	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ⁻ 53,15 49,02 35,33 25,06 14,40
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	osts (\$0.00)5/kWh)	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,21 53,15 49,02 35,33 25,06 14,40 4,43
Variable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Dct Nov Dec	osts (\$0.00 • OPERATI)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404	\$ \$ \$	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066 14,404	\$ \$	6,411,00 1,004,00 7,415,00
Variable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Dct Nov Dec	osts (\$0.00 • OPERATI)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333	\$ \$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,21 53,15 49,02 35,33 25,06 14,40 4,43 2,33
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month	osts (\$0.00 • OPERATI)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIR 16-Hour	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,859 23,659 23,859 23,859 23,859 23,859 23,859 23,859 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,21 53,15 49,02 35,33 25,06 14,40 4,43 2,33 200 4-Hour
Variable Operating Co TOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan	osts (\$0.00 • OPERATI)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,859 23,859 23,859 23,859 23,859 23,859 23,859 23,859 23,859 24,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 20,845	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ⁻ 53,15 49,02 35,33 25,00 14,40 4,43 2,33 200
/ariable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jan Feb	osts (\$0.00 • OPERATI)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIR 16-Hour	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,859 23,659 23,859 23,859 23,859 23,859 23,859 23,859 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 ² 53,15 49,02 35,33 25,00 14,40 4,43 2,33 200 4-Hour
/ariable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jan	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIR 16-Hour 4,602 0	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,859 23,659 23,859 23,859 23,859 23,859 23,859 23,859 23,859 23,859 23,859 23,859 24,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 20,000 14,404 4,439 2,333 151.8	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 53,15 49,00 35,33 25,00 14,40 4,43 2,33 200 4-Hour
/ariable Operating Co FOTAL ESTIMATED Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May May	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,859 23,859 23,859 24,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 3,840	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 3,840	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 53,15 49,00 35,33 25,00 14,40 4,43 2,33 25,00 14,44 4,43 2,33 200 4-Hour 4,60 3,84
/ariable Operating Co FOTAL ESTIMATED Month lan Feb Mar Apr May lun lul Aug Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun Lun Lun Lun Aug Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Feb Mar May Jun Lun Lun Month	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 3,840 22,523	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,659 23,859 23,859 23,859 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 3,840 22,523	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 3,840 28,413	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,73 12,2 53,13 49,00 35,33 25,00 14,44 4,43 2,33 25,00 14,44 4,44 2,33 200 4-Hour 4,60 3,84 47,99
/ariable Operating Co FOTAL ESTIMATED Month lan Feb Mar Apr May lun lul Aug Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun lul Lul Aug Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Feb Mar May Jun Lul Lul Lul Lul Lul Lul Lul Lul	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 3,840 22,523 23,659	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 3,840 28,413 29,845	\$	6,411,00 1,004,00 7,415,00 4-Hour 4,75 12,2 53,15 49,00 35,33 25,00 14,40 4,43 2,33 25,00 14,44 4,43 2,33 200 4-Hour 4,60 3,84 47,95 49,18
Ariable Operating Co OTAL ESTIMATED Month an Teb Aar Aay un ul Sep Doct NERGY OUTPUT (A Month an Teb Aar Aay UN NERGY OUTPUT (A North an Teb Aar Aay UN NERGY OUTPUT (A NORTH Aay UN NORTH Aay UN NORTH Aay UN NORTH Aay UN NORTH Aay UN NORTH Aay UN NORTH Aay NORTH Aay UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY UN NORTH AAY AAY AAY AAY AAY AAY AAY AA	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840 22,523 23,659 23,6	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 23,659 23,659	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 3,840 28,413 29,845 29,845	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 4-Hour 4,6
Ariable Operating Co TOTAL ESTIMATED Month an Teb Aar Aay Jun Jul Aug Sep Doct NERGY OUTPUT (A Month an Teb Aar Apr Aay Jun Jul Aug Sep Doct NERGY OUTPUT (A Month an Teb Aar Aay Jun Jul Aug Sep Doct Sep Doct Sec ENERGY OUTPUT (A Sep Aar Aay Jun Jul Aug Sep Doct Sec ENERGY OUTPUT (A Sec Aar Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aug Sep Doct Aay Jun Jul Aay Jun Jul Aay Jun Jul Aay Jun Jul Aay Jun Jun Jun Jun Jun Jun Jun Jun	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 3,840 22,523 23,659	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 3,840 28,413 29,845	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6
/ariable Operating Co FOTAL ESTIMATED Month lan Feb Mar Apr May lun lul Aug Sep Doct NERGY OUTPUT (A Month lan Feb Mar Apr May Jun lul Lul Sep Doct NerGY OUTPUT (A Month lan Feb Mar Apr Month lan Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Sep Doct Nov NerGY OUTPUT (A Month lan Sep Doct Nov NerGY OUTPUT (A Month lan Sep Doct Nov NerGY OUTPUT (A Month lan Sep Doct Nov NerGY OUTPUT (A Month lan Sep Doct Nov NerGY OUTPUT (A Month Ner NerGY OUTPUT (A Ner NerGY OUTPUT (A Ner Ner Ner Ner Ner Ner Ner Ner	osts (\$0.00)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4 ,602 0 0 0 0 3,840 28,413 29,845 29,845 29,845 17,502 13,994 3,209	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 4-Hour 4,6
Ariable Operating Co TOTAL ESTIMATED Month an Teb Aar Aay Jun Jul Aug Sep Doct NERGY OUTPUT (A Month an Teb Aar Apr Aay Jun Jul Aug Sep Doct Aav Dec ENERGY OUTPUT (A Month an Teb Aar Apr Aay Jun Jul Aug Sep Doct Aav Dec ENERGY OUTPUT (A Dec ENERGY (A DEC ENERG	AVERAGE)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 0 3,840 28,413 29,845 29,845 29,845 17,502 13,994 3,209 1,578	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 3,8 47,9 49,1 36,2 17,5 13,9 3,2 1,5
Arriable Operating Co COTAL ESTIMATED Month an eb Mar apr May un ul aug bec SNERGY OUTPUT (A Month an eb Mar apr Month an eb Mar ay un ul aug bec SNERGY OUTPUT (A Month an eb Mar	AVERAGE)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4 ,602 0 0 0 0 3,840 28,413 29,845 29,845 29,845 17,502 13,994 3,209	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 3,8 47,9 49,1 36,2 17,5 13,9 3,2 1,5
Ariable Operating Co OTAL ESTIMATED Month an eb far .pr fay un ul ug ep oct lov lec NERGY OUTPUT (A Month an eb far .pr fay un ul ug ep oct lov lec NERGY OUTPUT (A	AVERAGE)5/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ND ENERGY COS	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ICS	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 0 3,840 28,413 29,845 29,845 29,845 29,845 17,502 13,994 3,209 1,578 132.8	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 3 ,8 47,9 49,1 36,2 17,5 13,9 3,2 1,5 13,9 3,2 1,5 17,4
Arriable Operating Co TOTAL ESTIMATED Month an Teb Mar Arr Arr Arr Arr Arr Arr Arr A	AVERAGE	05/kWh) ING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ND ENERGY COS 16-Hour	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ICS 12-Hour	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 0 12,214 28,883 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 0 0 0 0 3,840 28,413 29,845 29,845 29,845 17,502 13,994 3,209 1,578 132.8	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 3,8 47,9 49,1 36,2 17,5 13,9 3,2 1,5 13,9 3,2 1,5 178 4-Hour
Ariable Operating Co TOTAL ESTIMATED Month An Teb Aar Apr Aay Uun Uul Aug Sep Doct NERGY OUTPUT (A Month Ian Teb Aar Apr Aay Uun Uul Aug Sep Doct NERGY OUTPUT (A Month Ian Teb Aar Apr Aay Uun Uul Aug Sep Doct NERGY OUTPUT (A Sep Doct Aay Uun Uul Aug Sep Doct Aay Aay Uun Uul Aug Sep Doct Aay Aay Uun Uul Aug Sep Doct Aay Aay UUTPUT (A Month Ian Teb Aar Aay UUTPUT (A Month Ian Teb Aar Aay UUTPUT (A Month Ian Teb Aar Aay UUTPUT (A Month Ian Teb Aar Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Ian Sep Doct Aay UUTPUT (A Month Aay Nov Doct NOV Doct Sep Doct Aay Nov Doct Sep Doct Nov Doct Sep Doct Nov Doct Sep Doct Nov Doct Sep Doct Nov Doct Sep	AVERAGE	D5/kWh) ING COST (ING COST) (ING COST) (I	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ DUTPUT UI	16-Hour 4,146,000 648,000 4,794,000 NDER AVERAGE 16-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 22,896 14,404 4,439 2,333 129.6 ER MINIMUM (FIF 16-Hour 4,602 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ND ENERGY COS	\$ \$ FLOW C	12-Hour 4,146,000 648,000 4,794,000 ONDTIONS 12-Hour 4,758 0 0 0 10,523 22,896 23,659 23,659 23,659 23,659 22,896 14,404 4,439 2,333 129.6 V CONDTIONS 12-Hour 4,602 0 0 0 3,840 22,523 23,659 23,659 17,502 13,994 3,209 1,578 114.6 ICS	\$	4,550,000 759,000 5,309,000 8-Hour 4,758 0 0 0 12,214 28,883 29,845 29,845 29,845 29,845 25,066 14,404 4,439 2,333 151.8 8-Hour 4,602 0 0 0 0 0 3,840 28,413 29,845 29,845 29,845 29,845 17,502 13,994 3,209 1,578 132.8	\$	6,411,0 1,004,0 7,415,0 4-Hour 4,7 12,2 53,1 49,0 35,3 25,0 14,4 4,4 2,3 200 4-Hour 4,6 3,8 47,9 49,1 36,2 17,5 13,9 3,2 1,5 17,8

 $M:\label{eq:linear} M:\label{eq:linear} M:\l$

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET KITEEN RIVER

					BASIC	SITE PARAME						t: May/31/18 14:04:
0	N	-128.78						nt Area at Intake			km ²	83
-	E	55.43						Mean Annual Unit			L/s/km ²	!
Region Estimated Footprint I	ha	North Coast 270					Mean Anr	nual Discharge (MA	D)		m ³ /s	42
	na	270										
NA (1		F .				LOWS TO RES			0	0.1	N	
Month Average	Jan 5.5	Feb 7.9	Mar 8.4	Apr 20.5	May 84.1	Jun 116.2	Jul 89.4	Aug 59.6	Sep 46.9	Oct 43.5	Nov 20.4	Dec 10.8
Firm (Low Flow)	5.5	7.9	8.4	20.5	84.1	116.2	89.4	59.6	46.9	43.5	20.4	10.8
					DES	GN PARAMETE	RS					
						6-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity				MW MW		20		27		40		80 110
nstalled Capacity Gross Head				m		37 82		37 82		55 82		82
Design Flow, Qd				m ³ /s		54		54		80		161
MAD Multiplier at Qd				2		1.3		1.3		1.9		3.7
Reservoir Storage Volu	ume			m ³		23,815,500		23,815,500		23,815,500		23,815,500
Live Storage Volume Dam Height at Minimur	m Oporatiu			m ³		14,349,000 22		14,349,000 22		14,349,000 22		14,349,000 22
Dam Height at Minimur Dam Height at Full Sup		ng Level		m m		22 44		22 44		22 44		22 44
)am Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length				m		278		278		278		278
Reservoir Surface Area	а			m ²		1,092,000		1,092,000		1,092,000		1,092,000
Penstock Length Transmission Line Len	ath			km km		5 23		5 23		5 23		5 23
Access Road Length	igui			km		4		4		4		4
					ESTIMA	TED CAPITAL C	OSTS					
					1	6-Hour		12-Hour		8-Hour		4-Hour
Nob, Demob, Insuranc		Overhead, Contr	actor's Pro	fits	\$	50,311,000		50,311,000	\$	61,253,000		91,978,0
Access and Site Prepa Cofferdams and Const		ater Management			\$ \$	13,790,000 4,723,000		13,790,000 4,723,000	\$ \$	13,790,000 4,723,000		13,790,0 4,723,0
ntake, Headrace, and		ater management			φ \$	8,883,000	φ \$	8,883,000	\$	13,316,000		26,631,0
Dam Construction					\$	54,342,000	\$	54,342,000	\$	54,342,000		54,342,0
Vater Conveyance Sy					\$	66,005,000	\$	66,005,000	\$	84,808,000		132,714,0
Powerhouse Construct Switchyard and Transn					\$ ¢	39,317,000 14,182,000	\$ \$	39,317,000 14,182,000	\$ \$	58,935,000 15,096,000		117,869,0 17,841,0
SUB-TOTAL	nission				Ф \$	251,553,000	Ф \$	251,553,000	э \$	306,263,000		459,888,0
EPCM Costs (8% of	Subtotal)				\$	20,124,000	\$	20,124,000	\$	24,501,000	•	36,791,0
Contingency (30% of	f Subtotal)				\$	75,466,000	\$	75,466,000	\$	91,879,000		137,966,0
TOTAL ESTIMATED (OVERNIG	HT CAPITAL CO	ST		\$	347,143,000	\$	347,143,000	\$	422,643,000	\$	634,645,0
				EST						0 Hour		4.1.0.0
-ixed Operating Costs	(2% of Ca	apital)			\$	6-Hour 6,943,000	\$	12-Hour 6,943,000	\$	8-Hour 8,453,000		4-Hour 12.693.0
Variable Operating Cos	sts (\$0.00	5/kWh)			\$	967,000		967,000	\$	1,183,000		1,303,0
FOTAL ESTIMATED (OPERATII	NG COST			\$	7,910,000	\$	7,910,000	\$	9,636,000	\$	13,996,0
						DER AVERAGE				A 11		
Month an				Units MWh	1	6-Hour 5,462		1 2-Hour 5,462		8-Hour 5,462		4-Hour 5,4
Feb				MWh		903		903		903		9
Mar				MWh		4,265		4,265		4,265		4,2
Apr Apr				MWh		10,074		10,074		10,074		10,0
/lay un				MWh MWh		31,095 26,376		31,095 26,376		44,694 39,536		46,5 57,1
ul				MWh		27,255		27,255		40,854		45,3
Nug				MWh		27,255		27,255		30,263		30,2
Sep				MWh		23,046		23,046		23,046		23,0
Dct Nov				MWh MWh		22,088 10,024		22,088 10,024		22,088 10,024		22,0 10,0
Dec				MWh		5,484		5,484		5,484		5,4
ENERGY OUTPUT (A	VERAGE)		GWh/yr		193.3		193.3		236.7		26
			EN			R MINIMUM (FIF	,					
Month an				Units MWh	1	6-Hour 5,462		12-Hour 5,462		8-Hour 5,462		4-Hour 5,4
eb				MWh		903		903		903		ç
<i>l</i> ar				MWh		4,265		4,265		4,265		4,2
.pr				MWh		10,074		10,074		10,074		10,0
1ay un				MWh MWh		31,095 26,376		31,095 26,376		44,694 39,536		46,5 57,1
ul				MWh		20,370		20,370		40,854		45,3
ug				MWh		27,255		27,255		30,263		30,2
бер				MWh		23,046		23,046		23,046		23,0
Det				MWh MWh		22,088		22,088 10,024		22,088		22,0 10,0
lov Dec				MWh		10,024 5,484		10,024 5,484		10,024 5,484		10,0 5,4
ENERGY OUTPUT (FI	IRM)			GWh/yr		193.3		193.3		236.7		26
				CA		D ENERGY CO						
		acity		Units \$/MW	1 \$	6-Hour 17,357,000		12-Hour 13,018,000	\$	8-Hour 10,566,000		4-Hour 7,933,0
Metric	Jahla Car			.0/IVIVV	D.	17,337,000	Э	13,010,000	φ	10,000,000	Φ	
Capacity Cost, Depend					\$			9.476.000	\$	7.697.000		5.779 (
Metric Capacity Cost, Depend Capacity Cost, Installed Energy Cost (Average) Energy Cost (Firm)	d Capacity			\$/MW \$/GWh \$/GWh		9,476,000 1,796,000	\$	9,476,000 1,796,000 1,796,000	\$ \$	7,697,000 1,786,000	\$	5,779,0 2,435,0 2,435,0

 $M:\label{eq:linear} M:\label{eq:linear} M:\l$

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
E	REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET KSI GWINHAT'AL

Northing N (2	0.12		BASIC	SITE PARAMET		Aroc at latal			km ²	
5	9.13					nt Area at Intake	D		km ² L/s/km ²	3
Easting E 55.4	41 th Coast					Mean Annual Unit			L/s/km⁻ m ³ /s	23
Region Nor Estimated Footprint ha 250					Mean An	nual Discharge (MA	D)		III /S	23
				LOWS TO RES		, ,		-		
Month Jan Average 3.6	Feb 3.5	Mar Apr 3.9 10.2	May 42.7	Jun 60.5	Jul 51.0	Aug 38.3	Sep 28.9	Oct 23.0	Nov 11.2	Dec 5.6
Firm (Low Flow) 3.6	3.5	3.9 10.2	42.7	60.5	51.0	38.3	28.9	23.0	11.2	5.6
· · ·										
				GN PARAMETE		12-Hour		8-Hour		4-Hour
Dependable Capacity		MW	I	20		27		40		80
nstalled Capacity		MW		32		32		47		93
Gross Head		m		131		131		131		131
Design Flow, Qd		m³/s		30 1.3		30 1.3		43 1.8		85 3.6
MAD Multiplier at Qd Reservoir Storage Volume		m ³		1.5 15,012,000		15,012,000		1.0 15,012,000		3.0 15,012,000
Live Storage Volume		m ³		9,626,000		9,626,000		9,626,000		9,626,000
Dam Height at Minimum Operating Lev	el	m		17		17		17		17
Dam Height at Full Supply Level		m		35		35		35		35
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m m²		381		381		381		381
Reservoir Surface Area Penstock Length		m⁻ km		939,000 5		939,000 5		939,000 5		939,000 5
Fransmission Line Length		km		20		20		20		20
Access Road Length		km		15		15		15		15
			ESTIMA	TED CAPITAL C	OSTS					
			1	l6-Hour		12-Hour	-	8-Hour		4-Hour
Nob, Demob, Insurance, Bonds, Overh Access and Site Preparation	ead, Contract	tor's Profits	\$ \$	41,047,000	\$	41,047,000	\$ ¢	48,272,000	\$	70,426,0
Cofferdams and Construction Water M	anagement		\$ \$	17,790,000 2,600,000	\$ \$	17,790,000 2,600,000	\$ \$	17,790,000 2,600,000	\$ \$	17,790,0 2,600,0
ntake, Headrace, and Forebay	anagement		\$	4,891,000	φ \$	4,891,000	\$	7,041,000	φ \$	14,082,0
Dam Construction			\$	46,252,000	\$	46,252,000	\$	46,252,000	\$	46,252,0
Vater Conveyance System			\$	46,188,000	\$	46,188,000	\$	57,342,000	\$	87,850,0
Powerhouse Construction Switchyard and Transmission			\$	33,849,000 12,619,000	\$	33,849,000	\$ \$	48,733,000	\$	97,467,0 15,661,0
SUB-TOTAL			Դ Տ	205,236,000	\$ \$	12,619,000 205,236,000	э \$	13,330,000 241,360,000	\$ \$	15,661,0 352,128,0
EPCM Costs (8% of Subtotal)			\$	16,419,000	\$	16,419,000	\$	19,309,000	\$	28,170,0
Contingency (30% of Subtotal)			\$	61,571,000	\$	61,571,000	\$	72,408,000	\$	105,638,0
TOTAL ESTIMATED OVERNIGHT CA	PITAL COST	ſ	\$	283,226,000	\$	283,226,000	\$	333,077,000	\$	485,936,0
		ESTI		NNUAL OPERA						
Fixed Operating Costs (2% of Capital)			1 \$	16-Hour 5,665,000	\$	12-Hour 5,665,000	\$	8-Hour 6,662,000	\$	4-Hour 9,719,0
Variable Operating Costs (\$0.005/kWh)		\$	854,000	\$	854,000	\$	1,047,000	\$	1,153,0
TOTAL ESTIMATED OPERATING CO			\$	6,519,000	\$	6,519,000	\$	7,709,000	\$	10,872,0
		ENERGY OL		DER AVERAGE	FLOW CO	ONDTIONS				
Month		Units	1	6-Hour		12-Hour		8-Hour		4-Hour
Jan Feb		MWh MWh		5,544 0		5,544 0		5,544 0		5,5
Mar		MWh		2,826		2,826		2,826		2,8
Apr		MWh		8,045		8,045		8,045		8,0
Мау		MWh		27,925		27,925		38,515		38,6
lun		MWh		23,308		23,308		33,556		47,7
lul Aug		MWh MWh		24,085 24,085		24,085 24,085		34,675 31,216		41,5 31,2
Sep		MWh		24,085		24,085 22,795		22,795		22,7
Dct		MWh		18,746		18,746		18,746		18,7
Nov		MWh		8,834		8,834		8,834		8,8
Dec ENERGY OUTPUT (AVERAGE)		MWh GWh/yr		4,564 170.8		4,564 170.8		4,564 209.3		4,5 23
		-						200.0		20
Month		ENERGY OUTP Units		R MINIMUM (FIF 6-Hour		CONDTIONS		8-Hour		4-Hour
an		MWh	•	5,544		5,544		5,544		4-11001 5,5
eb		MWh		0		0		0		
/lar		MWh		2,826		2,826		2,826		2,8
Npr Nay		MWh MWh		8,045 27,925		8,045 27,925		8,045 38,515		8,0 38,6
un		MWh		23,308		23,308		33,556		47,7
ul		MWh		24,085		24,085		34,675		41,5
lug		MWh		24,085		24,085		31,216		31,2
Sep Oct		MWh MWh		22,795 18,746		22,795 18,746		22,795 18,746		22,7 18,7
lov		MWh		8,834		8,834		8,834		8,8
Dec		MWh		4,564		4,564		4,564		4,5
ENERGY OUTPUT (FIRM)		GWh/yr		170.8		170.8		209.3		23
		САР		ID ENERGY CO	ST METRI	cs				
Metric		Units		6-Hour		12-Hour	¢	8-Hour	¢	4-Hour
apacity Cost, Dependable Capacity		\$/MW \$/MW	\$ \$	14,161,000 8,749,000	\$ \$	10,621,000 8,749,000	\$ \$	8,327,000 7,147,000	\$ \$	6,074,0 5,213,0
							Ψ	1, 171,000	0	J.Z I J.L
Capacity Cost, Installed Capacity Energy Cost (Average)		\$/GWh	\$	1,659,000	\$	1,659,000	\$	1,591,000	\$	2,108,0

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]KSI GWINHAT'AL

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET HIRSCH CREEK

NI CALLO IN	100 55		BAS	SIC SITE PARAME					L 2	
0	-128.55					nt Area at Intake			km ²	33
5	54.09					d Mean Annual Unit			L/s/km ²	6
0	North Coast 130				Mean An	nual Discharge (MA	D)		m³/s	20.
Estimated Footprint ha	100									
				Y FLOWS TO RES						_
Month Jan Average 9.4	Feb 8.0		Apr Ma 2.0 28.		Jul 34.1	Aug 25.2	Sep 22.2	Oct 25.4	Nov 20.8	Dec 11.8
Firm (Low Flow) 9.4	8.0		2.0 28.		34.1	25.2	22.2	25.4	20.8	11.8
· ·										
			D	ESIGN PARAMETE 16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity		MW		20		27		40		80
nstalled Capacity		MW		24		27		41		82
Gross Head		m		109		109		109		109
Design Flow, Qd		m³/s		26 1.3		30		45		90
MAD Multiplier at Qd Reservoir Storage Volume		m ³		13,871,613		1.4 13,871,613		2.2 13,871,613		4.3 13,871,613
Live Storage Volume		m ³		6,116,000		6,116,000		6,116,000		6,116,000
Dam Height at Minimum Operating	Level	m		19		19		19		19
Dam Height at Full Supply Level		m		21		21		21		21
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m m²		799		799		799		799
Reservoir Surface Area Penstock Length		m ⁻ km		948,000 3		948,000 3		948,000 3		948,000 3
Transmission Line Length		km		4		4		4		4
Access Road Length		km		5		5		5		5
			ESTI	MATED CAPITAL C	COSTS					
				16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insurance, Bonds, Ov Access and Site Preparation	verhead, Contr	actor's Profits	\$	28,243,000		29,968,000	\$	36,269,000	\$	54,211,00
Access and Site Preparation Cofferdams and Construction Wate	r Management	F	\$ \$	9,418,000 2,284,000		9,418,000 2,284,000	\$ \$	9,418,000 2,284,000	\$ \$	9,418,00 2,284,00
Intake, Headrace, and Forebay	i Management	L .	φ \$	4,295,000		4,952,000	\$	7,428,000	\$	14,856,00
Dam Construction			\$	41,266,000		41,266,000	\$	41,266,000	\$	41,266,00
Nater Conveyance System			\$	25,791,000		28,037,000	\$	35,710,000	\$	54,884,00
Powerhouse Construction			\$	24,934,000		28,750,000	\$	43,124,000	\$	86,249,00
Switchyard and Transmission SUB-TOTAL			\$ \$	4,982,000 141,213,000		5,163,000 149,838,000	\$ \$	5,844,000 181,343,000	\$ \$	7,888,00 271,056,00
EPCM Costs (8% of Subtotal)			¥ \$	11,297,000		11,987,000	∳ \$	14,507,000	∳ \$	21,684,00
Contingency (30% of Subtotal)			\$	42,364,000		44,951,000	\$	54,403,000	\$	81,317,00
TOTAL ESTIMATED OVERNIGHT	CAPITAL CO	OST	\$	194,874,000	\$	206,776,000	\$	250,253,000	\$	374,057,00
			ESTIMATED	ANNUAL OPERA						
Fixed Operating Costs (2% of Capit	tal)		\$	16-Hour 3,897,000		12-Hour 4,136,000	\$	8-Hour 5,005,000	\$	4-Hour 7,481,00
Variable Operating Costs (2 // 01 Capit			φ \$	745,000		779,000	φ \$	843,000	φ \$	846,00
TOTAL ESTIMATED OPERATING			\$	4,642,000		4,915,000	\$	5,848,000	\$	8,327,00
		ENE	RGY OUTPUT	UNDER AVERAGE	FLOW C	ONDTIONS				
Month			nits	16-Hour		12-Hour		8-Hour		4-Hour
Jan Feb		MWh MWh		7,539 3,349		7,539 3,349		7,539 3,349		7,53 3,34
Var		MWh		3,795		3,795		3,795		3,79
Apr		MWh		7,870		7,870		7,870		7,87
May		MWh		21,425		22,950		22,950		22,95
Jun		MWh		17,018		19,622		29,434		30,03
Jul Aug		MWh MWh		17,585 17,077		20,277 17,077		23,108 17,077		23,10 17,07
Sep		MWh		14,559		14,559		14,559		14,55
Dct		MWh	I	17,213		17,213		17,213		17,21
Nov		MWh		13,641		13,641		13,641		13,64
Dec ENERGY OUTPUT (AVERAGE)		MWh GWh		7,996 149.1		7,996 155.9		7,996 168.5		7,99 169
			-							
Month			Y OUTPUT UN nits	DER MINIMUM (FIF 16-Hour		/ CONDTIONS 12-Hour		8-Hour		4-Hour
Jan		MWh	l	7,539		7,539		7,539		7,53
eb		MWh		3,349		3,349		3,349		3,34
Mar		MWh MWh		3,795 7,870		3,795 7,870		3,795		3,79
Apr May		MVVr MWh		7,870 21,425		7,870 22,950		7,870 22,950		7,87 22,95
lun		MWh		17,018		19,622		22,930		30,03
lul		MWh	1	17,585		20,277		23,108		23,10
lug		MWh		17,077		17,077		17,077		17,07
Sep		MWh MWh		14,559		14,559 17 213		14,559		14,55
Dct Nov		MWr		17,213 13,641		17,213 13,641		17,213 13,641		17,2 <i>°</i> 13,64
Dec		MWh		7,996		7,996		7,996		7,99
ENERGY OUTPUT (FIRM)		GWh	/yr	149.1		155.9		168.5		169
			CAPACITY	AND ENERGY CO	ST METR	CS				
Metric	4 .		nits	16-Hour		12-Hour	^	8-Hour		4-Hour
	T\/	\$/MV	V \$	9,744,000	\$	7,754,000	\$	6,256,000	\$	4,676,00
Capacity Cost, Dependable Capaci	ty					7 597 000	¢	6 122 000	¢	1 575 00
Capacity Cost, Dependable Capaci Capacity Cost, Installed Capacity Energy Cost (Average)	ty	\$/MV \$/MV \$/GV	V \$	8,245,000 1,307,000	\$	7,587,000 1,326,000	\$ \$	6,122,000 1,485,000	\$ \$	4,575,00 2,212,00

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]HIRSCH CREEK

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET KITIMAT RIVER

				BASIC	SITE PARAME						t: May/31/18 14:04:
0	28.32						nt Area at Intake			km ²	4
5	.26						Mean Annual Unit			L/s/km ²	-
- 5 -	orth Coast					Mean Ann	ual Discharge (MA	D)		m³/s	32
Estimated Footprint ha 75	U										
					FLOWS TO RES			_	a 1		_
Month Jan Average 11.6	Feb 10.4	Mar 7.2	Apr 15.5	May 43.4	Jun 80.8	Jul 62.7	Aug 44.6	Sep 32.3	Oct 34.9	Nov 25.6	Dec 15.7
Firm (Low Flow) 11.6	10.4	7.2	15.5	43.4	80.8	62.7	44.6	32.3	34.9	25.6	15.7
				DES	IGN PARAMETE	RS					
					16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity nstalled Capacity			MW MW		20 37		27 49		40 73		80 146
Gross Head			m		37		49 37		37		37
Design Flow, Qd			m ³ /s		119		158		238		475
/AD Multiplier at Qd					3.7		4.9		7.4		14.8
Reservoir Storage Volume			m ³		83,088,000		83,088,000		83,088,000		83,088,000
ive Storage Volume	val		m ³		47,859,000		47,859,000		47,859,000		47,859,000
Dam Height at Minimum Operating Le Dam Height at Full Supply Level	vei		m m		20 37		20 37		20 37		20 37
Dam Type					CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m		307		307		307		307
Reservoir Surface Area			m ²		4,759,000		4,759,000		4,759,000		4,759,000
Penstock Length			km km		0		0		0		0
ransmission Line Length Access Road Length			km km		40 18		40 18		40 18		40 18
				PA		0077					
				-	TED CAPITAL C		12-Hour		8-Hour		4-Hour
lob, Demob, Insurance, Bonds, Over	head, Contr	actor's Pro	fits	\$	42,629,000		48,067,000	\$	58,942,000	\$	91,567,0
Access and Site Preparation	_			\$	39,007,000		39,007,000	\$	39,007,000	\$	39,007,0
Cofferdams and Construction Water N	/lanagement	t		\$	3,537,000		3,537,000	\$	3,537,000	\$	3,537,0
ntake, Headrace, and Forebay Dam Construction				ֆ Տ	19,667,000 42,720,000		26,223,000 42,720,000	\$ \$	39,335,000 42,720,000	\$ \$	78,669,0 42,720,0
Vater Conveyance System				φ \$	1,188,000		1,584,000	φ \$	2,377,000	φ \$	4,753,0
Powerhouse Construction				\$	42,565,000	\$	56,753,000	\$	85,129,000	\$	170,258,0
witchyard and Transmission				\$	21,831,000		22,442,000	\$	23,662,000	\$	27,325,0
				\$	213,144,000		240,333,000	\$	294,709,000	\$	457,836,0
EPCM Costs (8% of Subtotal) Contingency (30% of Subtotal)				\$ \$	17,052,000 63,943,000		19,227,000 72,100,000	\$ \$	23,577,000 88,413,000	\$ \$	36,627,0 137,351,0
TOTAL ESTIMATED OVERNIGHT C	APITAL CO	ST		\$	294,139,000		331,660,000	\$	406,699,000	\$	631,814,0
			EST	IMATED A	NNUAL OPERA	TING COS	TS				
Fixed Operating Costs (2% of Capital)				\$	16-Hour 5,883,000		12-Hour 6,633,000	\$	8-Hour 8,134,000	\$	4-Hour 12,636,00
/ariable Operating Costs (\$0.005/kWl				\$	447,000		447,000	\$	447,000	\$	447,0
OTAL ESTIMATED OPERATING C	OST			\$	6,330,000	\$	7,080,000	\$	8,581,000	\$	13,083,0
					IDER AVERAGE						
Month an			Units MWh	1	6-Hour 5,384		12-Hour 5,384		8-Hour 5,384		4-Hour 5,3
Feb			MWh		0,004		0,004		0,004		0,0
<i>M</i> ar			MWh		0		0		0		
Apr			MWh		3,147		3,147		3,147		3,1
/lay lun			MWh MWh		13,791 17,929		13,791 17,929		13,791 17,929		13,7 17,9
ul			MWh		14,376		14,376		14,376		14,3
Nug			MWh		10,226		10,226		10,226		10,2
Sep			MWh		7,167		7,167		7,167		7,1
Dct			MWh		8,002		8,002		8,002		8,0
lov Dec			MWh MWh		5,680 3,600		5,680 3,600		5,680 3,600		5,6 3,6
NERGY OUTPUT (AVERAGE)			GWh/yr		89.3		89.3		89.3		89
		EN	IERGY OUTI		R MINIMUM (FIF	,					
Month an			Units MWh	1	6 -Hour 5,384		I2-Hour 5,384		8-Hour 5,384		4-Hour 5,3
eb			MWh		0,004		0,004		0,004		0,0
1ar			MWh		0		0		0		
pr			MWh		3,147		3,147		3,147		3,1
lay			MWh MWh		13,791		13,791		13,791		13,7
un ul			MWh		17,929 14,376		17,929 14,376		17,929 14,376		17,9 14,3
ug			MWh		10,226		10,226		10,226		10,2
ep			MWh		7,167		7,167		7,167		7,1
Oct			MWh		8,002		8,002		8,002		8,0
lov Dec			MWh MWh		5,680 3,600		5,680 3,600		5,680 3,600		5,6 3,6
			GWh/yr		89.3		89.3		89.3		3,0 8
					ID ENERGY CO		cs				
			CA	PACITYAN	ID ENERGI CO		••				
Metric			Units	1	6-Hour	1	12-Hour	¢	8-Hour	۴	4-Hour
Metric Capacity Cost, Dependable Capacity			Units \$/MW		6-Hour 14,707,000	1 \$	12-Hour 12,437,000	\$ \$	10,168,000	\$	7,898,0
			Units	\$	6-Hour	1 \$ \$	12-Hour	\$ \$ \$		\$ \$ \$	4-Hour 7,898,0 4,313,0 7,075,0

M:\1\03\00647\01\A\Data\Dam and Reservoir Data\[SCREEN-3+4_20180531.xls]KITIMAT RIVER

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

Γ	0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
- [REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET ZYMOETZ RIVER

Northing N -128.35 Catchment Area Intake Ivm ² Easing E 54.50 Estimated Mean Annual Discharge (MAD) Ivalve ² Regin North Coast Mean Annual Discharge (MAD) m ³ /s Estimated Mean Annual Discharge (MAD) m ³ /s m ³ /s Month Jan Feb Mar Apr May Jun Jun Sep Oct Nov r Average 23.3 23.7 24.1 61.7 23.0.7 79.9 61.0 111.6 65.1 5 Firm (Low Flow) 27.6 19.1 14.2 35.6 181.6 234.8 126.1 78.9 61.0 41.5 28.5 3 Dependable Capacity MW 20 12.4 40 40 40 40 40 16.0 13.6 13.6 215 MA Mothingleer at Od 18.767.669 18.767.669 18.767.669 18.767.669 18.767.669 18.767.669 18.767.669 18.767.669 18.767.669 <t< th=""><th></th><th></th><th></th><th></th><th>BASIC</th><th>SITE PARAMET</th><th>ERS</th><th></th><th></th><th></th><th>Prin</th><th>t: May/31/18 14:04:5</th></t<>					BASIC	SITE PARAMET	ERS				Prin	t: May/31/18 14:04:5
Pages Moth Case Meen Armael Discharger Moh Meen Morin In a Noth Case ETHAATES MONTU-AL (UNN) And And Noth Noth Morin In a 123 22.3 24.1 65.7 26.9 195.5 122.9 105.5 112.9 105.5 122.9 105.5 112.9 100.1 44.55 55.0 122.9 100.1 44.55 122.9 100.1 44.55 122.9 100.1 44.55 100.1 44.55 100.0 44.55 122.9 100.1 44.55 100.0 44.55 122.9 100.0 44.55 100.0 44.55 122.9 100.0 44.55 100.0 44.55 100.0 44.55 100.0 44.55 100.0 44.55 100.0 44.55 <th>Northing N</th> <th>-128.35</th> <th></th> <th></th> <th>2/10/10</th> <th></th> <th>-</th> <th>nt Area at Intake</th> <th></th> <th></th> <th>km²</th> <th>2,96</th>	Northing N	-128.35			2/10/10		-	nt Area at Intake			km ²	2,96
Set	Easting E	54.50					Estimated	d Mean Annual Unit	Runoff			3
BESTIMATED MONTHLY PLOWS TO RESERVOR/INTAKE (m ² /m) Month Jan Add May Add May Add May Add Add May Add			oast				Mean Anr	nual Discharge (MA	D)		m³/s	73.
Month Jun Feb Mar Apr May Jun Aug Stap Dots Nov 1 Min Low From 27.2 13.1 14.2 05.6 11.6 22.4 11.6 20.8 11.6 22.4 11.6 20.8 11.6 20.8 11.6 20.8 11.6 20.8 11.6 20.8 12.8 20.8	_sumated ⊢ootprint ha	290										
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Binn (Exp. Rise) 27.6 10.1 14.2 36.6 19.10 24.8 12.6 17.0 0.10 43.5 26.6 3 Departable Capacity MW 10 12 Max 14 Max 14 Max 16 Max <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Dec 35.5</td></td<>												Dec 35.5
Image of Capacity Image of Capacity <thimage capacity<="" of="" th=""> Image of Capacity</thimage>			14.	2 35.6	181.6	234.8	126.1	78.9			28.5	33.1
Image: Capacity Image: Cap					DES	IGN PARAMETE	RS					
Installed Capacity MW 51 61						16-Hour						
Grades Head m 45 45 45 45 45 MAD Multipler at GA m ² /m ² 138 138 136 138 21 MAD Multipler at GA m ² /m ² 18 18 18 18 21 MAD Multipler at GA m ² /m ² 18 18 10												
Design Flow Od Multiple of University of Control (Control (Contro) (Control (Control (Control (Control (Control (Co												
MAD bulkplar at Qd 1.8 1.9 1.2												
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Dam Height af Minimum Operating Level m 45 45 45 45 45 Dam Height af Minimum Operating Level m RCC								, ,				18,767,669
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Dam Typic RCC R												
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Access and Site Preparation \$ 11.280.000 \$ 12.280.7000 \$ 12.800.7000	Moh Demoh Inguranga D	onde Overbeed	Contractor	Profite					¢		¢	4-Hour 60,151,00
Contentation Water Management \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 12.007.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.64.000 \$ 13.66.000 \$ 13.66.000 \$ 13.66.000 \$ 13.66.000 \$ 13.66.000 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.60.07 \$ 14.000 \$<			Contractor							, ,		11,280,00
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Water Convegance System \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 2,7000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 55,067,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 71,954,000 \$ 8,000,000 \$ 8,000,000 \$ 8,000,000 \$ 9,074		ebay			\$, ,		, ,		, ,		35,590,00
Proverhouse Construction \$ 5.067.000 \$ 56.067.000 \$ 56.067.000 \$ 91.5000000000000000000000000000000000000					\$ ¢							69,867,00 2,150,00
Switchyand and Transmission \$ 16,712,000 \$ 16,712,000 \$ 16,712,000 \$ 16,712,000 \$ 16,712,000 \$ 16,712,000 \$ 16,712,000 \$ 19,188,000 \$ 239,848,000 \$ 239,848,000 \$ 239,848,000 \$ 239,848,000 \$ 19,188,000 \$ 19,188,000 \$ 19,188,000 \$ 19,188,000 \$ 19,188,000 \$ 19,188,000 \$ 19,188,000 \$ 330,990,000 \$ 330,990,000 \$ 330,990,000 \$ 8,104,000 \$ 16,712,000 \$ 6,620,000 \$ 6,620,000 \$ 6,620,000 \$ 8,004,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ 1,384,000 \$ <		I			φ \$							91,520,00
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Iber of Deparating Costs (2% of Capital) Is 6 (820,000 \$ 6,820,000 \$ 6,620,000 \$ 6,620,000 \$ 1,384	• • •	,	L COST		•							90,226,00 415,039,00
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JanMWh8,3258,3258,325FebMWh4,7934,7934,793MarMWh3,9573,9573,957AprMWh9,6359,6359,635MayMWh41,96641,96641,966JunMWh36,89636,89636,896JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4	Manth					•	,			8 Hour		4 Hour
FebMWh4,7934,7934,793MarMWh3,9573,9573,957AprMWh9,6359,6359,635MayMWh41,96641,96641,966JunMWh36,89636,89636,896JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4					1							4-Hour 8,32
AprMWh9,6359,6359,635MayMWh41,96641,96641,966JunMWh36,89636,89636,896JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4				MWh		4,793		4,793		4,793		4,79
MayMWh41,96641,96641,966JunMWh36,89636,89636,896JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4												3,95
JunMWh36,89636,89636,896JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4												9,63 54,58
JulMWh35,24135,24135,241AugMWh22,03822,03822,038SepMWh16,50216,50216,502OctMWh12,14812,14812,148NovMWh7,7007,7007,700DecMWh9,2389,2389,238ENERGY OUTPUT (FIRM)GWh/yr208.4208.4208.4	-											58,15
Sep MWh 16,502 16,502 16,502 Oct MWh 12,148 12,148 12,148 Nov MWh 7,700 7,700 Dec MWh 9,238 9,238 ENERGY OUTPUT (FIRM) GWh/yr 208.4 208.4 208.4	Jul			MWh		35,241		35,241		35,241		35,24
MWh 12,148 12,148 12,148 Nov MWh 7,700 7,700 Dec MWh 9,238 9,238 ENERGY OUTPUT (FIRM) GWh/yr 208.4 208.4 208.4												22,03
Nov MWh 7,700 7,700 7,700 Dec MWh 9,238 9,238 9,238 ENERGY OUTPUT (FIRM) GWh/yr 208.4 208.4 208.4												16,50 12,14
Dec MWh 9,238 9,238 9,238 ENERGY OUTPUT (FIRM) GWh/yr 208.4 208.4 208.4												7,70
	Dec			MWh		9,238		9,238		9,238		9,23
CAPACITY AND ENERGY COST METRICS	ENERGY OUTPUT (FIRM)			GWh/yr		208.4		208.4		208.4		242.
Metric Units 16-Hour 12-Hour 8-Hour 4-Hour	Motric									8-Hour		4-Hour
Capacity Cost, Dependable Capacity \$/MW \$ 16,550,000 \$ 12,412,000 \$ 8,275,000 \$ 5,	Capacity Cost, Dependable			\$/MW		16,550,000		12,412,000	\$	8,275,000		5,188,00
Capacity Cost, Installed Capacity \$/MW \$ 6,459,000 \$ 6,459,000 \$ 5,	Capacity Cost, Installed Ca				\$	6,459,000			\$	6,459,000	\$	5,139,00
												1,232,00 1,713,00
Energy Cost (Firm) \$/GWh 1,588,000		d Reservoir Data\[S0			T	1,300,000	Φ	1,000,000	Φ	1,308,000	Φ	1,713,0

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET KSI HLGINX

			BASIC	SITE PARAMET	TERS				Pri	nt: May/31/18 14:04:5
Northing N	-129.59					nt Area at Intake			km ²	57
Easting E Region	54.96 North Coast					l Mean Annual Unit nual Discharge (MA			L/s/km ² m ³ /s	12 71.
Estimated Footprint ha	740				INEAL ALL	iuai Discharge (IVIA	(ט		111 /5	71.
Month	Jan Feb	Mar Apr	MONTHLY May	FLOWS TO RES Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	22.3 20.8	15.8 28.2	74.2	152.6	128.8	116.3	103.5		72.1	33.3
Firm (Low Flow)	22.3 20.8	15.8 28.2	74.2	152.6	128.8	116.3	103.5	91.9	72.1	33.3
						10.11		<u></u>		
Dependable Capacity		MW		16-Hour 20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity		MW		34		45		67		135
Gross Head		m 3.		33		33		33		33
Design Flow, Qd MAD Multiplier at Qd		m³/s		124 1.7		165 2.3		247 3.4		494 6.9
Reservoir Storage Volume	9	m ³		71,141,000		71,141,000		71,141,000		71,141,000
Live Storage Volume		m ³		40,130,000		40,130,000		40,130,000		40,130,000
Dam Height at Minimum (m		19		19		19		19
Dam Height at Full Supply Dam Type	/ Level	m		33 CFRD		33 CFRD		33 CFRD		33 CFRD
Dam Crest Length		m		755		755		755		755
Reservoir Surface Area		m²		3,915,000		3,915,000		3,915,000		3,915,000
Penstock Length Transmission Line Length		km km		0 58		0 58		0 58		0 58
Access Road Length		km		1		1		1		1
			ESTIM	ATED CAPITAL C	POSTS OF					
				16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insurance, I		ntractor's Profits	\$	53,353,000		58,618,000	\$	69,147,000		100,735,00
Access and Site Preparati Cofferdams and Construc		ent	\$ \$	29,796,000 7,900,000		29,796,000 7,900,000	\$ \$	29,796,000 7,900,000		29,796,00 7,900,00
Intake, Headrace, and Fo			φ \$	20,444,000		27,259,000	φ \$	40,889,000		81,777,00
Dam Construction			\$	84,440,000	\$	84,440,000	\$	84,440,000	\$	84,440,00
Water Conveyance Syste Powerhouse Construction			\$	1,235,000 39,815,000		1,647,000 53,086,000	\$ \$	2,471,000 79,629,000		4,941,00 159,258,00
Switchyard and Transmiss			э \$	29,782,000		30,343,000	э \$	31,464,000		34,828,00
SUB-TOTAL			\$	266,765,000		293,089,000	\$	345,736,000		503,675,00
EPCM Costs (8% of Sul			\$	21,341,000 80,030,000		23,447,000 87,927,000	\$	27,659,000		40,294,00
Contingency (30% of Su TOTAL ESTIMATED OVE		OST	\$ \$	368,136,000		404,463,000	\$ \$	103,721,000 477,116,000		151,103,00 695,072,00
		FS		ANNUAL OPERA	TING COS	TS				
				16-Hour		12-Hour		8-Hour		4-Hour
Fixed Operating Costs (29) Variable Operating Costs			\$ \$	7,363,000 837,000		8,089,000 871,000	\$ \$	9,542,000 871,000		13,901,00 871,00
TOTAL ESTIMATED OPE			\$	8,200,000		8,960,000	\$	10,413,000		14,772,00
		ENERGY		NDER AVERAGE	FLOW CO					
Month		Units		16-Hour	,	12-Hour		8-Hour		4-Hour
Jan Feb		MWh MWh		6,463 771		6,463 771		6,463 771		6,46 77
Mar		MWh		3,201		3,201		3,201		3,20
Apr		MWh		5,529		5,529		5,529	1	5,52
May Jun		MWh MWh		18,873 24,219		18,873 29,919		18,873 29,919		18,87 29,91
Jul		MWh		24,219		26,094		26,094		29,91
Aug		MWh		23,562		23,562		23,562	2	23,56
Sep		MWh		20,292		20,292		20,292		20,29
Oct Nov		MWh MWh		18,618 14,136		18,618 14,136		18,618 14,136		18,61 14,13
Dec		MWh		6,746		6,746		6,746	i	6,74
ENERGY OUTPUT (AVEI	RAGE)	GWh/yr		167.4		174.2		174.2		174.
Month				ER MINIMUM (FIF	,			0 Цони		4 Цоли
Month Jan		Units MWh	1	1 6-Hour 6,463		12-Hour 6,463		8-Hour 6,463	6	4-Hour 6,46
Feb		MWh		771		771		771		77
Mar		MWh MWh		3,201 5,529		3,201 5,529		3,201 5,529		3,20 5,52
Apr May		MWh		5,529 18,873		5,529 18,873		5,529 18,873		5,52 18,87
Jun		MWh		24,219		29,919		29,919	1	29,91
Jul Aug		MWh		25,027		26,094 23 562		26,094		26,09 23 56
Aug Sep		MWh MWh		23,562 20,292		23,562 20,292		23,562 20,292		23,56 20,29
Oct		MWh		18,618		18,618		18,618	;	18,61
Nov		MWh		14,136		14,136		14,136		14,13
Dec ENERGY OUTPUT (FIRM	l)	MWh GWh/yr		6,746 167.4		6,746 174.2		6,746 174.2		6,74 174.
•		-		ND ENERGY CO						
Matria		Units		16-Hour		12-Hour		8-Hour		4-Hour
Metric			•	40.000.000	¢	15,130,000	\$	11,899,000	\$	
Capacity Cost, Dependab		\$/MW	\$	18,362,000			-		-	8,667,00
		\$/MW \$/MW \$/GWh	\$ \$ \$	18,362,000 10,944,000 2,199,000	\$	9,018,000 2,322,000	գ \$ \$	7,092,000	\$	5,166,00 3,990,00

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET ANUDOL CREEK (A)

			BA	SIC SITE PARAME	TERS				Pilf	nt: May/31/18 14:04:59
Ν	-129.53					ent Area at Intake			km ²	70
E	55.12									7
	North Coast				Mean An	inual Discharge (MA	D)		m³/s	4.
ha	410									
		ESTIMA	TED MONTHI	LY FLOWS TO RES	SERVOIR/I	NTAKE (m ³ /s)				
Jan	Feb				Jul	Aug	Sep	Oct	Nov	Dec
										0.7 0.4
0.4	0.1	0.4 1	.0 0.	5 17.2	10.0	10.2	0.1	0.0	0.5	0.4
			D		ERS					
		N4\A/								4-Hour 80
										80
		m		507		507		507		507
		m³/s		7		7		10		19
				1.4		1.4		2.0		4.0
lume										4,322,500
										2,878,000
										12 15
		111								CFRD
		m		123		123		123		123
ea		m²		569,000		569,000		569,000		569,000
		km		10		10		10		10
ngth										51 14
		KIII		14		14		14		14
			EST		COSTS	40.11		0.11		4.11
oo Doode	Overhead Cast	actoria Drafita	~		ר ר		¢		۴	4-Hour
	Overnead, Contr	acions Pronits								53,356,00 22,895,00
	ater Management	t	\$			585,000				585,00
Forebay			\$,		1,099,000	\$			3,151,000
			\$			4,901,000	\$			4,901,000
			\$, ,						71,415,000
			\$ ¢							81,498,000 28,977,000
111551011			Ф \$							266,778,000
Subtotal)			\$			12,402,000	\$		•	21,342,000
of Subtotal)			,			46,506,000	\$			80,033,000
OVERNIG	HT CAPITAL COS	ST	\$	213,927,000	0\$	213,927,000	\$	251,969,000	\$	368,153,000
			ESTIMATE	D ANNUAL OPERA		STS				
(20/ of C	anital)		¢	16-Hour		12-Hour	¢	8-Hour	¢	4-Hour
•	• •		\$ ¢							7,363,000 1,004,000
			\$	- ,		4,950,000	\$			8,367,000
				16-Hour	0** 0	12-Hour		8-Hour		4-Hour
		MWh				4,651		4,651		4,65
		MWh		•	•	0		0		(
					5	•				(3,697
		MWh		,	r	3,097		3,097		
				24 /5	3			30.043		
		MWh		24,753 20,238		24,753 20,238		30,043 28,997		30,043
		MWh MWh		20,238 20,913	3 3	24,753 20,238 20,913		28,997 29,963		30,043 46,986 43,335
		MWh MWh MWh		20,238 20,913 20,913	8 3 3	24,753 20,238 20,913 20,913		28,997 29,963 29,963		30,043 46,986 43,339 31,233
		MWh MWh MWh MWh		20,238 20,913 20,913 20,238	3 3 3 3	24,753 20,238 20,913 20,913 20,238		28,997 29,963 29,963 22,157		30,04: 46,986 43,333 31,233 22,15
		MWh MWh MWh MWh MWh		20,238 20,913 20,913 20,938 12,732	3 3 3 2	24,753 20,238 20,913 20,913 20,913 20,238 12,732		28,997 29,963 29,963 22,157 12,732		30,043 46,986 43,333 31,233 22,157 12,732
		MWh MWh MWh MWh		20,238 20,913 20,913 20,238	3 3 3 3 2 3	24,753 20,238 20,913 20,913 20,238		28,997 29,963 29,963 22,157		30,043 46,986 43,333 31,233 22,157 12,732 3,923 2,063
VERAGE)		MWh MWh MWh MWh MWh MWh	yr	20,238 20,913 20,913 20,913 20,238 12,732 3,923	8 3 3 8 2 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923		28,997 29,963 29,963 22,157 12,732 3,923		30,043 46,986 43,335 31,233 22,157 12,732 3,923
VERAGE)		MWh MWh MWh MWh MWh MWh GWh /	-	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134. 7	3 3 3 3 2 2 3 3 3 1	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1		28,997 29,963 29,963 22,157 12,732 3,923 2,063		30,043 46,986 43,335 31,233 22,157 12,732 3,923 2,063
VERAGE)		MWh MWh MWh MWh MWh GWh/ ENERGY Ur	-	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 IDER MINIMUM (FI 16-Hour	3 3 2 3 3 3 1 RM) FLOV	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour		30,043 46,986 43,335 31,233 22,157 12,732 3,923 2,063 200.8 4-Hour
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ CHRERG Ur MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134 .1 IDER MINIMUM (FI 16-Hour 4,513	3 3 2 3 3 3 1 RM) FLOV 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513		30,043 46,986 43,335 31,233 22,155 12,732 3,923 2,063 200.8
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ CENERG Ur MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134 .1 IDER MINIMUM (FI 16-Hour 4,513	3 3 2 3 3 3 1 RM) FLOV 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0		30,043 46,986 43,333 31,233 22,155 12,732 3,925 2,065 200.8 4-Hour
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ CENERGY Ur MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134 .1 IDER MINIMUM (FI 16-Hour 4,513	3 3 2 3 3 3 1 RM) FLOV 3 0 0	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0		30,043 46,986 43,333 31,233 22,155 12,732 3,925 2,065 200.8 4-Hour 4,515
VERAGE)	,	MWh MWh MWh MWh MWh GWh/ GWh/ CENERG Ur MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134 .1 IDER MINIMUM (FI 16-Hour 4,513	3 3 2 3 3 3 1 RM) FLOV 3 0 0 0	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0		30,04: 46,980 43,33: 31,23: 22,15 12,73: 3,92: 2,06: 200. 4-Hour
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134. 7 IDER MINIMUM (FI 16-Hour 4,513 (0) 3,190 22,447 20,238	3 3 2 2 3 3 1 RM) FLOV 3 0 0 0 7 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 0 3,190 22,447 28,997		30,04: 46,980 43,333 31,233 22,15 12,733 3,923 2,063 200. 4-Hour 4,513 (0 3,190 22,44 43,125
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913	3 3 2 2 3 3 1 RM) FLOV 3 3 0 0 0 7 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963		30,04: 46,980 43,333 31,233 22,15 12,733 3,923 2,063 200. 4-Hour 4,513 (0 3,190 22,44 43,129 43,473
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ GWh GWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913	3 3 2 2 3 3 1 RM) FLOV 3 3 0 0 7 7 8 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963		30,04: 46,980 43,333 31,233 22,15 12,733 3,923 2,063 200. 200. 4-Hour 4,511 (0 3,190 22,44 43,129 43,473 32,004
VERAGE)		MWh MWh MWh MWh MWh MWh GWh/ GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470	3 3 2 2 3 3 1 RM) FLOV 3 3 0 0 7 8 3 3 3 0	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913 20,913 15,470		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 29,963 15,470		30,04: 46,980 43,333 31,233 22,15 12,733 3,923 2,063 200. 200. 4-Hour 4,511 (0 3,190 22,44 43,129 43,475 32,004 15,470
VERAGE)		MWh MWh MWh MWh MWh GWh/ GWh/ GWh GWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,365	3 3 3 2 3 3 3 1 RM) FLOV 3 3 5 5 7 8 3 3 5 9	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913 15,470 12,369		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 15,470 12,369		30,04: 46,98i 43,33: 22,15 12,73: 3,92: 2,06i 200. 4-Hour 4,51: 3,19i 22,44i 43,12i 43,47i 32,00i 15,47i 12,36i
		MWh MWh MWh MWh MWh MWh GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN its	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,395	3 3 3 2 3 3 3 1 RM) FLOV 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913 20,913 15,470		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 15,470 12,369 2,836 1,395		30,04: 46,98(43,33: 31,23: 22,15 12,73: 3,92: 2,06: 200. 4-Hour 4,51: 3,19(22,44' 43,12: 43,47: 32,00(15,47) 12,36: 2,83: 1,39:
IVERAGE)		MWh MWh MWh MWh MWh MWh GWh/ GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UN its	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836	3 3 3 2 3 3 3 1 RM) FLOV 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913 15,470 12,369 2,836		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 15,470 12,369 2,836		30,04 46,98 43,33 31,23 22,15 12,73 3,92 2,06 200. 4-Hour 4,51 3,19 22,44 43,12 43,47 32,00 15,47 12,36 2,83 1,39
		MWh MWh MWh MWh MWh MWh GWh/ CENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	Y OUTPUT UN its	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134 .7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,399 124.3	3 3 3 2 3 3 3 1 RM) FLOV 3 3 3 0 0 7 8 3 3 0 9 6 5 5 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,395 124.3		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 15,470 12,369 2,836 1,395		30,04 46,98 43,33 31,23 22,15 12,73 3,92 2,06 200. 4-Hour 4,51 3,19 22,44 43,12 43,47 32,00 15,47 12,36 2,83 1,39
IRM)		MWh MWh MWh MWh MWh GWh/ ENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	Y its CAPACITY its	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,399 124.3 AND ENERGY CO 16-Hour	3 3 3 2 3 3 3 1 RM) FLOV 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 15,470 12,369 2,836 1,395 124.3 ICS 12-Hour		28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 29,963 15,470 12,369 2,836 1,395 1,51.1 8-Hour		30,04 46,98 43,33 31,23 22,15 12,73 3,92 2,06 200. 4-Hour 4,51 3,19 22,44 43,12 43,47 32,00 15,47 12,36 2,83 1,39 180. 4-Hour
IRM) dable Cap	acity	MWh MWh MWh MWh MWh MWh GWh/ ENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	yr CAPACITY its \$	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,399 124.3 AND ENERGY CO 16-Hour 10,696,000	3 3 3 2 3 3 1 RM) FLOV 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 15,470 12,369 2,836 1,395 124.3 ICS 12-Hour 8,022,000	\$	28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 29,963 15,470 12,369 2,836 1,395 151.1 8-Hour 6,299,000	\$	30,04 46,98 43,33 31,23 22,15 12,73 3,92 2,06 200. 4-Hour 4,51 3,19 22,44 43,12 43,47 32,00 15,47 12,36 2,83 1,39 180. 4-Hour 4,602,00
IRM)	acity	MWh MWh MWh MWh MWh GWh/ ENERGY Ur MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	yr CAPACITY its \$	20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.7 IDER MINIMUM (FI 16-Hour 4,513 (0) 22,447 20,238 20,913 20,913 15,470 12,369 2,836 1,399 124.3 AND ENERGY CO 16-Hour 10,696,000 7,611,000	3 3 3 2 3 3 3 1 RM) FLOV 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	24,753 20,238 20,913 20,913 20,238 12,732 3,923 2,063 134.1 V CONDTIONS 12-Hour 4,513 0 0 3,190 22,447 20,238 20,913 15,470 12,369 2,836 1,395 124.3 ICS 12-Hour	\$	28,997 29,963 29,963 22,157 12,732 3,923 2,063 168.2 8-Hour 4,513 0 0 3,190 22,447 28,997 29,963 29,963 29,963 15,470 12,369 2,836 1,395 1,51.1 8-Hour	\$	30,04 46,98 43,33 31,23 22,15 12,73 3,92 2,06 200. 4-Hour 4,51 3,19 22,44 43,12 43,47 32,00 15,47 12,36 2,83 1,39 180. 4-Hour
	E ha Jan 0.4 0.4 0.4 a m Operati pply Level a ngth ce, Bonds, aration truction W Forebay stem tion mission Subtotal) f Subtotal) f Subtotal) DVERNIGI	E 55.12 North Coast ha 410 Jan Feb 0.4 0.4 0.4 0.1 ume m Operating Level pply Level a ngth ce, Bonds, Overhead, Contr aration truction Water Management Forebay rstem tion mission Subtotal) f Subtotal)	E 55.12 North Coast ha 410 ESTIMA Jan Feb Mar A 0.4 0.4 0.4 1 0.4 0.1 0.4 1 MW MW m m ³ /s ume m ³ m Operating Level m a m ² km ngth km km ce, Bonds, Overhead, Contractor's Profits aration truction Water Management Forebay stem tion mission Subtotal) f Subtotal) DVERNIGHT CAPITAL COST (2% of Capital) sts (\$0.005/kWh) DPERATING COST ENEF	E 55.12 North Coast ha 410 ESTIMATED MONTHI Jan Feb Mar Apr Ma 0.4 0.4 0.4 1.6 8: 0.4 0.1 0.4 1.6 5: MW MW m ³ /s ume m ³ m Operating Level m poly Level m a m ² km ngth km km Station s ree, Bonds, Overhead, Contractor's Profits s aration \$ Forebay \$ sterm \$ Subtotal) \$	E 55.12 North Coast ha 410 ESTIMATED MONTHLY FLOWS TO RES Jan Feb Mar Apr May Jun 0.4 0.4 0.4 0.4 1.6 8.3 15.4 0.4 0.1 0.4 1.6 5.9 14.2 DESIGN PARAMETI MW 20 MW 20 MW 20 m 507 m ³ s 7 1.4 urme m ³ 4,322,500 m ³ 2,878,000 m Operating Level m 12 orgh km 15 CFRD m 123 a m ² 569,000 km 10 rgth km 51 km 51 k	E 55.12 Bestimate North Coast Mean An ha 410 Bestimate May Jun Jul Jul 0.4 0.4 0.4 1.6 5.9 14.2 13.8 Design PARAMETERS 16-Hour MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m 507 m ³ /s 7 1 1.4 Unit 20 MW 28 m ³ /s 7 1 1.4 Unit 20 MW 28 m ³ /s 7 1 1.4 Unit 20 MW 28 m ³ /s 7 1 1.4 Unit 20 MW 28 m ³ /s 7 1 1.4 Unit 20 MW 28 m ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 28 M ³ /s 7 1 1.4 Unit 20 MW 1 0 MW 0 0 MW 1 0	E 55.12 North Coast 410 Estimated Mean Annual Unit Mean Annual Discharge (MA a Intermediate a Feb Mar Apr May Jun Jul Aug Jan Feb Mar Apr May Jun Jul Aug 0.4 0.4 0.4 1.6 6.3 15.4 13.8 10.2 0.4 0.1 0.4 1.6 5.9 14.2 13.8 10.2 0.4 0.1 0.4 1.6 5.9 14.2 13.8 10.2 0.4 0.1 0.4 1.6 5.9 14.2 13.8 10.2 0.4 0.1 0.4 1.6 5.9 14.2 12 12 0.7 7 7 7 7 7 16.10ur 12.10ur 13.22.500 13.22.500 13.22.500 13.22.500 12.40ur 14 14 14 14 14 14 14 14 14 14 14 14 14 </td <td>E 55.12 Estimated Mean Annual Unit Runoff North Coast 410 ESTIMATED MONTHLY FLOWS TO RESERVOIR/INTAKE (m³/s) ESTIMATED MONTHLY FLOWS TO RESERVOIR/INTAKE (m³/s) 0.4 0.4 0.4 1.6 8.3 15.4 13.8 9.9 7.3 0.4 0.1 0.4 1.6 5.9 14.2 13.8 10.2 5.1 DESIGN PARAMETERS UESIGN PARAMETERS UESIGN PARAMETERS 16-Hour 12-Hour 12-Hour 12-Hour 12-Hour m 5607 5607 m³/s 7 7 7 m³/s 1.4 1.4 Uume m³ 4.322,500 4.322,500 m 0.perating Level m 12 12 pply Level m 15 15 a m² 569,000 2.878,000 m 0.perating Level m 12 12 pply Level m 15 15 a m² 569,000 569,000 m³ 51 51 51 tkm 14 14 ESTIMATED CAPITAL COSTS Forebay \$ 4,901,000 \$ 341,004,000 \$ stem \$ 22,895,000 \$ 22,895,000 \$ stem \$ 39,739,000 \$ 39,739,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 28,876,000 \$ stem \$ 1,099,000 \$ 4,901,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 28,876,000 \$ stem \$ 24,890,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 24,870,000 \$ stem \$ 23,927,000 \$ 4,901,000 \$ stem \$ 23,927,000 \$ 4,901,000 \$ stem \$ 24,410,000 \$ 4,901,000 \$ stem \$ 23,927,000 \$ 213,927,000 \$ stem \$ 155,019,000 \$ 4,901,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 161,000 \$ 124,000 \$ 124,000 \$ stem \$ 161,000 \$ 124,000 \$ 124,000 \$ stem \$ 155,019,000 \$ 124,000 \$ 124,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 161,000 \$</td> <td>E 55.12 Estimated Mean Annual Discharge (MAD) ha 410 Mean Annual Discharge (MAD) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan O.4 0.4 1.6 8.9 14.2 13.8 9.9 7.3 4.0 MW 2.0 2.7 4.0 4.0 Mor 2.0 2.0 3.9 ume m³ 4.322.500 4.322.500 4.322.500 4.322.500 4.322.500 mo 123 123 123 123 123 123 123 a m² 569,000 <th< td=""><td>E 51.2 Estimated Mean Annual Unit Ruonf Mean Annual Unit Ruonf Mean Annual Discharge (MAD) m³/s ^M/s ^M</td></th<></td>	E 55.12 Estimated Mean Annual Unit Runoff North Coast 410 ESTIMATED MONTHLY FLOWS TO RESERVOIR/INTAKE (m ³ /s) ESTIMATED MONTHLY FLOWS TO RESERVOIR/INTAKE (m ³ /s) 0.4 0.4 0.4 1.6 8.3 15.4 13.8 9.9 7.3 0.4 0.1 0.4 1.6 5.9 14.2 13.8 10.2 5.1 DESIGN PARAMETERS UESIGN PARAMETERS UESIGN PARAMETERS 16-Hour 12-Hour 12-Hour 12-Hour 12-Hour m 5607 5607 m ³ /s 7 7 7 m ³ /s 1.4 1.4 Uume m ³ 4.322,500 4.322,500 m 0.perating Level m 12 12 pply Level m 15 15 a m ² 569,000 2.878,000 m 0.perating Level m 12 12 pply Level m 15 15 a m ² 569,000 569,000 m ³ 51 51 51 tkm 14 14 ESTIMATED CAPITAL COSTS Forebay \$ 4,901,000 \$ 341,004,000 \$ stem \$ 22,895,000 \$ 22,895,000 \$ stem \$ 39,739,000 \$ 39,739,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 28,876,000 \$ stem \$ 1,099,000 \$ 4,901,000 \$ stem \$ 4,901,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 28,876,000 \$ stem \$ 24,890,000 \$ 4,901,000 \$ stem \$ 24,841,000 \$ 24,870,000 \$ stem \$ 23,927,000 \$ 4,901,000 \$ stem \$ 23,927,000 \$ 4,901,000 \$ stem \$ 24,410,000 \$ 4,901,000 \$ stem \$ 23,927,000 \$ 213,927,000 \$ stem \$ 155,019,000 \$ 4,901,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 213,927,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 124,000 \$ 4,950,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 161,000 \$ 124,000 \$ 124,000 \$ stem \$ 161,000 \$ 124,000 \$ 124,000 \$ stem \$ 155,019,000 \$ 124,000 \$ 124,000 \$ stem \$ 155,019,000 \$ 152,019,000 \$ stem \$ 161,000 \$	E 55.12 Estimated Mean Annual Discharge (MAD) ha 410 Mean Annual Discharge (MAD) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan Feb Mar Apr May Jun Jul Aug Sep Oct Jan O.4 0.4 1.6 8.9 14.2 13.8 9.9 7.3 4.0 MW 2.0 2.7 4.0 4.0 Mor 2.0 2.0 3.9 ume m ³ 4.322.500 4.322.500 4.322.500 4.322.500 4.322.500 mo 123 123 123 123 123 123 123 a m ² 569,000 <th< td=""><td>E 51.2 Estimated Mean Annual Unit Ruonf Mean Annual Unit Ruonf Mean Annual Discharge (MAD) m³/s ^M/s ^M</td></th<>	E 51.2 Estimated Mean Annual Unit Ruonf Mean Annual Unit Ruonf Mean Annual Discharge (MAD) m ³ /s ^M

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET ANUDOL CREEK (B)

					BASIC	SITE PARAMET	ERS				Prir	nt: May/31/18 14:04:
Northing	N	-129.53						nt Area at Intake			km ²	ç
Easting	E	55.17					Estimated	I Mean Annual Unit	Runoff		L/s/km ²	7
Region		North Coast					Mean Ani	nual Discharge (MA	D)		m³/s	6
Estimated Footprint	ha	380										
			ESTI	MATED MO		LOWS TO RESI	ERVOIR/II	NTAKE (m ³ /s)				
Month	Jan 0.6	Feb 0.5	Mar 0.6	Apr 2.2	May 11.8	Jun 21.8	Jul 19.5	Aug 14.0	Sep 10.3	Oct	Nov 1.8	Dec 0.9
Average Firm (Low Flow)	0.0	0.5	0.0	2.2	8.4	21.8	19.5	14.0	7.2	5.7 5.6	1.0	0.9
()		-		-							-	
					-	GN PARAMETE 6-Hour	-	12-Hour		8-Hour		4-Hour
Dependable Capacity	,		M	N	'	20		27		40		80
Installed Capacity			M	N		21		28		41		83
Gross Head			m	ı.		245		245		245		245
Design Flow, Qd MAD Multiplier at Qd			m³	/s		10 1.5		13 2.0		20 3.0		40 6.0
Reservoir Storage Vol	lume		m³	5		9,510,500		9,510,500		9,510,500		9,510,500
Live Storage Volume	June		m ³			6,301,000		6,301,000		6,301,000		6,301,000
Dam Height at Minimu	um Operati	ng Level	m			13		13		13		13
Dam Height at Full Su	upply Level		m			21		21		21		21
Dam Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length	~~		m m²	2		96 701 000		96 701 000		96 701 000		96 701 000
Reservoir Surface Are Penstock Length	ca		m km			791,000 5		791,000 5		791,000 5		791,000 5
Transmission Line Lei	ngth		km			45		45		45		45
Access Road Length			km	ı		8		8		8		8
						TED CAPITAL C						
Mob, Demob, Insuran	ice Bonde	Overhead Contro	actor's Profite		1 \$	6-Hour 24,048,000	\$	12-Hour 27,132,000	\$	8-Hour 33,020,000	\$	4-Hour 49,608,00
Access and Site Prepa			actor 5 FIUIIIS		ծ Տ	17,768,000	э \$	17,768,000	э \$	17,768,000		49,608,00
Cofferdams and Cons		ater Management			\$	827,000	\$	827,000	\$	827,000		827,00
Intake, Headrace, and	d Forebay	-			\$	1,672,000	\$	2,230,000	\$	3,345,000	\$	6,690,00
Dam Construction					\$	6,386,000	\$	6,386,000	\$	6,386,000		6,386,00
Water Conveyance Sy Powerhouse Construct					\$ ¢	25,065,000 21,191,000	\$ \$	29,432,000 28,255,000	\$ \$	37,053,000 42,382,000		55,610,00 84,765,00
Switchyard and Trans					ֆ Տ	23,284,000	э \$	23,629,000	э \$	42,382,000 24,319,000		26,387,00
SUB-TOTAL					\$	120,241,000	\$	135,659,000	\$	165,100,000		248,041,00
EPCM Costs (8% of	f Subtotal)				\$	9,619,000	\$	10,853,000	\$	13,208,000	\$	19,843,00
Contingency (30% c			-		\$	36,072,000	\$	40,698,000	\$	49,530,000	\$	74,412,00
TOTAL ESTIMATED	OVERNIG	HI CAPITAL COS) [\$	165,932,000	\$	187,210,000	\$	227,838,000	\$	342,296,00
				ESTI		NNUAL OPERA 6-Hour		TS 12-Hour		8-Hour		4-Hour
Fixed Operating Costs	s (2% of Ca	apital)			\$	3,319,000	\$	3,744,000	\$	4,557,000	\$	4-noui 6,846,00
Variable Operating Co	osts (\$0.00	5/kWh)			\$	491,000	\$	581,000	\$	681,000	\$	693,00
TOTAL ESTIMATED	OPERATIN	IG COST			\$	3,810,000	\$	4,325,000	\$	5,238,000	\$	7,539,00
Month			E	NERGY OU Units		DER AVERAGE 6-Hour		ONDTIONS 12-Hour		8-Hour		4-Hour
Jan			M	Nh	-	4,395		4,395		4,395		4,39
Feb				Nh		0		0		0		
Mar				Nh		0		0		0		
Apr May				Nh		4 004		1 001		4 0 0 4		4.00
Jun			K/A	/vn		1,261 19,230		1,261 21,769		1,261 21 769		
				Nh Nh		1,261 19,230 14,894		1,261 21,769 19,858		21,769		21,76
			M\ M\	Nh Nh		19,230 14,894 15,390		21,769 19,858 20,520		21,769 29,788 29,650		21,76 32,14 29,65
Aug			M\ M\ M\	Wh Wh Wh		19,230 14,894 15,390 15,390		21,769 19,858 20,520 20,520		21,769 29,788 29,650 21,370		21,76 32,14 29,65 21,37
Aug Sep			M\ M\ M\	Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894		21,769 19,858 20,520 20,520 15,160		21,769 29,788 29,650 21,370 15,160		21,76 32,14 29,65 21,37 15,16
Aug Sep Oct			M\ M\ M\ M\	Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712		21,769 19,858 20,520 20,520 15,160 8,712		21,769 29,788 29,650 21,370 15,160 8,712		21,76 32,14 29,65 21,37 15,16 8,71
Jul Aug Sep Oct Nov Dec			M\ M\ M\ M\ M\	Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411		21,769 19,858 20,520 20,520 15,160		21,769 29,788 29,650 21,370 15,160		1,26 21,76 32,14 29,65 21,37 15,16 8,71 2,68 1,41
Aug Sep Oct Nov Dec	AVERAGE)		M\ M\ M\ M\ M\ M\	Wh Nh Nh Nh Nh Nh		19,230 14,894 15,390 15,390 14,894 8,712 2,684		21,769 19,858 20,520 20,520 15,160 8,712 2,684		21,769 29,788 29,650 21,370 15,160 8,712 2,684		21,76 32,14 29,65 21,37 15,16 8,71 2,68
Aug Sep Oct Nov Dec ENERGY OUTPUT (A	AVERAGE)		M\ M\ M\ M\ M\ G \	Wh Wh Wh Wh Wh Wh/yr RGY OUTP		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2		21,76 32,14 29,65 21,37 15,16 8,71 2,68 1,41 138
Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF	Wh Wh Wh Wh Wh Wh/yr RGY OUTP Units Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411		21,76 32,14 29,65 21,37 15,16 8,71 2,68 1,41
Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF	Wh Wh Wh Wh Wh Wh/yr Chyr Units Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0		21,76 32,14 29,65 21,37 15,16 8,71 2,68 1,41 138 4-Hour
Aug Sep Dot Sec ENERGY OUTPUT (A Month Jan Feb Mar	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF M\ M\ M\	Wh Wh Wh Wh Wh Wh/yr Chits Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0 0		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0		21,76 32,14 29,65 21,37 15,16 8,7 ⁻ 2,66 1,4 ⁻ 138 4-Hour 4,30
Aug Sep Dot Sec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF	Wh Wh Wh Wh Wh Wh/yr Vh/yr Units Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914		21,76 32,14 29,65 21,33 15,16 8,7 ⁷ 2,66 1,4 138 4-Hour 4,30
Aug Sep Dot Sec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May	AVERAGE)	,	M\ M\ M\ M\ M\ M\ G\ ENEF M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh/yr Chits Wh Wh Wh		19,230 14,894 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914 16,571		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0 0 914 16,571		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914 16,571		21,76 32,14 29,65 21,33 15,16 8,7 ⁻ 2,66 1,4 138 4-Hour 4,30 9 ⁻ 16,5 ⁻
Aug Sep Dot Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun	AVERAGE)	,	M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914		21,70 32,14 29,63 21,3 15,10 8,7 2,66 1,4 138 4-Hour 4,30 9 16,5 29,5
Aug Sep Dot Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jun Jul Aug	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914 16,571 14,894 15,390 15,390		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914 16,571 29,510 29,748 21,897		21,76 32,14 29,65 21,33 15,16 8,7' 2,66 1,4' 138 4-Hour 4,30 9' 16,55 29,5' 29,74 21,85
Aug Sep Dot Sec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jun Jul Aug Sep	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 914 16,571 14,894 15,390 15,390 10,585		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585		21,70 32,14 29,63 21,3 15,10 8,7' 2,66 1,4 138 4-Hour 4,30 9 16,5 29,5 29,7 21,83 10,55
Aug Sep Dot Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Man Feb Man Feb Mar Apr May Jun Jul Aug Sep Dot	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 914 16,571 14,894 15,390 15,390 10,585 8,463		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585 8,463		21,74 32,14 29,63 21,33 15,14 8,7 2,66 1,4 138 4-Hour 4,34 4-Hour 9 16,5 29,5 29,7 21,83 10,56 8,44
Aug Sep Dot Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Man Feb Man Feb Mar Apr May Jun Jul Aug Sep Dot Nov	AVERAGE)		M\ M\ M\ M\ M\ M\ G\ G\ ENEF ENEF (M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M	Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 914 16,571 14,894 15,390 15,390 10,585 8,463 1,941		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463 1,941		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585 8,463 1,941		21,7/ 32,1- 29,6 21,3 15,1 8,7 2,6 1,4 138 4-Hour 4,3 9 16,5 29,5 29,7 21,8 10,5 8,4 1,9
Aug Sep Doct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun Jul Sep Doct Nov Dec			M\ M\ M\ M\ M\ M\ G\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh		19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 914 16,571 14,894 15,390 15,390 10,585 8,463		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585 8,463		21,7 32,1 29,6 21,3 15,1 8,7 2,6 1,4 138 4-Hour 4,3 9 16,5 29,5 29,7 21,8 10,5 8,4 1,9 9 9
Aug Sep Dot Nec SNERGY OUTPUT (A Month an Seb Mar Agr May un ul Sep Dot Iov			M\ M\ M\ M\ M\ M\ G\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr COTP Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1	19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 914 16,571 14,894 15,390 15,390 10,585 8,463 1,941 954		21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 7 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463 1,941 954 104.6		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585 8,463 1,941 954		21,7 32,1 29,6 21,3 15,1 8,7 2,6 1,4 13 8 4-Hour 4,3 9 9 16,5 29,5 29,7 21,8 10,5 8,4 1,9 9 9
Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month an Seb Mar Mar May un ul Aug Sep Dot Nov Dec ENERGY OUTPUT (F Metric	FIRM)		M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 ACITY AN 1	19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914 16,571 14,894 15,390 10,585 8,463 1,941 954 89.4 ID ENERGY COS 6-Hour	ST METRI	21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463 1,941 954 104.6 CS 12-Hour		21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914 16,571 29,510 29,748 21,897 10,585 8,463 1,941 954 124.9 8-Hour		21,7 32,1 29,6 21,3 15,1 8,7 2,6 1,4 138 4-Hour 4,3 9 9 16,5 29,5 29,7 21,8 10,5 8,4 1,9 9 9 12 4
Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun Jul Aug Sep Dot Avy Dec ENERGY OUTPUT (F Metric Capacity Cost, Depen	FIRM)	acity	M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 ACITY AN	19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914 16,571 14,894 15,390 10,585 8,463 1,941 954 89.4 ID ENERGY COS 6-Hour 8,297,000	ST METRI	21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463 1,941 954 104.6 CS 12-Hour 7,020,000	\$	21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 914 16,571 29,510 29,748 21,897 10,585 8,463 1,941 954 124.9 8-Hour 5,696,000	\$	21,7 32,1- 29,6 21,3 15,1 8,7 2,6 1,4 138 4-Hour 4,3 9 16,5 29,5 29,7 21,8 10,5 8,4 1,9 9 124 4-Hour 4,279,0
Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (F	FIRM) ndable Cap	acity	M\ M\ M\ M\ M\ M\ G\ ENEF ENEF M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\ M\	Wh Wh Wh Wh Wh Wh Vh/yr Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 ACITY AN 1	19,230 14,894 15,390 15,390 14,894 8,712 2,684 1,411 98.3 R MINIMUM (FIR 6-Hour 4,301 0 0 914 16,571 14,894 15,390 10,585 8,463 1,941 954 89.4 ID ENERGY COS 6-Hour	ST METRI	21,769 19,858 20,520 20,520 15,160 8,712 2,684 1,411 116.3 CONDTIONS 12-Hour 4,301 0 0 914 16,571 19,858 20,520 20,520 10,585 8,463 1,941 954 104.6 CS 12-Hour	\$	21,769 29,788 29,650 21,370 15,160 8,712 2,684 1,411 136.2 8-Hour 4,301 0 0 914 16,571 29,510 29,748 21,897 10,585 8,463 1,941 954 124.9 8-Hour	\$	21,74 32,14 29,63 21,33 15,14 8,7 2,66 1,4 138 4-Hour 4,34 9 16,5 29,5 29,7 21,84 10,55 8,44 1,9 9 9 124

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SKEENA RIVER

				BASIC	SITE PARAMETE	RS				Prin	:: May/31/18 14:04:59
N	-127.96			-	(Catchment				km ²	12,304
Е	55.79										29
ha					r	Mean Ann	ual Discharge (MA	.D)		m³/s	353.3
na	1,190										
lan	Tab						· · /	S	Oct	Nov	Dee
	Feb 41.7				Jun 1150.5	Jui 795.6		Sep 305.9		128.1	Dec 67.4
59.5	41.7	43.8	91.3	787.0	1150.5	795.6	471.4	305.9	277.8	128.1	67.4
				DEC		6					
				-		-	2-Hour		8-Hour		4-Hour
/			MW		20		27		40		80
											133 21
											21 748
			11170		1.3		1.3		1.3		2.1
olume			m ³		89,174,000		89,174,000		89,174,000		89,174,000
					47,939,000		47,939,000		47,939,000		47,939,000
											13 21
upply Level			m								RCC
			m		110		110		110		110
ea			m ²		6,067,000		6,067,000		6,067,000		6,067,000
nath			km		0		0		0		0
ngn			km km		90 23		90 23		90 23		90 23
				FOTIM		Nete					
							2-Hour		8-Hour		4-Hour
	, Overhead, Contra	actor's Pro	fits	\$	95,319,000	\$	95,319,000	\$, ,	\$	126,957,000
	ator Monogomont	L									56,163,000
	ater Management	L		ծ Տ							38,858,000 123,845,000
arolobay				\$	61,586,000	\$	61,586,000	\$, ,		61,586,000
System				\$	4,416,000	\$	4,416,000	\$, ,		7,483,000
				\$							170,726,000
smission				\$ \$							49,166,000 634,784,000
f Subtotal)				\$	38,128,000	\$	38,128,000	\$			50,783,000
				\$	142,979,000	\$	142,979,000	\$		\$	190,435,000
OVERNIG	HT CAPITAL COS	ST		\$	657,703,000	\$	657,703,000	\$	657,703,000	\$	876,002,000
			ES						A 11		
ts (2% of Ca	apital)			\$	16-Hour 13,154,000	1 \$	2-Hour 13,154,000	\$		\$	4-Hour 17,520,000
osts (\$0.00	5/kWh)			\$	1,830,000	\$	1,830,000	\$	1,830,000		2,453,000
OPERATIN	NG COST			\$	14,984,000	\$	14,984,000	\$	14,984,000	\$	19,973,000
									0.110.00		4.11.0.00
			MWh		8,419	1	2-ноиг 8,419				4-Hour 8,419
			MWh		2,620		2,620		2,620		2,620
											5,805
											11,711 103,023
			MWh		56,638		56,638				95,983
			MWh		58,526		58,526		58,526		99,183
											62,481
			MWh								39,237 36,820
			MWh		16,431		16,431		16,431		16,431
			MWh		8,933 266 0		8,933 366 0				8,933 490.6
AVERAGE)			-						300.0		490.0
		E	NERGY OUT Units		ER MINIMUM (FIRM 16-Hour	,	CONDTIONS 2-Hour		8-Hour		4-Hour
					8,419		8,419		8,419		8,419
			MWh				2,620		2,620		2,620
			MWh		2,620						F 005
			MWh MWh		5,805		5,805		5,805		5,805 11 711
			MWh								5,805 11,711 103,023
			MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638		5,805 11,711 62,366 56,638		5,805 11,711 62,366 56,638		11,711 103,023 95,983
			MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526		5,805 11,711 62,366 56,638 58,526		5,805 11,711 62,366 56,638 58,526		11,711 103,023 95,983 99,183
			MWh MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526 58,526		5,805 11,711 62,366 56,638 58,526 58,526		5,805 11,711 62,366 56,638 58,526 58,526 58,526		11,711 103,023 95,983 99,183 62,481
			MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526		5,805 11,711 62,366 56,638 58,526		5,805 11,711 62,366 56,638 58,526		11,711 103,023 95,983 99,183
			MWh MWh MWh MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431		11,711 103,023 95,983 99,183 62,481 39,237 36,820 16,431
FIRM)			MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933		11,71 103,02 95,98 99,18 62,48 39,23 36,820 16,43 8,93
FIRM)			MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526 39,237 36,820 16,431 8,933 366.0		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933 366.0		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431		11,71 103,02 95,98 99,18 62,48 39,23 36,820 16,43
FIRM)			MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933 366.0		5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933		11,71 103,02 95,98 99,18 62,48 39,23 36,820 16,43 8,93
, ndable Cap			MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr CA S/MW		5,805 11,711 62,366 56,638 58,526 39,237 36,820 16,431 8,933 366.0 ND ENERGY COS 16-Hour 32,885,000	1 \$	5,805 11,711 62,366 56,638 58,526 39,237 36,820 16,431 8,933 366.0 S 2-Hour 24,664,000	\$	5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933 366.0 8-Hour 16,443,000	\$	11,71 103,02; 95,98; 99,18; 62,48 39,23; 36,820 16,43 8,93; 490.6 4-Hour 10,950,000
,			MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr CA Units		5,805 11,711 62,366 56,638 58,526 39,237 36,820 16,431 8,933 366.0 ND ENERGY COS ^T 16-Hour	1	5,805 11,711 62,366 56,638 58,526 58,526 39,237 36,820 16,431 8,933 366.0	\$ \$	5,805 11,711 62,366 56,638 58,526 39,237 36,820 16,431 8,933 366.0 8-Hour	\$ \$	11,71 103,02; 95,98; 99,18; 62,48 39,23; 36,820 16,43 8,93; 490.0
	E ha Jan 59.5 59.5 , , , , , , , , , , , , , , , , , , ,	E 55.79 North Coast ha 1,190	E 55.79 North Coast ha 1,190 The Teb Mar 59.5 41.7 43.8 59.5 41.7 43.8 41.7 41.7 43.8 41.7 41.7 43.8 41.7 41.7 41.7 41.7 41.7 41.7 41.7 41.7	E 55.79 North Coast ha Image State ha 1,190 Jan Feb Mar Apr 59.5 41.7 43.8 91.3 59.5 41.7 43.8 91.3 59.5 41.7 43.8 91.3 S9.5 41.7 43.8 91.3 Iume m MW MW m m³'s MW um Operating Level m m sa m²' M mgth km km saa m²' M saa m²' M saa m²' M km km km struction Water Management d Forebay km Km ystem ction mission Struction Cost Est s (2% of Capital) otst (\$0.005/kWh) OPERATING COST ENERGY O MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	E 55.79 North Coast ha 1,190 ESTIMATED MONTHLY Jan Feb Mar Apr May 59.5 41.7 43.8 91.3 787.0 59.5 41.7 43.8 91.3 787.0 EVENT OPERATING LEVEL MWW MW m n m ³ /s lume m ³ ////////////////////////////////////	E 55.79	E 55.79	E 55.79 Estimated Mara Annual Unit ha 1.190 ESTIMATED MONTHLY FLOWS TO RESERVOIR/INTAKE (n ¹ /s) Jan Feb Mar Apr May Jun Jul Aug 59.5 41.7 43.8 91.3 787.0 1150.5 795.6 471.4 DESIGN PARAMETERS MWW 200 12-HOUr MWW 79 79.79 m 21 21 MWW 79 79.79 m 21 21 MWW 79 79.79 m 21 21 MWW 79 79.79 m 21 21 MWW 79 79.79 m 21 21 m ³ 88,174,000 89,174,000 m 13 13 13 13 13 13 13 13 13 13 13 13 14 21 m ³ 88,174,000 89,174,000 m 21 21 m 23 88,174,000 89,174,000 10 110 10 110 10 110 10 60 m 23 23 ESTIMATED CAPITAL COSTS 10-HOUR \$ 58,95,319,000 \$ 65,183,000 s 65,183,000 \$ 65,183,000 s 66,183,000 \$ 61,586,000 s 100,742,000 \$ 100,742,000 s 100,742,000 \$ 100,742,000 s 142,979,000 \$ 13,144,000 s 142,979,000 \$ 142,400 s 142,979,000 \$ 142,979,000 of SWothal) S 142,979,000 \$ 142,979,000 OPERATING COST S 142,979,000 \$ 142,979,000 OPERATING COST S 142,979,000 \$ 142,979,000 OFENCIONES UNITS 16-HOUR 12-HOUR	E 55.79 North Coast 1,190 Estimated Mean Annual Unit Runoff Mean Annual Discharge (MAD) Jan Feb Mar A1,7 Apr 43.8 91.3 787.0 1180.5 798.6 471.4 308.9 S9.5 41.7 43.8 91.3 787.0 1180.5 798.6 471.4 308.9 WW 200 27 798.6 471.4 308.9 787.0 1180.5 798.6 471.4 308.9 MW 200 27 79 79 79 79 79 MW 201 21.1 21 71.4 308.9 MW 79 79 79 79 79 m 1.3 1.3 1.3 13 MW 79.0 80.00 80.74.00.0 80.74.00.0 ms 110 110 110 110 at 73.00 80.74.00.0 80.74.00.0 80.74.00.0 80.74.00.0 mg 110 110 10 10	E 55.79 Nort Coast 1190 Estimated Mean Annual Unit Runoff Mean Annual Discharge (MAD) Test Matter Mean Annual Discharge (MAD) Estimated Mean Annual Discharge (MAD) Jan Feb Mar Al 1,7 Mar 43.8 Mar 91.3 787.0 1150.5 785.6 471.4 305.9 277.8 S9.5 41.7 43.8 91.3 787.0 1150.5 785.6 471.4 305.9 277.8 S9.5 41.7 43.8 91.3 787.0 1150.5 785.6 471.4 305.9 277.8 MW 20 27 40 79 79 79 79 m ³ 80,174.000 69,174.000 69,174.000 69,174.000 60,67.000 60,60	E 55.7a Estimated Mean Annual Discharge (MAD) Lyskm ² ha 1,19 Estimated Mean Annual Discharge (MAD) Lyskm ² Jan Feb Mar Apr May Jun Jun Aug Sup OC Nov 58.5 41.7 43.8 91.3 787.0 1160.5 796.6 471.4 306.9 277.8 122.10 58.5 41.7 43.8 91.3 787.0 1160.5 796.6 471.4 306.9 277.8 122.10 12.1000 12.1000 12.1000 13.1 13

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

2. ALL COST ESTIMATES FOLLOW AACE CLASS 5 ESTIMATE (-50% TO +100%)

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET CLORE RIVER

				BAS		ERS				Prir	
Northing	Ν	-127.94					nt Area at Intake			km ²	77
Easting	E	54.32					I Mean Annual Unit			L/s/km ²	3
Region Estimated Footprint	ha	North Coast 500				Mean Anr	nual Discharge (MA	D)		m³/s	19.
	nu	500					*				
Month	Jan	Feb	ESTIMA Mar Ap		Y FLOWS TO RES	ERVOIR/II Jul	NTAKE (m³/s) Aug	Sep	Oct	Nov	Dec
Average	8.4	6.2	6.3 15		77.2	51.2	32.0	27.6		16.9	9.2
Firm (Low Flow)	7.2	5.0	3.7 9.	3 47.3	61.2	32.9	20.5	15.9	11.3	7.4	8.6
				DE	SIGN PARAMETE	RS					
					16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity	1		MW MW		20 35		27 35		40 52		80 103
Gross Head			m		35 117		117		117		117
Design Flow, Qd			m ³ /s		36		36		53		106
MAD Multiplier at Qd					1.8		1.8		2.8		5.5
Reservoir Storage Vo	lume		m³		14,545,500		14,545,500		14,545,500		14,545,500
Live Storage Volume	o "		m ³		8,863,000		8,863,000		8,863,000		8,863,000
Dam Height at Minimu Dam Height at Full Su			m m		22 48		22 48		22 48		22 48
Dam Type	ippiy Levei		111		CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m		219		219		219		219
Reservoir Surface Are	ea		m²		980,000		980,000		980,000		980,000
Penstock Length	un autile		km		4		4		4		4
Transmission Line Le Access Road Length	ngth		km km		66 1		66 1		66 1		66 1
				FQTI	MATED CAPITAL C	0.575					
					16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insuran		Overhead, Contra	actor's Profits	\$	45,846,000	\$	45,846,000	\$ ¢	53,849,000		76,891,000
Access and Site Prep Cofferdams and Cons		ater Management		\$ \$	18,053,000 3,128,000		18,053,000 3,128,000	\$ \$	18,053,000 3,128,000		18,053,000 3,128,000
Intake, Headrace, and		ater management		φ \$	5,883,000		5,883,000	φ \$	8,768,000		17,536,000
Dam Construction	· · · · ,			\$	48,185,000		48,185,000	\$	48,185,000	\$	48,185,000
Water Conveyance S				\$	38,210,000		38,210,000	\$	48,594,000		75,030,000
Powerhouse Construc Switchyard and Trans				\$	36,488,000 33,436,000		36,488,000 33,436,000	\$ ¢	54,380,000 34,287,000		108,759,000 36,873,000
SUB-TOTAL	5111551011			э \$	229,229,000		229,229,000	\$ \$	269,244,000		384,455,000
EPCM Costs (8% of	f Subtotal)			\$	18,338,000		18,338,000	\$	21,540,000		30,756,000
Contingency (30% c	,			\$	68,769,000	\$	68,769,000	\$	80,773,000		115,337,000
TOTAL ESTIMATED	OVERNIG	IT CAPITAL COS	Τ	\$	316,336,000	\$	316,336,000	\$	371,557,000	\$	530,548,000
				ESTIMATED	ANNUAL OPERA				0.11		4.11
Fixed Operating Costs	s (2% of Ca	apital)		\$	16-Hour 6,327,000		12-Hour 6,327,000	\$	8-Hour 7,431,000	\$	4-Hour 10,611,000
Variable Operating Co				\$	938,000		938,000	\$	1,119,000		1,230,000
TOTAL ESTIMATED	OPERATIN	IG COST		\$	7,265,000	\$	7,265,000	\$	8,550,000	\$	11,841,000
Month			ENED		UNDER AVERAGE	FLOW CO					
					16-Hour		12-Hour		8-Hour		4-Hour
Jan			Uni MWh		16-Hour 7,385		12-Hour 7,385		8-Hour 7,385	i	4-Hour 7,385
Jan Feb			Un MWh MWh		7,385 1,654		7,385 1,654		7,385 1,654		7,385 1,654
Jan Feb Mar			Un MWh MWh MWh		7,385 1,654 4,555		7,385 1,654 4,555		7,385 1,654 4,555		7,385 1,654 4,555
Jan Feb			Un MWh MWh		7,385 1,654		7,385 1,654		7,385 1,654 4,555 11,119	;	7,385 1,654 4,555 11,119
Jan Feb Mar Apr May Jun			Uni MWh MWh MWh MWh MWh MWh		7,385 1,654 4,555 11,119 29,665 24,991		7,385 1,654 4,555 11,119 29,665 24,991		7,385 1,654 4,555 11,119 42,328 37,246		7,385 1,654 4,555 11,119 47,498 54,276
Jan Feb Mar Apr May Jun Jul			Uni MWh MWh MWh MWh MWh MWh MWh		7,385 1,654 4,555 11,119 29,665 24,991 25,825		7,385 1,654 4,555 11,119 29,665 24,991 25,825		7,385 1,654 4,555 11,119 42,328 37,246 37,193		7,385 1,654 4,555 11,119 47,496 54,276 37,193
Jan Feb Mar Apr May Jun Jul Aug			Uni MWh MWh MWh MWh MWh MWh MWh MWh		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268		7,385 1,654 4,555 11,119 47,496 54,276 37,190 23,268
Jan Feb Mar Apr May Jun Jul			Uni MWh MWh MWh MWh MWh MWh MWh		7,385 1,654 4,555 11,119 29,665 24,991 25,825		7,385 1,654 4,555 11,119 29,665 24,991 25,825		7,385 1,654 4,555 11,119 42,328 37,246 37,193		7,385 1,654 4,555 11,119 47,496 54,276 37,193
Jan Feb Mar Apr May Jun Jul Aug Sep			Un MWh MWh MWh MWh MWh MWh MWh MWh		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380		7,385 1,654 4,555 11,119 47,496 54,276 37,190 23,266 19,380
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	its	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712		7,385 1,654 4,555 11,119 47,498 54,276 37,193 23,266 19,380 21,120 11,915 6,712
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	its rr	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6		7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915		7,385 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Un	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour		7,385 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246 .1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Un MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878		7,385 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246. 1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Un MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856		7,385 1,654 4,555 11,119 47,496 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246 .1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Un MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 7 CONDTIONS 12-Hour 6,878 856 2,680		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680		7,385 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246 .1 4-Hour 6,878 856 2,680
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb	AVERAGE)		Un MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Un MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856		7,388 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246. 4-Hour 6,878 856
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun	AVERAGE)		Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 7 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223,9 8-Hour 6,878 856 2,680 6,526 38,212 37,246		7,388 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246. 4-Hour 6,878 856 2,680 6,520 38,212 43,012
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul	AVERAGE)		Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223,9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870		7,388 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246. 4-Hour 6,876 856 2,680 6,520 38,212 43,012 23,870
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug	AVERAGE)		Uni MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223,9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927		7,388 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,918 6,712 246. 4-Hour 6,876 856 2,680 6,526 38,212 43,012 23,870 14,925
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul	AVERAGE)		Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223,9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870		7,388 1,654 4,555 11,119 47,498 54,276 37,193 23,268 19,380 21,120 11,915 6,712 246. 4-Hour 6,876 856 2,680 6,520 38,212 43,012 23,870
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	AVERAGE)		Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215		7,38 1,65 4,55 11,119 47,49 54,27 37,19 23,26 19,38 21,12 11,918 6,712 246. 4-Hour 6,878 856 2,680 6,526 38,212 43,012 23,870 14,922 11,177 8,229 5,218
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI its	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215 6,257		7,38 1,65- 4,55 11,119 47,49 54,27 37,19 23,26 19,38 21,12 11,919 6,712 246.
Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr <u>OUTPUT UNI</u> its	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215		7,38 1,65 4,55 11,11 47,49 54,27 37,19 23,26 19,38 21,12 11,91 6,71 246 . 4-Hour 6,87 2,68 6,52 38,21 43,01 23,87 14,92 11,17 8,22 5,21
Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI its rr CAPACITY	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3		7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215 6,257		7,38 1,65 4,55 11,11 47,49 54,27 37,19 23,26 19,38 21,12 11,91 6,71 246 . 4-Hour 6,87 2,68 6,52 38,21 43,01 23,87 14,92 111,17 8,22 5,21 6,25
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (F ENERGY OUTPUT (F	FIRM)		Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI its rr CAPACITY	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3 AND ENERGY CO 16-Hour 15,817,000	RM) FLOW	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3 CS 12-Hour 11,862,000	\$	7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223.9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215 6,257 162.1		7,38 1,65 4,55 11,11 47,49 54,27 37,19 23,26 19,38 21,12 11,91 6,71 246 . 4-Hour 6,87 85 2,68 6,52 38,21 43,01 23,87 14,92 11,17 8,22 5,21 6,25 167 . 4-Hour 8,632,00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (F	FIRM)		Un MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	rr OUTPUT UNI its rr CAPACITY its \$	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 DER MINIMUM (FIF 16-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3 AND ENERGY COS	ST METRIC	7,385 1,654 4,555 11,119 29,665 24,991 25,825 23,268 19,380 21,120 11,915 6,712 187.6 CONDTIONS 12-Hour 6,878 856 2,680 6,526 29,665 24,991 23,870 14,927 11,177 8,229 5,215 6,257 141.3 CS 12-Hour	\$	7,385 1,654 4,555 11,119 42,328 37,246 37,193 23,268 19,380 21,120 11,915 6,712 223,9 8-Hour 6,878 856 2,680 6,526 38,212 37,246 23,870 14,927 11,177 8,229 5,215 6,257 162,1		7,38 1,65 4,55 11,11 47,49 54,27 37,19 23,26 19,38 21,12 11,91 6,71 246 . 4-Hour 6,87 85 2,68 6,52 38,21 43,01 23,87 14,92 11,17 8,22 5,21 6,25 167 .

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET MORE CREEK

1			BASIC	SITE PARAMET	ERS					t: May/31/18 14:04:59
Northing N	-130.38					t Area at Intake			km ²	88
Easting E	57.03					Mean Annual Unit			L/s/km ²	7
Region	North Coast				Mean Ann	ual Discharge (MA	D)		m³/s	60.
Estimated Footprint ha	740									
				LOWS TO RESI		· /	_	0.1	N	
Month Jan Average 5.6	Feb 4.5	Mar Apr 5.1 20.0	May 105.7	Jun 195.9	Jul 174.8	Aug 126.0	Sep 92.4	Oct 51.4	Nov 16.4	Dec 8.3
Firm (Low Flow) 4.7	1.7	4.9 20.7	75.1	179.8	175.4	129.1	64.5	49.9	11.8	5.6
			DES	GN PARAMETE	RS					
				6-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity		MW		29		38		57		115
Installed Capacity Gross Head		MW m		38 34		51 34		77 34		153 34
Design Flow, Qd		m³/s		136		181		271		542
MAD Multiplier at Qd		<u>,</u>		2.2		3.0		4.5		9.0
Reservoir Storage Volume		m ³		108,429,500		108,429,500		108,429,500		108,429,500
Live Storage Volume Dam Height at Minimum Operatir	na l evel	m ³ m		64,106,000 25		64,106,000 25		64,106,000 25		64,106,000 25
Dam Height at Full Supply Level	ng Level	m		34		34		34		34
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m		151		151		151		151
Reservoir Surface Area Penstock Length		m² km		6,601,000 0		6,601,000 0		6,601,000 0		6,601,000 0
Transmission Line Length		km		13		13		13		13
Access Road Length		km		1		1		1		1
			ESTIMA	TED CAPITAL C	OSTS					
Mah Damah In D	Overbee L.C.	e starla Desfit	1	6-Hour	1	12-Hour	^	8-Hour	~	4-Hour
Mob, Demob, Insurance, Bonds, Access and Site Preparation	Overhead, Contra	actor's Profits	\$ \$	37,947,000 35,461,000	\$ \$	43,848,000 35,461,000	\$ \$	55,650,000 35,461,000		91,056,000 35,461,000
Cofferdams and Construction Wa	ater Management	t	φ \$	7,425,000	\$	7,425,000	\$ \$	7,425,000		7,425,000
Intake, Headrace, and Forebay			\$	22,444,000	\$	29,925,000	\$	44,888,000	\$	89,775,000
Dam Construction			\$	30,237,000	\$	30,237,000	\$	30,237,000		30,237,000
Water Conveyance System Powerhouse Construction			ծ Տ	1,356,000 45,098,000	\$ \$	1,808,000 60,130,000	\$ \$	2,712,000 90,195,000		5,424,000 180,390,000
Switchyard and Transmission			\$	9,766,000	\$	10,404,000	\$	11,682,000		15,513,000
SUB-TOTAL			\$	189,734,000	\$	219,238,000	\$	278,250,000		455,281,000
EPCM Costs (8% of Subtotal)			\$ \$	15,179,000 56,920,000	\$	17,539,000 65,771,000	\$	22,260,000		36,422,000
Contingency (30% of Subtotal) TOTAL ESTIMATED OVERNIGH	IT CAPITAL COS	ST	\$	261,833,000	\$ \$	302,548,000	\$ \$	83,475,000 383,985,000	\$ \$	136,584,000 628,287,000
		FST				TS				
		201	1	6-Hour	1	12-Hour		8-Hour		4-Hour
Fixed Operating Costs (2% of Ca	• •		\$	5,237,000	\$	6,051,000	\$	7,680,000	\$	12,566,000
Variable Operating Costs (\$0.005 TOTAL ESTIMATED OPERATIN			\$ \$	744,000 5,981,000	\$ \$	831,000 6,882,000	\$ \$	847,000 8,527,000		847,000 13,413,000
<u> </u>				DER AVERAGE						
Month		Units		6-Hour		2-Hour		8-Hour		4-Hour
Jan		MWh		4,528		4,528		4,528		4,528
Feb		MWh MWh		0		0 0		0		(
Mar Apr				0				0		Ĺ
May		MWh		973				973		973
,				973 26,062		973 26,062		973 26,062		26,062
Jun		MWh MWh MWh		26,062 27,588		973 26,062 36,784		26,062 39,848		26,062 39,848
Jun Jul		MWh MWh MWh MWh		26,062 27,588 28,508		973 26,062 36,784 36,751		26,062 39,848 36,751		26,062 39,848 36,751
Jun Jul Aug		MWh MWh MWh		26,062 27,588		973 26,062 36,784		26,062 39,848		26,062 39,848 36,751 26,488
Jun Jul Aug Sep Oct		MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798		973 26,062 36,784 36,751 26,488 18,791 10,798		26,062 39,848 36,751 26,488 18,791 10,798		26,062 39,848 36,751 26,488 18,791 10,798
Jun Jul Aug Sep Oct Nov		MWh MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327		973 26,062 36,784 36,751 26,488 18,791 10,798 3,327		26,062 39,848 36,751 26,488 18,791 10,798 3,327		973 26,062 39,848 36,751 26,488 18,791 10,798 3,327
Jun Jul Aug Sep Oct Nov Dec		MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798		973 26,062 36,784 36,751 26,488 18,791 10,798		26,062 39,848 36,751 26,488 18,791 10,798		26,062 39,848 36,751 26,488 18,791 10,798
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8		973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749
Jun Jul Aug Sep Oct Nov Dec		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Month Jan		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Month Jan Feb		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Month Jan Feb Mar		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Month Jan Feb Mar Apr May		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 4-Hour 4,411 0 543 19,620
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) ENERGY OUTPUT (AVERAGE) Month Jan Feb Mar Apr May Jun		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 4-Hour 4,411 (543 19,620 36,577
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) ENERGY OUTPUT (AVERAGE) Month Jan Feb Mar Apr May Jun Jul		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873		26,062 39,848 36,75 26,488 18,79 10,798 3,327 1,749 169.3 4-Hour 4,41 ⁷ (543 19,620 36,577 36,873
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Month Jan Feb Mar Apr May Jun Jul Aug		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577		26,062 39,848 36,75 26,488 18,79 10,798 3,327 1,749 169.3 4-Hour 4,41 ⁷ (543 19,620 36,57
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Morth Jan Feb Mar Apr May Jun Jul Aug Sep Oct		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490		26,062 39,848 36,75 26,488 18,79 10,798 3,327 1,749 169.3 4-Hour 4,41 ⁷ (0 543 19,620 36,577 36,873 27,142 13,120 10,490
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Morth Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490 2,406	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406		26,062 39,844 36,75 26,484 18,79 10,794 3,322 1,744 169. 4-Hour 4,41 ⁻ (543 19,620 36,57 36,87 27,142 13,120 10,490 2,400
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) ENERGY OUTPUT (AVERAGE) Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490	,	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490		26,062 39,844 36,75 26,484 18,79 10,794 3,322 1,744 169. 4-Hour 4,41 ⁻ (543 19,620 36,57 36,87 27,142 13,120 10,490
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) ENERGY OUTPUT (AVERAGE) Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1	26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490 2,406 1,183 135.0	1	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183		26,06; 39,84; 36,75 26,48; 18,79 10,79; 3,32 1,74; 169 ,3 4-Hour 4,41 ⁻ (54; 19,62; 36,57 ⁻ 36,87; 27,14; 13,12; 10,49; 2,40; 1,18;
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 PACITY AN	26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490 2,406 1,183	5T METRIC	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4		26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183		26,06; 39,84; 36,75 26,48; 18,79 10,79; 3,32 1,74; 169 ,3 4-Hour 4,41 ⁻ (54; 19,62; 36,57 ⁻ 36,87; 27,14; 13,12; 10,49; 2,40; 1,18;
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Morth Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable Capa		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 PACITY AN 1 \$	26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490 2,406 1,183 135.0 ID ENERGY COS 6-Hour 9,111,000	ST METRIC	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4 :S 2-Hour 7,896,000	\$	26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4 8-Hour 6,681,000	\$	26,06; 39,84; 36,75 26,48; 18,79 10,79; 3,32 1,74; 169 ,3 4-Hour 4,41 [°] (54; 19,62(36,57° 36,87; 27,14; 13,12(10,49) 2,400 1,18; 152 ,4 4-Hour 5,465,000
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAGE) Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun		MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 <u>PACITY AN</u> 1	26,062 27,588 28,508 26,488 18,791 10,798 3,327 1,749 148.8 R MINIMUM (FIR 6-Hour 4,411 0 0 543 19,620 27,588 28,508 27,142 13,120 10,490 2,406 1,183 135.0 ID ENERGY COS 6-Hour	ST METRIC	973 26,062 36,784 36,751 26,488 18,791 10,798 3,327 1,749 166.3 CONDTIONS 2-Hour 4,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4 :S 2-Hour	\$	26,062 39,848 36,751 26,488 18,791 10,798 3,327 1,749 169.3 8-Hour 4 ,411 0 0 543 19,620 36,577 36,873 27,142 13,120 10,490 2,406 1,183 152.4	\$	26,06; 39,84; 36,75 26,48; 18,79 10,79; 3,32; 1,74; 169 , 4-Hour 4,41 4,41 54; 19,62; 36,57; 36,87; 27,14; 13,12; 10,49; 2,40; 1,18; 152 ,-

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET BELL-IRVING RIVER

					BASI	SITE PARAMET	ERS				Prir	nt: May/31/18 14:04:5
Northing	Ν	-129.73						nt Area at Intake			km ²	93
Easting	Е	56.80					Estimated	d Mean Annual Unit	Runoff		L/s/km ²	4
Region		North Coast					Mean An	nual Discharge (MA	D)		m³/s	38.
Estimated Footprint	ha	650										
						FLOWS TO RESI		· · · ·				
Month Average	Jan 6.2	Feb 3.9	Mar 3.8	Apr 7.7	May 66.1	Jun 121.1	Jul 96.7	Aug 67.1	Sep 44.1	Oct 27.7	Nov 13.3	Dec 7.4
Firm (Low Flow)	6.2	3.9	3.8	7.7	66.1	121.1	96.7	67.1	44.1	27.7	13.3	7.4
					DES	IGN PARAMETE	De					
						16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity	iy .		MV			20		27		40		80
Installed Capacity Gross Head			MV m	N		27 43		37 43		55 43		110 43
Design Flow, Qd			m ³	/s		43 76		43 101		43 152		43 304
MAD Multiplier at Qd	ł					2.0		2.6		3.9		7.8
Reservoir Storage Vo			m ³			64,015,500		64,015,500		64,015,500		64,015,500
Live Storage Volume			m ³			39,974,000		39,974,000		39,974,000		39,974,000
Dam Height at Minim Dam Height at Full S			m m			32 43		32 43		32 43		32 43
Dam Type		51	111			CFRD		45 CFRD		43 CFRD		45 CFRD
Dam Crest Length			m			435		435		435		435
Reservoir Surface Ar	rea		m²			3,358,000		3,358,000		3,358,000		3,358,000
Penstock Length Transmission Line Le	enath		km km			0 50		0 50		0 50		0 50
Access Road Length			km			8		8		8		8
-					ESTIM	ATED CAPITAL C	OSTS					
		_				16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insural		s, Overhead, Contra	actor's Profits		\$ \$	44,893,000	\$	48,720,000	\$	56,374,000	\$	79,338,00
Access and Site Prep Cofferdams and Con		Vater Management			ծ Տ	28,947,000 4,281,000	\$ \$	28,947,000 4,281,000	\$ \$	28,947,000 4,281,000	\$ \$	28,947,00 4,281,00
Intake, Headrace, an					\$	12,562,000	\$	16,749,000	\$	25,123,000	\$	50,246,00
Dam Construction					\$	75,914,000	\$	75,914,000	\$	75,914,000	\$	75,914,00
Water Conveyance S Powerhouse Constru					\$ ¢	759,000 31,235,000	\$ \$	1,012,000 41,646,000	\$ \$	1,518,000 62,469,000	\$ \$	3,036,00 124,938,00
Switchyard and Trans					φ \$	25,872,000	э \$	26,329,000	φ \$	27,244,000	\$	29,988,00
SUB-TOTAL					\$	224,463,000	\$	243,598,000	\$	281,870,000	\$	396,688,00
EPCM Costs (8% c					\$	17,957,000	\$	19,488,000	\$	22,550,000	\$	31,735,00
Contingency (30% TOTAL ESTIMATED			т		ъ \$	67,339,000 309,759,000	\$ \$	73,079,000 336,165,000	\$ \$	84,561,000 388,981,000	\$ \$	119,006,00 547,429,00
				F0								, ,
				E91		16-Hour		12-Hour		8-Hour		4-Hour
Fixed Operating Cos					\$	6,195,000	\$	6,723,000	\$	7,780,000	\$	10,949,00
Variable Operating C TOTAL ESTIMATED					\$ \$	545,000 6,740,000	\$ \$	606,000 7,329,000	\$ \$	632,000 8,412,000	\$ \$	632,00 11,581,00
											•	
Month			EI	Units		NDER AVERAGE 16-Hour		12-Hour		8-Hour		4-Hour
Jan			MV			4,808		4,808		4,808		4,80
Feb Mar			MV MV			0		0		0		
Apr				Wh		0		0		0		
May				Vh		21,578		21,578		21,578		21,57
Jun			MV			19,756		26,342		31,521		31,52
Jul Aug				Wh Wh		20,415 18,048		26,009 18,048		26,009 18,048		26,00 18,04
Sep			MV	Wh		11,479		11,479		11,479		11,47
Oct Nov			MV MV	Wh Wh		7,450 3,462		7,450 3,462		7,450 3,462		7,45 3,46
Dec				Wh		1,990		3,462 1,990		3,462 1,990		1,99
ENERGY OUTPUT (Ξ)	GV	Vh/yr		109.0		121.2		126.3		126.
			ENEF			R MINIMUM (FIR	,					
Month Jan			MV	Units Wh		16-Hour 4,808		12-Hour 4,808		8-Hour 4,808		4-Hour 4,80
Feb			MV			+,008 0		-,008 0		4,808		4,00
Mar			MV			0		0		0		
Apr Mov				Wh Mh		0		0		0		
May Jun			MV MV			21,578 19,756		21,578 26,342		21,578 31,521		21,57 31,52
Jul				Wh		20,415		26,009		26,009		26,00
Aug			MV			18,048		18,048		18,048		18,04
Sep Oct			MV MV	Wh Wh		11,479 7,450		11,479 7,450		11,479 7,450		11,47 7,45
Nov			MV			7,450 3,462		7,450 3,462		7,450 3,462		3,46
Dec			MV	Wh		1,990		1,990		1,990		1,99
ENERGY OUTPUT ((FIRM)		GV	Vh/yr		109.0		121.2		126.3		126.
						ND ENERGY COS						
		.,	¢ (1	Units	\$	16-Hour 15,488,000	\$	12-Hour 12,606,000	\$	8-Hour 9,725,000	\$	4-Hour 6,843,00
Metric Capacity Cost. Depe	endable Ca	Dacity	3/1/									
Capacity Cost, Depe Capacity Cost, Instal	lled Capaci		\$/N	ЛVV ЛVV	\$	11,289,000	\$	9,188,000	\$	7,088,000	\$	4,988,00
Capacity Cost, Depe	lled Capaci		\$/N \$/C		↓ \$ \$							

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET NIMPKISH RIVER (A)

					BASIC	SITE PARAME	TERS				Prin	t: May/31/18 14:04:5
Northing N		-126.85					Catchme	nt Area at Intake			km ²	1,16
Easting E		50.26						d Mean Annual Unit			L/s/km ²	7
Region		Van Island					Mean An	nual Discharge (MA	D)		m³/s	66.
Estimated Footprint ha	a	380										
						FLOWS TO RES		· /				
Month Average	Jan 136.8	Feb 88.8	Mar 91.6	Apr 93.5	May 91.1	Jun 74.0	Jul 42.5	Aug 22.8	Sep 34.5	Oct 105.0	Nov 176.6	Dec 134.2
Firm (Low Flow)	43.1	86.8	91.0 98.0	95.5 96.8	119.3	67.8	28.3	11.2	57.4		54.4	64.5
(,											• · · ·	
						IGN PARAMETE		12-Hour		8-Hour		4-Hour
Dependable Capacity				MW		20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity				MW		31		31		40		81
Gross Head				m		32		32		32		32
Design Flow, Qd				m³/s		114		114		150		300
MAD Multiplier at Qd				m ³		1.7		1.7		2.3		4.5
Reservoir Storage Volum Live Storage Volume	le			m ³		26,371,980 482,000		26,371,980 482,000		26,371,980 482,000		26,371,980 482,000
Dam Height at Minimum	Operatin	a Level		m		22		22		22		22
Dam Height at Full Supp		5		m		22		22		22		22
Dam Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length				m m²		232		232		232		232
Reservoir Surface Area Penstock Length				m⁻ km		2,480,000 3		2,480,000 3		2,480,000 3		2,480,000 3
Transmission Line Lengt	:h			km		20		20		20		20
Access Road Length				km		1		1		1		1
					ESTIMA	ATED CAPITAL C	OSTS					
Mah Damah J	Der			4.0		16-Hour		12-Hour	•	8-Hour	•	4-Hour
Mob, Demob, Insurance, Access and Site Prepara		overnead, Contr	actor's Profi	เร	\$ \$	47,868,000 17,694,000		47,868,000 17,694,000	\$ \$	55,845,000 17,694,000		87,198,000 17,694,000
Cofferdams and Constru		ter Management	t		φ \$	10,003,000		10,003,000	φ \$	10,003,000		10,003,000
Intake, Headrace, and Fe			•		\$	18,813,000		18,813,000	\$	24,796,000		49,592,000
Dam Construction					\$	26,036,000		26,036,000	\$	26,036,000		26,036,000
Water Conveyance Syste					\$	70,146,000		70,146,000	\$	84,055,000		134,874,000
Powerhouse Constructio Switchyard and Transmis					¢ ¢	36,252,000 12,528,000		36,252,000 12,528,000	\$ \$	47,782,000 13,015,000		95,563,000 15,029,000
SUB-TOTAL	551011				\$	239,340,000		239,340,000	\$	279,226,000		435,989,000
EPCM Costs (8% of Su					\$	19,147,000	\$	19,147,000	\$	22,338,000		34,879,000
Contingency (30% of S			.		\$	71,802,000		71,802,000	\$	83,768,000		130,797,000
TOTAL ESTIMATED OV	ERNIGH	I CAPITAL CO	51		\$	330,289,000	\$	330,289,000	\$	385,332,000	\$	601,665,000
				EST			TING COS			0 Hour		4.1.1
Fixed Operating Costs (2	2% of Cap	oital)			\$	16-Hour 6,606,000	\$	12-Hour 6,606,000	\$	8-Hour 7,707,000	\$	4-Hour 12,033,000
Variable Operating Costs	s (\$0.005	/kWĥ)			\$	957,000	\$	957,000	\$	1,026,000	\$	1,052,000
TOTAL ESTIMATED OP	ERATING	GCOST			\$	7,563,000	\$	7,563,000	\$	8,733,000	\$	13,085,000
NA (1						NDER AVERAGE				0.11		4.11
Month Jan				Units MWh	1	1 6-Hour 17,046		12-Hour 17,046		8-Hour 19,736		4-Hour 19,736
Feb				MWh		16,019		16,019		16,019		16,019
Mar				MWh		18,321		18,321		18,321		18,321
Apr				MWh		18,109		18,109		18,109		18,109
May Jun				MWh MWh		22,074 14,329		22,074 14,329		22,074 14,329		22,074 14,329
Jul				MWh		8,506		8,506		8,506		8,506
Aug				MWh		4,561		4,561		4,561		4,561
Sep				MWh		6,688		6,688		6,688		6,688
Oct Nov				MWh MWh		21,002 22,009		21,002 22,009		21,002 29,009		21,002 34,187
NOV						22,000				26,859		26,859
				MWh		22,743		22,743		20,059		
Dec ENERGY OUTPUT (AVE	ERAGE)			MWh GWh/yr						20,839 205.2		210.4
Dec ENERGY OUTPUT (AVE	ERAGE)			GWh/yr		22,743 191.4 R MINIMUM (FIF	RM) FLOW	22,743 191.4 / CONDTIONS		205.2		
Dec ENERGY OUTPUT (AVE Month	ERAGE)		EN	GWh/yr IERGY OUT Units		22,743 191.4 R MINIMUM (FIF 16-Hour	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour		205.2 8-Hour		4-Hour
Dec ENERGY OUTPUT (AVE	ERAGE)		EN	GWh/yr		22,743 191.4 R MINIMUM (FIF	RM) FLOW	22,743 191.4 / CONDTIONS		205.2		
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar	ERAGE)		EN	GWh/yr IERGY OUT Units MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602	RM) FLOV	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602		8-Hour 8,842 15,652 19,602		4-Hour 8,842 15,652 19,602
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr	ERAGE)		EN	GWh/yr IERGY OUT Units MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740		8-Hour 8,842 15,652 19,602 18,740		4-Hour 8,842 15,652 19,602 18,740
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May	ERAGE)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583		8-Hour 8,842 15,652 19,602 18,740 27,710		4-Hour 8,842 15,652 19,602 18,740 27,710
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun	ERAGE)		EN	GWh/yr IERGY OUT Units MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740		8-Hour 8,842 15,652 19,602 18,740		4-Hour 8,842 15,652 19,602 18,740
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug	ERAGE)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250		4-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep	ERAGE)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122		4-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	ERAGE)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376		4-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep	ERAGE)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376 10,526		4-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,370 10,526
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov			EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376		4-Hour 8,842 15,652 19,602 18,74(27,710 13,132 5,660 2,250 11,122 13,370
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4		8-Hour 8.842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376 10,526 12,909		4-Hour 8,84: 15,655 19,600 18,74(27,710 13,133 5,660 2,250 11,122 13,370 10,520 12,909
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRI Metric	M)		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PACITY AI	22,743 191.4 Terminimum (Fir 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 ND ENERGY CO 16-Hour	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 CS 12-Hour		205.2 8-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376 10,526 12,909 159.5 8-Hour		4-Hour 8,84: 15,655 19,600 18,74(27,710 13,133 5,660 2,256 11,122 13,370 10,520 12,909 159 .4
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIR ENERGY OUTPUT (FIR Metric Capacity Cost, Dependal	M) ble Capa		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PACITY AI	22,743 191.4 R MINIMUM (FIF 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 ND ENERGY CO 16-Hour 16,514,000	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 CS 12-Hour 12,386,000	\$	205.2 8-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376 10,526 12,909 159.5 8-Hour 9,633,000	\$	4-Hour 8,84: 15,65: 19,60: 18,74(27,71(13,13: 5,66(2,25(11,12: 13,37(10,52(12,90) 159 ,6 4-Hour 7,521,000
Dec ENERGY OUTPUT (AVE Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIR	M) ble Capa		EN	GWh/yr ERGY OUT Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PACITY AI	22,743 191.4 Terminimum (Fir 16-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 ND ENERGY CO 16-Hour	RM) FLOW	22,743 191.4 / CONDTIONS 12-Hour 8,842 15,652 19,602 18,740 26,583 13,135 5,660 2,250 11,122 13,376 10,526 12,909 158.4 CS 12-Hour	\$	205.2 8-Hour 8,842 15,652 19,602 18,740 27,710 13,135 5,660 2,250 11,122 13,376 10,526 12,909 159.5 8-Hour	\$	4-Hour 8,84: 15,655 19,600 18,74(27,710 13,133 5,660 2,256 11,122 13,370 10,520 12,909 159 ,4

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET NIMPKISH RIVER (B)

Northing					BASIC	SITE PARAMET	ERS				Prin	t: May/31/18 14:04:59
·······	N	-127.02			2,1010	-	-	nt Area at Intake			km ²	1,75
Easting	E	50.52					Estimated	d Mean Annual Unit	Runoff		L/s/km ²	7
Region		Van Island					Mean An	nual Discharge (MA	D)		m³/s	99.
Estimated Footprint	ha	4,850										
						FLOWS TO RESE		· · · ·				
Month Average	Jan 206.1	Feb 133.8	Mar 137.9	Apr 140.9	May 137.3	Jun 111.5	Jul 64.0	Aug 34.3	Sep 52.0	Oct 158.1	Nov 265.9	Dec 202.2
Firm (Low Flow)	64.8	130.8	147.6	140.9	179.7	102.2	42.6	16.9	86.5	100.7	205.9 81.9	97.2
· · ·												
						IGN PARAMETE		12-Hour		8-Hour		4-Hour
Dependable Capacity	,		M	W		20		27		40		80
Installed Capacity			M			78		78		78		82
Gross Head			m m			54		54		54		54
Design Flow, Qd MAD Multiplier at Qd			m	-/S		171 1.7		171 1.7		171 1.7		181 1.8
Reservoir Storage Vol	lume		m	3		97,610,015		97,610,015		97,610,015		97,610,015
Live Storage Volume			m			81,931,000		81,931,000		81,931,000		81,931,000
Dam Height at Minimu	um Operati	ng Level	m			11		11		11		11
Dam Height at Full Su	upply Level		m			12		12		12		12
Dam Type Dam Crest Length						RC 307		RC 307		RC 307		RC 307
Reservoir Surface Are	22		m m ²			307 47,975,000		307 47,975,000		307 47,975,000		
Reservoir Surface Are Penstock Length	a		rn kn			47,975,000 3		47,975,000 3		47,975,000 3		47,975,000 3
Transmission Line Ler	ngth		kn			8		8		8		8
Access Road Length	-		kn	n		1		1		1		1
					ESTIMA	TED CAPITAL C	OSTS					
Mob Domeh lister		Overhead Oral	notorio Drafit			16-Hour		12-Hour	¢	8-Hour	¢	4-Hour
Mob, Demob, Insurand Access and Site Prepa		Overnead, Contr	actor's Profits		\$ \$	75,135,000 29,691,000	\$ \$	75,135,000 29,691,000	\$ \$	75,135,000 29,691,000		77,741,000 29,691,000
Cofferdams and Cons		ater Managemen	t		φ \$	15,067,000	\$	15,067,000	φ \$	15,067,000		15,067,000
Intake, Headrace, and		ator managomon			\$	28,336,000	\$	28,336,000	\$	28,336,000	\$	30,033,000
Dam Construction					\$	48,152,000	\$	48,152,000	\$	48,152,000		48,152,000
Water Conveyance Sy					\$	83,673,000	\$	83,673,000	\$	83,673,000		87,009,000
Powerhouse Construc Switchyard and Transi					\$ ¢	86,141,000 9,479,000	\$ \$	86,141,000 9,479,000	\$ \$	86,141,000 9,479,000		91,300,000 9,711,000
SUB-TOTAL	SITISSION				Ф \$	375,674,000	Ф \$	375,674,000	ъ \$	375,674,000		388,704,000
EPCM Costs (8% of	f Subtotal)				\$	30,054,000	\$	30,054,000	\$	30,054,000		31,096,000
Contingency (30% o	of Subtotal)				\$	112,702,000	\$	112,702,000	\$	112,702,000	\$	116,611,000
TOTAL ESTIMATED (OVERNIG	HT CAPITAL COS	ST		\$	518,430,000	\$	518,430,000	\$	518,430,000	\$	536,411,000
				EST		NNUAL OPERAT						
Fixed Operating Costs	s (2% of Ca	anital)			\$	16-Hour 10.369.000	\$	12-Hour 10,369,000	\$	8-Hour 10,369,000	\$	4-Hour 10,728,000
Variable Operating Costs					Ψ \$	2,319,000	\$ \$	2,319,000	φ \$	2.319.000		2,363,000
TOTAL ESTIMATED										, ,		
i i i i i i i i i i i i i i i i i i i					\$	12,688,000	\$	12,688,000	\$	12,688,000		13,091,000
<u> </u>			E	NERGY O	•	, ,			\$	12,688,000		13,091,000
Month				Units		IDER AVERAGE	FLOW CO	ONDTIONS 12-Hour	\$	8-Hour		4-Hour
Jan			M	Units Wh		IDER AVERAGE 6-Hour 37,355	FLOW CO	DNDTIONS 12-Hour 37,355	\$	8-Hour 37,355	\$	4-Hour 39,362
Jan Feb			M' M'	Units Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435	FLOW CO	DNDTIONS 12-Hour 37,355 30,435	\$	8-Hour 37,355 30,435	\$	4-Hour 39,362 30,435
Jan Feb Mar			M' M'	Units Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497	\$	8-Hour 37,355 30,435 46,497	\$	4-Hour 39,362 30,435 46,497
Jan Feb Mar Apr			M' M' M' M'	Units Wh Wh Wh Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117	\$	8-Hour 37,355 30,435 46,497 45,959 50,117	\$	4-Hour 39,362 30,435 46,497 45,959 50,117
Jan Feb Mar Apr May Jun			M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117 36,365	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365
Jan Feb Mar Apr May Jun Jul			M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587
Jan Feb Mar Apr May Jun Jul Aug			M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576
Jan Feb Mar Apr May Jun Jul Aug Sep			M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov			M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	VFRAGE		M' M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176
Jan	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' G	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	UTPUT UN	IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' G	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176 472.6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Chits Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 6-Hour 16,534	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Chrits Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 R MINIMUM (FIR 16,534 29,502	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502	\$	4-Hour 39,362 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534 29,502
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749	\$	4-Hour 39,362 30,438 46,497 45,956 50,117 36,366 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534 29,502 49,745
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Chrits Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 R MINIMUM (FIR 16,534 29,502 49,749 47,560	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560	\$	4-Hour 39,362 30,438 46,497 45,956 50,117 36,366 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534 29,502 49,748 47,560
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr RGY OUTF Units Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 R MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560	\$	4-Hour 39,362 30,438 46,497 45,956 50,117 36,366 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534 29,502 49,748 47,560 64,421
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Chrits Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 R MINIMUM (FIR 16,534 29,502 49,749 47,560	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560	\$	4-Hour 39,362 30,438 46,497 45,956 50,117 36,368 21,587 11,576 16,973 53,302 59,203 61,176 472.6 4-Hour 16,534 29,502 49,748 47,560
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Mov ENERGY OUTPUT (A Mar Apr Mar Apr May Jun Jul Aug	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710	\$	4-Hour 39,362 30,433 46,497 45,956 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176 472.6 472.6 472.6 44,42 33,335 14,365 5,710
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Mov ENERGY OUTPUT (A Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227	\$	4-Hour 39,362 30,433 46,497 45,956 50,117 36,365 21,587 11,576 16,973 53,302 59,203 61,176 472.6 472.6 472.6 44,42 33,335 14,365 5,710 28,227
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	\$	4-Hour 39,363 30,433 46,497 45,956 50,117 36,363 21,583 11,576 16,973 53,302 59,203 61,176 472.0 472.0 472.0 47560 64,42 33,333 14,363 5,710 28,227 33,940
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	AVERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713	\$	4-Hour 39,362 30,433 46,497 45,956 50,117 36,363 21,587 11,576 16,973 53,302 59,203 61,176 472.6 472.6 472.6 475,502 49,745 47,560 64,42 33,335 14,365 5,710 28,227 33,946 26,713
Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946	\$	4-Hour 39,36: 30,43: 46,49 45,95: 50,11' 36,36: 21,58 11,57(16,97: 53,30: 59,20: 61,17(472. 472. 472. 472. 47560 64,42: 33,33: 14,36: 5,710 28,22: 33,940
Jan =eb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A Dec ENERGY OUTPUT (A Month Jan =eb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0	FLOW CO	Jack Stress 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 7 7 2000000000000000000000000000000000000	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761	\$	4-Hour 39,36 30,43 46,49 45,95 50,11 36,36 21,58 11,57 16,97 53,30 59,20 61,17 472. 4-Hour 472. 4-Hour 16,53 29,50 49,74 47,56 64,42 33,33 14,36 5,711 28,22 33,94 26,71 32,76
Jan =eb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A Dec ENERGY OUTPUT (A Month Jan =eb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761	FLOW CO	Jack Stress 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 7 7 2000000000000000000000000000000000000	\$	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761	\$	4-Hour 39,36 30,43 46,49 45,95 50,11 36,36 21,58 11,57 16,97 53,30 59,20 61,17 472. 4-Hour 472. 4-Hour 16,53 29,50 49,74 47,56 64,42 33,33 14,36 5,711 28,22 33,94 26,71 32,76
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (F ENERGY OUTPUT (F	FIRM)		M' M' M' M' M' M' M' M' M' G ENEI ENEI M' M' M' M' M' M' M' M' M' M' M' M' M'	Units Wh Wh/yr Units Wh Wh <td></td> <td>IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 ID ENERGY COS 16-Hour 25,921,000</td> <td>FLOW CO</td> <td>DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 CS 12-Hour 19,441,000</td> <td>\$ </td> <td>8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 8-Hour 12,961,000</td> <td>\$</td> <td> 4-Hour 39,36: 30,43: 46,49 45,95: 50,11' 36,36: 21,58: 11,57(16,97: 53,30: 59,20: 61,17(472.0 472.0 53,30: 59,20: 61,170 472.0 53,30: 59,20: 61,170 472.0 53,30: 59,20: 61,170 16,975.000 </td>		IDER AVERAGE 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 IR MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 ID ENERGY COS 16-Hour 25,921,000	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 CS 12-Hour 19,441,000	\$ 	8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 8-Hour 12,961,000	\$	 4-Hour 39,36: 30,43: 46,49 45,95: 50,11' 36,36: 21,58: 11,57(16,97: 53,30: 59,20: 61,17(472.0 472.0 53,30: 59,20: 61,170 472.0 53,30: 59,20: 61,170 472.0 53,30: 59,20: 61,170 16,975.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (F	FIRM)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh		IDER AVERAGE 6-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 R MINIMUM (FIR 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 ID ENERGY COS 16-Hour	FLOW CO	DNDTIONS 12-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 / CONDTIONS 12-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0 CS 12-Hour		8-Hour 37,355 30,435 46,497 45,959 50,117 36,365 21,587 11,576 16,973 53,302 55,858 57,720 463.7 8-Hour 16,534 29,502 49,749 47,560 61,560 33,335 14,365 5,710 28,227 33,946 26,713 32,761 380.0	\$ 	 4-Hour 39,36; 30,43; 46,49; 45,95; 50,11; 36,36; 21,58; 11,57; 16,97; 53,30; 59,20; 61,17; 472,1 4-Hour 4-Hour 16,53; 29,50; 49,74; 47,56; 64,42; 33,33; 14,36; 5,71; 28,22; 33,94; 26,71; 32,76; 382,:

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET NANAIMO RIVER

					BASIC	SITE PARAMET	ERS				Pnn	nt: May/31/18 14:04:5
Northing	N	-123.96			2/10/0	-	-	nt Area at Intake			km ²	65
Easting	E	49.06					Estimated	Mean Annual Unit	Runoff		L/s/km ²	6
Region		Van Island					Mean Anr	nual Discharge (MA	D)		m³/s	26.
Estimated Footprint	ha	180										
Manakh	lan	Fab				LOWS TO RESE		· /	Can	Oat	May	Dee
Month Average	Jan 83.1	Feb 51.0		Apr 42.8	May 32.7	Jun 8.1	Jul 17.8	Aug 5.3	Sep 8.1	Oct 30.1	Nov 73.5	Dec 74.1
Firm (Low Flow)	46.2	22.5	35.0	21.8	58.1	8.3	23.6	7.0	6.7	17.1	52.9	14.7
					DES	GN PARAMETER	s					
					1	6-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity			MW MW			20 25		27 27		40 40		80 81
Gross Head			m			23 59		59		59		59
Design Flow, Qd			m³/s			50		55		82		165
MAD Multiplier at Qd			3			1.9		2.1		3.1		6.3
Reservoir Storage Volume	ume		m ³ m ³			15,415,688		15,415,688		15,415,688		15,415,688
Live Storage Volume Dam Height at Minimu	m Operatir	na Level	m			1,193,000 15		1,193,000 15		1,193,000 15		1,193,000 15
Dam Height at Full Sup		.9 _0.0	m			16		16		16		16
Dam Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length Reservoir Surface Area	•		m m ²			192 1,231,000		192 1,231,000		192 1,231,000		192 1,231,000
Penstock Length	a		km			1,231,000 4		1,231,000		1,231,000		1,231,000
Transmission Line Len	igth		km			7		7		7		7
Access Road Length			km			1		1		1		1
						TED CAPITAL CO						
Mob, Demob, Insuranc	e Bonds	Overhead Contr	ractor's Profits		1 \$	6-Hour 30,289,000	\$	12-Hour 31,865,000	\$	8-Hour 40,903,000	\$	4-Hour 66,195,00
Access and Site Prepa					э \$	9,881,000	э \$	9,881,000	э \$	9,881,000		9,881,00
Cofferdams and Const	ruction Wa	ater Managemen	t		\$	4,423,000	\$	4,423,000	\$	4,423,000	\$	4,423,00
Intake, Headrace, and Dam Construction	Forebay				\$	8,318,000 11,639,000	\$ \$	9,081,000 11,639,000	\$	13,622,000 11,639,000		27,244,00 11,639,00
Water Conveyance Sy	stem				ֆ Տ	53,349,000	э \$	56,283,000	\$ \$	72,396,000		113,441,00
Powerhouse Construct					\$	27,162,000	\$	29,655,000	\$	44,482,000		88,964,00
Switchyard and Transn	nission				\$	6,382,000	\$	6,496,000	\$	7,168,000		9,187,00
SUB-TOTAL EPCM Costs (8% of	Subtotal)				\$ \$	151,443,000 12,115,000	\$ \$	159,323,000 12,746,000	\$ \$	204,514,000 16,361,000		330,974,00 26,478,00
Contingency (30% of					ֆ Տ	45,433,000	\$	47,797,000	φ \$	61,354,000		99,292,00
TOTAL ESTIMATED C	OVERNIGH	IT CAPITAL COS	ST		\$	208,991,000	\$	219,866,000	\$	282,229,000		456,744,00
				ESTIM	ATED A	NNUAL OPERAT	ING COS	TS				
Fixed Operating Costs	(2% of Ca	upital)			1 \$	6-Hour 4,180,000	\$	12-Hour 4,397,000	\$	8-Hour 5,645,000	\$	4-Hour 9,135,00
Variable Operating Cos	•	. ,			\$	706,000	\$	738,000	\$	837,000		838,00
TOTAL ESTIMATED C	PERATIN	G COST			\$	4,886,000	\$	5,135,000	\$	6,482,000	\$	9,973,00
						DER AVERAGE				A.U.		4.11
Month Jan			L MWI	Inits	1	6-Hour 14,489		12-Hour 15,466		8-Hour 21,278		4-Hour 21,44
Feb						16,404		16,657		16,657		16,65
Mar			MWI							20,536		
Anr			MWI	h		18,339		20,022			i	20,53
			MWI MWI	h h		18,339 15,100		15,100		15,100	; 	15,10
May			MWI	h h h		18,339					;) 	
May Jun Jul			MWI MWI MWI MWI	h h h h		18,339 15,100 15,770 2,860 6,479		15,100 15,770 2,860 6,479		15,100 15,770 2,860 6,479		15,10 15,77 2,86 6,47
May Jun Jul Aug			MWI MWI MWI MWI MWI	h h h h h		18,339 15,100 15,770 2,860 6,479 1,929		15,100 15,770 2,860 6,479 1,929		15,100 15,770 2,860 6,479 1,929		15,10 15,77 2,86 6,47 1,92
May Jun Jul Aug Sep			MWI MWI MWI MWI MWI MWI	h h h h h h		18,339 15,100 15,770 2,860 6,479 1,929 2,846		15,100 15,770 2,860 6,479 1,929 2,846		15,100 15,770 2,860 6,479 1,929 2,846		15,10 15,77 2,86 6,47 1,92 2,84
May Jun Jul Aug Sep Oct			MWI MWI MWI MWI MWI	n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929		15,100 15,770 2,860 6,479 1,929		15,100 15,770 2,860 6,479 1,929		15,10 15,77 2,86 6,47 1,92
Apr May Jun Jul Aug Sep Oct Nov Dec	VERACE		MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339		15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03
May Jun Jul Aug Sep Oct Nov	VERAGE)		MWI MWI MWI MWI MWI MWI MWI MWI GWI	n n n n n n n n/yr		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3		15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96
May Jun Jul Aug Sep Oct Nov Dec	VERAGE)		MWI MWI MWI MWI MWI MWI GWI ENERG	n n n n n n n n/yr		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 .
May Jun Jul Aug Sep Oct Oct Dec ENERGY OUTPUT (AV Month Jan	VERAGE)		MWI MWI MWI MWI MWI MWI GWI ENERG	h h h h h h h h/yr SY OUTPUT Inits h		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A V Month Jan Feb	VERAGE)		MWI MWI MWI MWI MWI MWI GWI ENERG L MWI	n n n n n n n/yr SY OUTPU Inits n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A V Month Jan Feb Mar	VERAGE)		MWI MWI MWI MWI MWI MWI MWI GWI ENERG L MWI MWI MWI	h h h h h h h h/yr Jnits h h		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb	VERAGE)		MWI MWI MWI MWI MWI MWI GWI ENERG L MWI	h h h h h h h h/yr Jnits h h h		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26
May Jun Jul Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun	VERAGE)		MWI MWI MWI MWI MWI MWI MWI GWI ENERC L MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Inits n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul	VERAGE)		MWI MWI MWI MWI MWI MWI MWI GWI ENERC L MWI MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Jnits n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167. 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul Aug	VERAGE)		MWI MWI MWI MWI MWI MWI MWI GWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Jnits n n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul Aug Sep	VERAGE)		MWI MWI MWI MWI MWI MWI MWI GWI ENERC L MWI MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Jnits n n n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Mar Man Feb Mar Apr May Jun Jul Aug Sep Oct Nov	VERAGE)		MWI MWI MWI MWI MWI MWI MWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Jnits n n n n n n n n n n n n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566 2,382 6,249 18,681		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167. 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38 6,24 18,68
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov			MWI MWI MWI MWI MWI MWI MWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n/yr Jnits n n n n n n n n n n n n n n n n n n n		18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748 5,363	,	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681 5,363		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566 2,382 6,249 18,681 5,363		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167. 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38 6,24 18,68 5,36
May Jun Jul Sep Dot Sov Dec ENERGY OUTPUT (AN Month Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun			MWI MWI MWI MWI MWI MWI MWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n i/yr Vnits n n n n n n n n n n n n n n n n n n n	1	18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748 5,363 109.4		15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681 5,363 112.1		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566 2,382 6,249 18,681		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167. 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38 6,24 18,68 5,36
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov			MWI MWI MWI MWI MWI MWI MWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n i/yr Vnits n n n n n n n n n n n n n n n n n n n	1 CITY AN	18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748 5,363	TMETRI	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681 5,363 112.1		15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566 2,382 6,249 18,681 5,363		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (AN Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (FI Metric Capacity Cost, Depend	RM)		MWI MWI MWI MWI MWI MWI MWI ENERG ENERG U MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n Y OUTPU n Y OUTPU n n Y OUTPU n n n Y Y CAPA Inits	1 CITY AN	18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748 5,363 109.4 D ENERGY COS 6-Hour 10,449,000	T METRIC	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681 5,363 112.1 CS 12-Hour 8,245,000	\$	15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 8-Hour 8,625 2,566 2,382 6,249 18,681 5,363 113.2 8-Hour 7,056,000		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167 . 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38 6,24 18,68 5,36 113 . 4-Hour 4-Hour 5 ,709,00
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AV Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FI	RM) dable Capa d Capacity		MWI MWI MWI MWI MWI MWI MWI ENERC L MWI MWI MWI MWI MWI MWI MWI MWI MWI MWI	n n n n n n n ivyr Voits n n n n n n n n n n n n n n n n n n n	1 <u>CITY AN</u> 1	18,339 15,100 15,770 2,860 6,479 1,929 2,846 10,996 17,748 18,339 141.3 R MINIMUM (FIR 6-Hour 13,636 7,261 12,789 7,712 22,179 2,939 8,625 2,566 2,382 6,249 17,748 5,363 109.4 ID ENERGY COS 6-Hour	TMETRI	15,100 15,770 2,860 6,479 1,929 2,846 10,996 19,376 20,022 147.5 CONDTIONS 12-Hour 13,636 7,261 12,789 7,712 23,862 2,939 8,625 2,566 2,382 6,249 18,681 5,363 112.1	\$	15,100 15,770 2,860 6,479 1,929 2,846 10,996 25,961 27,031 167.4 8-Hour 8-Hour 13,636 7,261 12,789 7,712 25,023 2,939 8,625 2,566 2,382 6,249 18,681 5,363 113.2		15,10 15,77 2,86 6,47 1,92 2,84 10,99 25,96 27,03 167. 4-Hour 13,63 7,26 12,78 7,71 25,02 2,93 8,62 2,56 2,38 6,24 18,68 5,36 113.

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET CHEMAINUS RIVER

					BASIC	SITE PARAMET	ERS					
•	Ν	-123.80						nt Area at Intake			km ²	29
•	E	48.88						d Mean Annual Unit			L/s/km ²	5
Region Estimated Footprint	ha	Van Island 110					Mean An	nual Discharge (MA	D)		m³/s	9
	Πά	110										
Month	Jan	Feb	EST Mar	Apr	ONTHLY F May	LOWS TO RESI	ERVOIR/I Jul	NTAKE (m ³ /s) Aug	Sep	Oct	Nov	Dec
Average	34.6	20.5	22.4	Арі 16.5	11.2	5.3	1.7	0.6	3ep 1.4	9.6	28.4	30.4
Firm (Low Flow)	11.5	16.7	17.3	13.7	11.7	8.8	1.5	0.6	0.5	5.6	7.3	18.5
					DES	GN PARAMETE	RS					
					1	6-Hour	-	12-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity			M' M'			20 26		27 27		40 40		80 80
Gross Head			m			20 161		161		161		161
Design Flow, Qd			m			19		20		30		60
MAD Multiplier at Qd						2.0		2.1		3.2		6.3
Reservoir Storage Vol	lume		m			5,253,689		5,253,689		5,253,689		5,253,689
Live Storage Volume			m			94,000		94,000		94,000		94,000
Dam Height at Minimu Dam Height at Full Su		ng Level	m m			46 47		46 47		46 47		46 47
Dam Type	ірріў селеі					CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m			172		172		172		172
Reservoir Surface Are	a		m²			394,000		394,000		394,000		394,000
Penstock Length	a artila		kn			4		4		4		4
Transmission Line Ler Access Road Length	ngui		kn kn			10 1		10 1		10 1		10 1
					ESTIMA	TED CAPITAL C	0979					
		_			1	6-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insurand		Overhead, Contr	ractor's Profits		\$	26,249,000	\$	26,790,000	\$	32,548,000		48,904,00
Access and Site Prepa Cofferdams and Cons		ater Managemen	ht.		\$ \$	5,818,000 1,672,000	\$ \$	5,818,000 1,672,000	\$ \$	5,818,000 1,672,000		5,818,00 1,672,00
Intake, Headrace, and		ater managemen	it.		э \$	3,144,000	э \$	3,294,000	э \$	4,942,000		9,883,00
Dam Construction	i i orobuj				\$	35,039,000	\$	35,039,000	\$	35,039,000		35,039,00
Water Conveyance Sy					\$	25,087,000	\$	25,771,000	\$	32,620,000		49,503,00
Powerhouse Construc					\$	26,460,000	\$	27,730,000	\$	41,595,000		83,189,00
Switchyard and Transı SUB-TOTAL	mission				\$ ¢	7,775,000 131,244,000	\$ \$	7,837,000 133,951,000	\$ \$	8,505,000 162,739,000		10,510,00 244,518,00
EPCM Costs (8% of	Subtotal)				₽ \$	10,500,000		10,716,000	ب ج	13,019,000		19,561,00
Contingency (30% o					\$	39,373,000	\$	40,185,000	\$	48,822,000		73,355,00
TOTAL ESTIMATED (OVERNIGH	IT CAPITAL CO	ST		\$	181,117,000	\$	184,852,000	\$	224,580,000	\$	337,434,00
				EST			ING COS					
Fixed Operating Costs	s (2% of Ca	pital)			1 \$	6-Hour 3,622,000	\$	12-Hour 3,697,000	\$	8-Hour 4,492,000	\$	4-Hour 6,749,00
Variable Operating Co	osts (\$0.005	5/kWh)			\$	688,000	\$	708,000	\$	843,000	\$	859,00
TOTAL ESTIMATED (OPERATIN	G COST			\$	4,310,000	\$	4,405,000	\$	5,335,000	¢	7,608,00
							•				\$	
Month			E			DER AVERAGE	FLOW C			8-Hour	φ	4-Hour
Month Jan				NERGY OU Units Wh		DER AVERAGE 6-Hour 14,860	FLOW C	ONDTIONS 12-Hour 15,389		8-Hour 21,164		4-Hour 23,91
Jan Feb			M' M'	Units Wh Wh		6-Hour 14,860 17,110	FLOW C	12-Hour 15,389 17,931		21,164 18,447		23,91 18,44
Jan Feb Mar			M' M'	Units Wh Wh Wh		6-Hour 14,860 17,110 18,979	FLOW C	12-Hour 15,389 17,931 19,890		21,164 18,447 22,350		23,91 18,44 22,35
Jan Feb Mar Apr			M' M' M'	Units Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937	FLOW C	12-Hour 15,389 17,931 19,890 15,937		21,164 18,447 22,350 15,937		23,91 18,44 22,35 15,93
Jan Feb Mar Apr May			M' M' M' M'	Units Wh Wh Wh		6-Hour 14,860 17,110 18,979	FLOW C	12-Hour 15,389 17,931 19,890		21,164 18,447 22,350		23,9 18,44 22,39 15,90 15,00
Jan Feb Mar Apr May Jun Jul			M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709		21,164 18,447 22,350 15,937 15,068 5,113 1,709		23,9 ¹ 18,44 22,35 15,93 15,06 5,11 1,70
Jan Feb Mar Apr May Jun Jul Aug			M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596		23,9 ⁻ 18,44 22,35 15,93 15,00 5,1 ⁻ 1,70 5,5
Jan Feb Mar Apr May Jun Jul Aug Sep			M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323		23,9 18,44 22,35 15,93 15,00 5,1 1,70 55 1,32
Jan Feb Mar Apr May Jun Jul Aug Sep Oct			M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596		23,9 ¹ 18,44 22,35 15,93 15,00 5,11 1,70 59 1,32 9,54
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec			M' M' M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh		6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836		23,91 18,44 22,35 15,93 15,06 5,11 1,70 59 1,32 9,54 27,44 30,41
Jan Feb Mar Apr Jun Jun Jul Aug Sep Oct Nov	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' G	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447		23,91 18,44 22,35 15,93 15,06 5,11 1,70 59 1,32 9,54 27,44
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' G	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836		23,91 18,44 22,35 15,93 15,06 5,11 1,70 59 1,32 9,54 27,44 30,41
Jan Feb Mar Apr Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (A Month Jan	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh/yr Chits Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525		23,91 18,44 22,35 15,93 15,00 5,11 1,70 59 1,32 9,52 27,44 30,41 171 4-Hour 10,52
Jan Feb Mar Apr Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (A Month Jan Feb	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Enits Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996		23,91 18,44 22,35 15,93 15,00 5,11 1,70 59 1,32 9,52 27,44 30,41 171 4-Hour 10,52 14,95
Jan Feb Mar Apr May Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh/yr Enits Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303		23,91 18,44 22,35 15,93 15,06 5,11 1,70 59 1,32 9,54 27,44 30,41 171 4-Hour 10,52 14,99 17,30
Jan Feb Mar Apr May Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh/yr Enits Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996		23,91 18,44 22,35 15,93 15,06 5,11 1,70 55 1,32 9,54 27,44 30,41 171 4-Hour 10,52 14,99 17,30 13,20
lan Feb Mar Apr May Jun Jul Aug Sep Dot Soc ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Yh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495		23,9° 18,44 22,35 15,90 15,00 5,1° 1,70 55 1,32 9,54 27,44 30,4° 17,1 4-Hour 10,52 14,99 17,30 13,20 15,50 8,45
lan Feb Mar Apr May Jun Jul Sep Doct Sov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Yh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473		23,9° 18,44 22,38 15,90 15,00 5,1° 1,70 58 1,32 9,54 27,44 30,4° 17,1 4-Hour 10,52 14,99 17,30 13,20 15,50 8,49 1,4°
Jan Feb Mar Apr May Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601		23,9° 18,44 22,35 15,90 15,00 5,1° 1,70 55 1,32 9,5 ² 27,44 30,4° 17,1 4-Hour 10,52 14,99 17,30 13,20 15,50 8,45 1,47 60
lan Feb Mar Apr May Jun Jul Sep Doct Soc ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun Jun Jul Sep	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466		23,9 18,44 22,33 15,93 15,00 5,1 1,70 55 1,33 9,54 27,44 30,4 171 4-Hour 10,55 14,99 17,30 13,20 15,50 8,44 1,4 60 44
lan Feb Mar Apr May Jun Jul Sep Doct Soc ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jun Jul Sep Doct	VERAGE)		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Yh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601		23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 1,3 9,5 27,4 30,4 171 4-Hour 1 0,5 14,9 17,3 13,2 15,5 8,4 1,4 6
Jan Feb Mar Apr May Jun Jul Aug Sep Dot ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514		23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 1,3 9,5 27,4 30,4 171 4-Hour 10,5 14,9 17,3 13,2 15,5 8,4 1,4 6 4 4 5,6 7,0 18,5
an eb Mar Ar Ay un ul Sep Det Nov Dec ENERGY OUTPUT (A Month an eb Mar Ay un ul ul Sep Det Iov Dec ENERGY OUTPUT (A Month an Seb Mar Ay Un Un Un Un Un Un Un Un Un Un			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 PUT UNDE	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025		23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 1,3 9,5 27,4 30,4 171 4-Hour 10,5 14,9 17,3 13,2 15,5 8,4 1,4 6 4 4 5,6 7,0 18,5
an eb Mar .pr May un ul .ug bec ENERGY OUTPUT (A Month an eb Mar .pr May un ul .ug bep Dot lov Dec ENERGY OUTPUT (F			M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 <u>PUT UNDE</u> 1 PACITY AN	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7 D ENERGY COS	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7		21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7		23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 27,4 30,4 17 4-Hour 10,5 14,9 17,3 13,2 15,5 8,4 1,4 6 4 5,6 7,0 18,5 11 3
an Feb Mar Ayr May un ul Sep Dot NERGY OUTPUT (A Month an Feb Mar Ayr May un ul Sep Dot NERGY OUTPUT (F ENERGY OUTPUT (F Metric Capacity Cost, Depend	IRM) dable Capa		M' M' M' M' M' M' M' M' M' G ENEI ENEI M' M' M' M' M' M' M' M' M' M' M' M' M'	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 <u>PUT UNDE</u> 1 PACITY AN	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7 D ENERGY COS 6-Hour 9,072,000	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7 ICS 12-Hour 6,944,000	\$	21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 8-Hour 8-Hour 8-Hour 8-Hour 8-Hour 5 ,624,000	\$	23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 1,3 9,5 27,4 30,4 17 4-Hour 4-Hour 4-Hour 4-Hour 4 ,225,0
Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (F	IRM) dable Capa		M' M' M' M' M' M' M' M' M' M' M' M' M' M	Units Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh Wh	1 <u>PUT UNDE</u> 1 PACITY AN 1	6-Hour 14,860 17,110 18,979 15,937 15,068 5,113 1,709 596 1,323 9,545 18,367 18,979 137.6 R MINIMUM (FIR 6-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7 D ENERGY COS 6-Hour	FLOW C	12-Hour 15,389 17,931 19,890 15,937 15,068 5,113 1,709 596 1,323 9,545 19,249 19,890 141.6 V CONDTIONS 12-Hour 10,525 14,996 17,303 13,208 15,507 8,495 1,473 601 466 5,615 7,025 18,514 113.7 ICS 12-Hour	\$	21,164 18,447 22,350 15,937 15,068 5,113 1,709 596 1,323 9,545 27,447 29,836 168.5 8-Hour 8-Hour 8-Hour 8-Hour 8-Hour 8-Hour	\$ \$	23,9 18,4 22,3 15,9 15,0 5,1 1,7 5 1,3 9,5 27,4 30,4 171 4-Hour 4-Hour 1 0,5 14,9 17,3 13,2 15,5 8,4 1,4 6 4 4 5,6 7,0 18,5 113

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET FREDA CREEK

				BASIC		TERS				Prir	nt: May/31/18 14:04:5
Northing N	-124.23					Catchme	ent Area at Intake			km ²	7
Easting E	49.95						d Mean Annual Unit			L/s/km ²	12
Region	Lower Mainland	d				Mean Ar	nnual Discharge (MA	D)		m³/s	6.
Estimated Footprint ha	220										
.					FLOWS TO RES		· /		<u> </u>		
Month Ja Average 11		Mar 9.3	Apr 9.1	May 10.9	Jun 8.7	Jul 4.7	Aug 2.5	Sep 3.5	Oct 10.0	Nov 14.2	Dec 10.5
Firm (Low Flow) 3.3		6.1	8.6	12.8	14.1	6.1	1.5	2.4	9.0	4.3	5.4
				DES	IGN PARAMETE	De					
					16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity			1W		20		27		40		80
Installed Capacity			100		31		31		40		80
Gross Head Design Flow, Qd		n	ו 1 ³ /s		348 11		348 11		348 14		348 28
MAD Multiplier at Qd			173		1.6		1.6		2.1		4.2
Reservoir Storage Volume		n			2,945,945		2,945,945		2,945,945		2,945,945
Live Storage Volume		n	1 ³		558,000		558,000		558,000		558,000
Dam Height at Minimum Ope		n			20		20		20		20
Dam Height at Full Supply Le Dam Type	vel	n	1		21 CFRD		21 CFRD		21 CFRD		21 CFRD
Dam Crest Length		n	ı		86		86		86		86
Reservoir Surface Area		n			365,000		365,000		365,000		365,000
Penstock Length		k	m		9		9		9		9
Transmission Line Length			m		27 1		27 1		27 1		27 1
Access Road Length		ĸ	m		Į		I		I		I
					TED CAPITAL C	COSTS	12-Hour		8-Hour		4-Hour
Mob, Demob, Insurance, Bon	ds, Overhead, Contra	actor's Profits		\$	27,981,000	\$	12-Hour 27,981,000	\$	8-Hour 32,512,000	\$	4-Hour 50,223,00
Access and Site Preparation				\$	11,095,000		11,095,000	\$	11,095,000	\$	11,095,00
Cofferdams and Construction				\$	928,000		928,000	\$	928,000	\$	928,00
Intake, Headrace, and Foreba	ау			\$	1,745,000		1,745,000	\$	2,287,000	\$	4,574,00
Dam Construction Water Conveyance System				\$ \$	5,806,000 45,592,000		5,806,000 45,592,000	\$ \$	5,806,000 53,032,000	\$ \$	5,806,00 78,842,00
Powerhouse Construction				\$	31,080,000		31,080,000	\$	40,745,000	\$	81,490,00
Switchyard and Transmission				\$	15,678,000		15,678,000	\$	16,153,000	\$	18,155,00
SUB-TOTAL				\$	139,905,000		139,905,000	\$	162,558,000	\$	251,113,00
EPCM Costs (8% of Subtot				\$ \$	11,192,000		11,192,000	\$	13,005,000	\$	20,089,00 75,334,00
Contingency (30% of Subto TOTAL ESTIMATED OVERN		т		φ \$	41,972,000 193,069,000		41,972,000 193,069,000	\$ \$	48,767,000 224,330,000	\$ \$	346,536,00
			EQT		NNUAL OPERA		ете				
			E91	1	16-Hour		12-Hour		8-Hour		4-Hour
Fixed Operating Costs (2% of				\$	3,861,000 1,012,000		3,861,000	\$	4,487,000 1,053,000	\$	6,931,00
Variable Operating Costs (\$0 TOTAL ESTIMATED OPERA				\$ \$	1,012,000 4,873,000		1,012,000 4,873,000	\$ \$	1,053,000 5,540,000	\$ \$	1,057,00 7,988,00
					IDER AVERAGE		ONDTIONS				
Month			Units		6-Hour	FLOWC	12-Hour		8-Hour		4-Hour
Jan			1Wh		17,039		17,039		17,608		17,60
Feb			1Wh		12,879		12,879		12,879		12,87
Mar Apr			1Wh 1Wh		19,950 18,980		19,950 18,980		19,950 18,980		19,95 18,98
May			1Wh		26,572		26,572		27,322		27,32
Jun		N	1Wh		18,109		18,109		18,109		18,10
Jul			1Wh		10,169		10,169		10,169		10,16
Aug Sep			1Wh 1Wh		5,486 7,209		5,486 7,209		5,486 7,209		5,48 7,20
Oct			1Wh		21,481		21,481		21,481		21,48
Nov			1Wh		21,998		21,998		28,839		29,60
Dec ENERGY OUTPUT (AVERAC	3F)		1Wh i Wh/yr		22,627 202.5		22,627 202.5		22,627 210.7		22,62 211 .
	, ,		-						210.7		211.
Month		ENE	RGY OUTH		R MINIMUM (FIF	RM) FLO	V CONDTIONS 12-Hour		8-Hour		4-Hour
Jan			1Wh	•	8,571		8,571		8,571		8,57
Feb			1Wh		10,822		10,822		10,822		10,82
Mar			1Wh 1Wh		13,175 17,997		13,175 17,997		13,175 17,997		13,17 17,99
			1Wh		26,572		26,572		31,500		31,50
Apr			1Wh		21,998		21,998		28,839		29,41
Apr May					10 101		13,134		13,134		13,13
Apr May Jun Jul		N N	1Wh		13,134						3,21
Apr May Jun Jul Aug		N N N	1Wh 1Wh		3,210		3,210 4 963		3,210 4 963		
Apr May Jun Jul Aug Sep Oct		N N N	1Wh		3,210 4,963		4,963		3,210 4,963 19,439		4,96
Apr May Jun Jul Aug Sep		N N N N	1Wh 1Wh 1Wh 1Wh 1Wh		3,210 4,963 19,439 8,970		4,963 19,439 8,970		4,963 19,439 8,970		4,96 19,43 8,97
Apr May Jun Jul Aug Sep Oct Nov Dec		N N N N N N N	IWh IWh IWh IWh IWh		3,210 4,963 19,439 8,970 11,594		4,963 19,439 8,970 11,594		4,963 19,439 8,970 11,594		4,96 19,43 8,97 11,59
Apr May Jun Jul Aug Sep Oct Nov		N N N N N N N	IWh IWh IWh IWh IWh IWh IWh		3,210 4,963 19,439 8,970 11,594 160.4		4,963 19,439 8,970 11,594 160.4		4,963 19,439 8,970		4,96 19,43 8,97 11,59 172.
Apr May Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (FIRM)		N N N N N N N	IWh IWh IWh IWh IWh SWh/yr		3,210 4,963 19,439 8,970 11,594 160.4 ID ENERGY CO		4,963 19,439 8,970 11,594 160.4		4,963 19,439 8,970 11,594 172.2		4,96 19,43 8,97 11,59 172 .
Apr May Jun Jul Aug Sep Oct Oct Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable C		M M M M M G	IWh IWh IWh IWh IWh IWh IWh		3,210 4,963 19,439 8,970 11,594 160.4	ST METR	4,963 19,439 8,970 11,594 160.4	\$	4,963 19,439 8,970 11,594	\$	4,96 19,43 8,97 11,59 172 . 4-Hour
Apr May Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable C Capacity Cost, Installed Capa		M M M M G G S \$	1Wh 1Wh 1Wh 1Wh 1Wh 1Wh 3 Wh/yr CAI Units /MW /MW	1 \$ \$	3,210 4,963 19,439 8,970 11,594 160.4 ID ENERGY CO 6-Hour 9,653,000 6,319,000	ST METR	4,963 19,439 8,970 11,594 160.4 ICS 12-Hour 7,240,000 6,319,000	\$	4,963 19,439 8,970 11,594 172.2 8-Hour 5,608,000 5,601,000	\$	4,96 19,43 8,97 11,59 172. 4-Hour 4,332,00 4,326,00
Apr May Jun Jul Aug Sep Oct Oct Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable C		M M M M M G G S \$ \$ \$ \$	IWh IWh IWh IWh IWh IWh/yr CAI Units /MW	1	3,210 4,963 19,439 8,970 11,594 160.4 ID ENERGY CO 6-Hour 9,653,000	ST METR	4,963 19,439 8,970 11,594 160.4 ICS 12-Hour 7,240,000		4,963 19,439 8,970 11,594 172.2 8-Hour 5,608,000		4,96 19,43 8,97 11,59 172 .

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SQUAMISH RIVER (A)

						BASI		ERS				Prin	t: May/31/18 14:04:5
Northing	Ν	-123.4	49						ent Area at Intake			km ²	32
Easting	Е	50.14						Estimate	d Mean Annual Unit	t Runoff		L/s/km ²	8
Region			r Mainland					Mean An	nual Discharge (MA	AD)		m³/s	24.
Estimated Footprint	ha	360											
		_					FLOWS TO RES		· · ·	-			_
Month Average	Ja 8.		eb 5.8	Mar 8.2	Apr 16.3	May 39.8	Jun 58.5	Jul 66.5	Aug 51.1	Sep 33.5	Oct 24.9	Nov 19.2	Dec 9.1
Firm (Low Flow)	4.		.3	5.7	12.3	30.6	42.7	55.5	58.4	33.5		27.0	5.8
							SIGN PARAMETE	PC					
						DL	16-Hour	NO	12-Hour		8-Hour		4-Hour
Dependable Capacity	y				MW		20		27		40		80
Installed Capacity Gross Head					MW m		30 100		30 100		40 100		81 100
Design Flow, Qd					m ³ /s		36		36		48		97
MAD Multiplier at Qd							1.4		1.4		2.0		3.9
Reservoir Storage Vo					m³		15,141,000		15,141,000		15,141,000		15,141,000
Live Storage Volume		national avail			m ³		10,062,000		10,062,000		10,062,000		10,062,000
Dam Height at Minim Dam Height at Full Se	•	•			m m		29 30		29 30		29 30		29 30
Dam Type							CFRD		CFRD		CFRD		CFRD
Dam Crest Length					m		127		127		127		127
Reservoir Surface Ar	ea				m²		1,338,000		1,338,000		1,338,000		1,338,000
Penstock Length Transmission Line Le	enath				km km		5 27		5 27		5 27		5 27
Access Road Length					km		27		27		27		27
						ESTIM	ATED CAPITAL C	OSTS					
	_				<i>C</i> .		16-Hour		12-Hour	-	8-Hour	-	4-Hour
Mob, Demob, Insurar Access and Site Prep		ids, Overhea	ad, Contrac	tor's Pr	otits	\$ \$	36,565,000 26,445,000	\$ \$	36,565,000 26,445,000	\$ \$	42,307,000 26,445,000	\$ \$	63,037,00 26,445,00
Cofferdams and Con		Water Man	agement			ф \$	3,146,000		3,146,000	э \$	3,146,000	φ \$	3,146,00
Intake, Headrace, an			-9			\$	5,916,000	\$	5,916,000	\$	7,995,000	\$	15,989,00
Dam Construction						\$	16,829,000		16,829,000	\$	16,829,000	\$	16,829,00
Water Conveyance S Powerhouse Constru						\$ \$	46,549,000 31,728,000		46,549,000 31,728,000	\$ \$	55,765,000 42,874,000	\$ \$	85,796,00 85,748,00
Switchyard and Trans		ı				φ \$	15,647,000		15,647,000	\$	16,173,000	\$	18,196,00
SUB-TOTAL						\$	182,825,000		182,825,000	\$	211,534,000	\$	315,186,00
EPCM Costs (8% o						\$	14,626,000	\$	14,626,000	\$	16,923,000	\$	25,215,00
Contingency (30%)			TAL COST			φ \$	54,848,000 252,299,000	\$ \$	54,848,000 252,299,000	\$ \$	63,460,000 291,917,000	\$ \$	94,556,00 434,957,00
					E6,		ANNUAL OPERA		ete				
					Eð		16-Hour		12-Hour		8-Hour		4-Hour
Fixed Operating Cost						\$	5,046,000	\$	5,046,000	\$	5,838,000	\$	8,699,00
Variable Operating C TOTAL ESTIMATED						\$ \$	840,000 5,886,000	\$ \$	840,000 5,886,000	\$ \$	969,000 6,807,000	\$ \$	1,065,00 9,764,00
	-				ENED OV (-,		-, -,
Month					ENERGY C		NDER AVERAGE 16-Hour		OND HONS 12-Hour		8-Hour		4-Hour
Jan					MWh		6,970		6,970		6,970		6,97
Feb					MWh		935		935		935		93
Mar Apr					MWh MWh		5,088 9,843		5,088 9,843		5,088 9,843		5,08 9,84
May					MWh		26,116		26,116		28,651		28,65
Jun					MWh		21,558		21,558		29,130		35,29
Jul					MWh MWh		22,276 22,276		22,276 22,276		30,101 30,101		41,44
Aug Sep					MWh		22,276 20,176		22,276 20,176		30,101 20,176		31,86 20,17
Oct					MWh		15,497		15,497		15,497		15,49
Nov Dec					MWh MWh		11,559 5,693		11,559 5,693		11,559 5,693		11,55
ENERGY OUTPUT (/	AVERA	GE)			GWh/yr		168.0		168.0		193.7		5,69 213 .
					ENERGY OUT		ER MINIMUM (FIF	RM) FLOV					
Month					Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan Feb					MWh MWh		5,585 0		5,585 0		5,585 0		5,58
Mar					MWh		3,053		3,053		3,053		3,05
Apr					MWh		7,393		7,393		7,393		7,39
Мау					MWh		22,889		22,889		22,889		22,88
Jun Jul					MWh MWh		21,558 22,276		21,558 22,276		25,779 30,101		25,77 34,60
Aug					MWh		22,276		22,276		30,101		36,37
Sep					MWh		20,179		20,179		20,179		20,17
					MWh MWh		9,353		9,353 16 277		9,353		9,35
					MWh MWh		16,277 3,621		16,277 3,621		16,277 3,621		16,27 3,62
Oct Nov Dec					GWh/yr		154.5		154.5		174.3		185.
Nov Dec	FIRM)												
Nov Dec	FIRM)				CA		ND ENERGY CO	ST METR	ICS				
Nov Dec ENERGY OUTPUT (I Metric	,				Units		16-Hour		12-Hour	-	8-Hour	-	4-Hour
Nov Dec ENERGY OUTPUT (I Metric Capacity Cost, Deper	, ndable (Units \$/MW		16-Hour 12,615,000	\$	12-Hour 9,461,000	\$ \$	7,298,000	\$	5,437,00
Nov Dec ENERGY OUTPUT (I Metric	ndable (led Capa				Units		16-Hour	\$ \$	12-Hour	\$ \$ \$		\$ \$	4-Hour 5,437,00 5,375,00 2,042,00

NOTES:

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0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SQUAMISH RIVER (B)

			E	BASIC	SITE PARAMET	ERS					:: May/31/18 14:04:59
Northing N	-123.36					Catchmer	nt Area at Intake			km ²	1,722
Easting E	50.08						Mean Annual Unit			L/s/km ²	8
Region Estimated Footprint ha	Lower Mainland 430	d				Mean Anr	nual Discharge (MA	D)		m³/s	130.9
	+50										
					LOWS TO RESE		· · · ·	_	<u>.</u>		
Month Jan Average 45.9				May 211.3	Jun 310.5	Jul 352.9	Aug 271.4	Sep 177.5	Oct 132.0	Nov 101.7	Dec 48.5
Firm (Low Flow) 25.6		30.2	65.0 1	62.2	226.8	294.7	309.7	177.6	79.6	143.2	30.8
				DESI	GN PARAMETER	35					
					6-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity		MW MW			20 68		27 68		40 68		80 82
Installed Capacity Gross Head		m			68 43		43		43		82 43
Design Flow, Qd		m³/s			190		190		190		229
MAD Multiplier at Qd		2			1.4		1.4		1.4		1.8
Reservoir Storage Volume		m ³ m ³			23,840,552		23,840,552		23,840,552		23,840,552
Live Storage Volume Dam Height at Minimum Opera	ating Level	m			4,038,000 21		4,038,000 21		4,038,000 21		4,038,000 21
Dam Height at Full Supply Lev		m			22		22		22		22
Dam Type					CFRD		CFRD		CFRD		CFRD
Dam Crest Length Reservoir Surface Area		m m²			274 2,602,000		274 2,602,000		274 2,602,000		274 2,602,000
Penstock Length		km			3		3		3		2,002,000 3
Transmission Line Length		km			20		20		20		20
Access Road Length		km			20		20		20		20
			E				40.11		0.11		4.11
Mob, Demob, Insurance, Bond	ls Overhead Contra	actor's Profite		1 \$	6-Hour 73,411,000	\$	12-Hour 73,411,000	\$	8-Hour 73,411,000	\$	4-Hour 82,327,000
Access and Site Preparation	,			\$ \$	27,500,000	\$	27,500,000	\$	27,500,000	\$	27,500,000
Cofferdams and Construction				\$	16,692,000	\$	16,692,000	\$	16,692,000		16,692,000
Intake, Headrace, and Forebay Dam Construction	у			\$ ¢	31,393,000 36,826,000	\$ \$	31,393,000 36,826,000	\$ \$	31,393,000 36,826,000		37,932,000 36,826,000
Water Conveyance System				գ Տ	89,650,000	\$ \$	89,650,000	φ \$	89,650,000		101,993,000
Powerhouse Construction				\$	77,196,000	\$	77,196,000	\$	77,196,000	\$	93,275,000
Switchyard and Transmission				\$	14,386,000	\$	14,386,000	\$	14,386,000		15,091,000
SUB-TOTAL EPCM Costs (8% of Subtota	D			\$ S	367,054,000 29,364,000	\$ \$	367,054,000 29,364,000	\$ \$	367,054,000 29,364,000		411,636,000 32,931,000
Contingency (30% of Subtota				\$	110,116,000	φ \$	110,116,000	\$	110,116,000		123,491,000
TOTAL ESTIMATED OVERNI	GHT CAPITAL COS	т		\$	506,534,000	\$	506,534,000	\$	506,534,000	\$	568,058,000
			ESTIMA		NNUAL OPERAT		-				
Fixed Operating Costs (2% of	Capital)			1 \$	6-Hour 10,131,000	\$	12-Hour 10,131,000	\$	8-Hour 10,131,000	\$	4-Hour 11,361,000
Variable Operating Costs (\$0.0	005/kWh)			\$	1,876,000	\$	1,876,000	\$	1,876,000	\$	2,060,000
TOTAL ESTIMATED OPERAT	ING COST			\$	12,007,000	\$	12,007,000	\$	12,007,000	\$	13,421,000
					DER AVERAGE						
Month Jan		L MW	Jnits h	1	6-Hour 10,919		12-Hour 10,919		8-Hour 10,919		4-Hour 10,919
Feb		MW			7,008		7,008		7,008		7,008
Mar		MW			11,507		11,507		11,507		11,507
Apr May		MW			22,259 54,218		22,259 54,218		22,259 54,218		22,259 59,950
Jun		MW			48,753		48,753		48,753		58,907
Jul		MW			50,378		50,378		50,378		60,87 ²
Aug Sep		MW			50,378 45,627		50,378 45,627		50,378 45,627		60,87 ² 45,627
Oct		MW			35,048		35,048		35,048		35,048
Nov		MW			26,142		26,142		26,142		26,142
Dec ENERGY OUTPUT (AVERAG	E)	MW GWI			12,875 375.1		12,875 375.1		12,875 375.1		12,875 412.0
	_,		-								
Month			BY OUTPUT I		R MINIMUM (FIR 6-Hour	,	CONDTIONS		8-Hour		4-Hour
Jan		MW	h		7,787		7,787		7,787		7,787
Feb Mar		MW			3,768 8,031		3,768 8,031		3,768 8,031		3,768 8,03 <i>1</i>
Apr		MW			16,719		16,719		16,719		8,03 16,719
May		MW	h		46,921		46,921		46,921		46,921
Jun		MW			48,753		48,753 50,378		48,753		58,299
Jul Aug		MW			50,378 50,378		50,378 50,378		50,378 50,378		60,87 ² 60,87 ²
Sep		MW	h		45,635		45,635		45,635		45,635
Oct		MW			21,152		21,152		21,152		21,152
Nov Dec		MW			36,810 8,188		36,810 8,188		36,810 8,188		36,810 8,188
ENERGY OUTPUT (FIRM)		GWI			344.5		344.5		344.5		375.1
			CAPACI	ΤΥ ΔΝ	D ENERGY COS	TMFTRI	CS				
					ENERGI COS						
Metric			Inits		6-Hour		12-Hour		8-Hour		4-Hour
Capacity Cost, Dependable Ca		\$/M\	Inits ∕∕	1 \$ ¢	25,327,000	\$	18,995,000	\$	12,663,000		7,101,000
			Inits ∾ ∾							\$	

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1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET ELAHO RIVER

			BASI	C SITE PARAMET	ERS				Prin	t: May/31/18 14:04:59
Northing N	-123.40		2			t Area at Intake			km ²	1,262
Easting E	50.11					Mean Annual Unit			L/s/km ²	88
Region	Lower Mainlan	nd			Mean Ann	ual Discharge (MA	.D)		m³/s	96.
Estimated Footprint ha	290									
Month Ja	n Feb			FLOWS TO RESE Jun	RVOIR/IN Jul	· /	Sep	Oct	Nov	Dec
Average 33		Mar Ap 31.8 63			258.7	Aug 198.9	Зер 130.1		74.6	35.5
Firm (Low Flow) 18	.8 12.7	22.2 47	.7 118.9	166.3	216.0	227.0	130.1	58.4	105.0	22.6
			DES	SIGN PARAMETER	RS					
Demendela Ornerita		N 43 4 /		16-Hour	1	2-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity		MW MW		20 64		27 64		40 64		80 81
Gross Head		m		55		55		55		55
Design Flow, Qd		m ³ /s		139		139		139		177
MAD Multiplier at Qd				1.4		1.4		1.4		1.8
Reservoir Storage Volume		m³		16,089,933		16,089,933		16,089,933		16,089,933
Live Storage Volume	с. I. I.	m ³		810,000		810,000		810,000		810,000
Dam Height at Minimum Ope Dam Height at Full Supply Le		m m		41 42		41 42		41 42		41 42
Dam Type				42 CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m		343		343		343		343
Reservoir Surface Area		m²		779,000		779,000		779,000		779,000
Penstock Length		km		1		1		1		1
Transmission Line Length Access Road Length		km km		26 26		26 26		26 26		26 26
			EQTIM		0575			-		-
				16-Hour	1	2-Hour		8-Hour		4-Hour
Mob, Demob, Insurance, Bon	ds, Overhead, Contra	actor's Profits	\$	62,017,000	\$	62,017,000	\$	62,017,000		69,733,000
Access and Site Preparation Cofferdams and Construction	Water Management		\$	21,492,000 12,235,000	\$ \$	21,492,000 12,235,000	\$ \$	21,492,000 12,235,000		21,492,000 12,235,000
Intake, Headrace, and Foreba			э \$	23,011,000	э \$	23,011,000	э \$	23,011,000		29,269,000
Dam Construction	~)		\$	78,359,000	\$	78,359,000	\$	78,359,000		78,359,000
Water Conveyance System			\$	25,214,000	\$	25,214,000	\$	25,214,000		29,683,000
Powerhouse Construction			\$	70,860,000	\$	70,860,000	\$	70,860,000		90,131,000
Switchyard and Transmissior SUB-TOTAL	1		\$ ¢	16,895,000 310,083,000	\$ \$	16,895,000 310,083,000	\$ \$	16,895,000 310,083,000		17,764,000 348,666,000
EPCM Costs (8% of Subtot	al)		Գ Տ	24,807,000	₽ \$	24,807,000	. Տ	24,807,000		27,893,000
Contingency (30% of Subto			\$	93,025,000	\$	93,025,000	\$	93,025,000		104,600,000
TOTAL ESTIMATED OVERN	IGHT CAPITAL COS	ST	\$	427,915,000	\$	427,915,000	\$	427,915,000	\$	481,159,000
				ANNUAL OPERAT				9 Hour		4 Hour
Fixed Operating Costs (2% o	f Capital)		\$	16-Hour 8,558,000	\$	2-Hour 8,558,000	\$	8-Hour 8,558,000	\$	4-Hour 9,623,000
Variable Operating Costs (\$0			\$	1,774,000	\$	1,774,000	\$	1,774,000	\$	1,993,000
TOTAL ESTIMATED OPERA			\$	10,332,000	\$	10,332,000	\$	10,332,000	\$	11,616,000
Month		ENER Uni		NDER AVERAGE 16-Hour		NDTIONS 2-Hour		8-Hour		4-Hour
Jan		MWh		10,521	-	10,521		10,521		10,521
Feb		MWh		6,888		6,888		6,888		6,888
Mar		MWh MWb		10,861		10,861		10,861		10,861
Apr May		MWh MWh		21,009 51,388		21,009 51,388		21,009 51,388		21,009 56,798
Jun		MWh		46,014		46,014		46,014		58,528
Jul		MWh		47,548		47,548		47,548		60,479
Aug		MWh		47,548		47,548		47,548		60,479
Sep Oct		MWh MWh		43,064 33,079		43,064 33,079		43,064 33,079		43,064 33,079
Nov		MWh		24,673		24,673		24,673		24,673
Dec		MWh		12,152		12,152		12,152		12,152
ENERGY OUTPUT (AVERAG	JE)	GWh/y		354.7		354.7		354.7		398.5
Month		ENERGY Uni		ER MINIMUM (FIR 16-Hour	,	CONDTIONS 2-Hour		8-Hour		4-Hour
Jan		MWh		7,565		7,565		7,565		7,565
Feb		MWh MWb		3,831		3,831		3,831		3,831
Mar Apr		MWh MWh		7,580 15,780		7,580 15,780		7,580 15,780		7,580 15,780
May		MWh		44,501		44,501		44,501		44,501
Jun		MWh		46,014		46,014		46,014		55,024
Jul		MWh		47,548		47,548		47,548		60,479
Aug		MWh MWh		47,548 43,071		47,548 43,071		47,548 43,071		60,479
Sep Oct		MWh		43,071 19,964		43,071 19,964		43,071 19,964		43,071 19,964
		MWh		34,743		34,743		34,743		34,743
		MWh		7,728		7,728		7,728		7,728
Nov Dec		GWh/y	r	325.9		325.9		325.9		360.7
Nov Dec		·····,								
Nov Dec ENERGY OUTPUT (FIRM)		-		ND ENERGY COS		-		8-Hour		4-Hour
Nov Dec ENERGY OUTPUT (FIRM) Metric	Capacity	Uni \$/MW		ND ENERGY COS 16-Hour 21,396,000		S 2-Hour 16,047,000	\$	8-Hour 10,698,000	\$	4-Hour 6,014,000
Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable C Capacity Cost, Installed Capa		Uni \$/MW \$/MW	ts \$ \$	16-Hour 21,396,000 6,696,000	1 \$ \$	2-Hour 16,047,000 6,696,000	\$	10,698,000 6,696,000	\$	6,014,00 5,919,00
Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable C		Uni \$/MW	ts \$ \$	16-Hour 21,396,000	1 \$	2-Hour 16,047,000		10,698,000	\$ \$	6,014,00

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SOO RIVER

Northeire er			BASIC	SITE PARAME	TERS					
Northing N	-123.11				Catchme	nt Area at Intake			rm²	17
Easting E	50.23					d Mean Annual Unit			./s/km ²	4
Region Estimated Footprint ha	Lower Mainla 320	and			Mean An	nual Discharge (MAI	D)	r	n³/s	6.
	320									
				FLOWS TO RES		ι <i>Γ</i>	0			_
Month Average	Jan Feb 3.2 2.3	Mar Apr 2.5 3.6	May 8.8	Jun 16.5	Jul 17.5	Aug 12.1	Sep 7.2	Oct 5.8	Nov 5.3	Dec 3.2
Firm (Low Flow)	2.6 2.1	2.3 2.2	10.9	13.8	12.9	11.3	6.3	5.5	7.2	3.1
			DES	IGN PARAMETE	RS					
				16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity		MW MW		20 20		27 27		40 40		80 81
Installed Capacity Gross Head		m		20 164		27 164		40 164		164
Design Flow, Qd		m ³ /s		15		20		29		59
MAD Multiplier at Qd		2		2.2		2.9		4.4		8.8
Reservoir Storage Volume	Э	m ³ m ³		11,369,000		11,369,000		11,369,000		11,369,000
Live Storage Volume Dam Height at Minimum (Operating Level	m		7,563,000 35		7,563,000 35		7,563,000 35		7,563,000 35
Dam Height at Full Supply		m		37		37		37		37
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length Reservoir Surface Area		m m²		417 1,315,000		417 1,315,000		417 1,315,000		417 1.315.000
Penstock Length		km		1,315,000 4		1,315,000		1,315,000		1,315,000 4
Transmission Line Length	1	km		22		22		22		22
Access Road Length		km		22		22		22		22
				TED CAPITAL C						
Mob, Demob, Insurance, I	Bonds Overhead Can	tractor's Profite	1 \$	16-Hour 33,881,000		12-Hour 37,016,000	\$	8-Hour 43,017,000	\$	4-Hour 59,980,00
Access and Site Preparati			\$ \$	22,913,000		37,016,000 22,913,000	ծ \$	43,017,000 22,913,000	ֆ \$	59,980,00 22,913,00
Cofferdams and Construc	tion Water Manageme	nt	\$	811,000	\$	811,000	\$	811,000	\$	811,00
Intake, Headrace, and For	rebay		\$	2,440,000		3,253,000	\$	4,880,000	\$	9,760,00
Dam Construction Water Conveyance System	m		\$ \$	50,720,000 24,800,000	•	50,720,000 29,213,000	\$ \$	50,720,000 36,963,000	\$ \$	50,720,00 56,054,00
Powerhouse Construction			\$	20,931,000		27,908,000	\$	41,861,000	\$	83,723,00
Switchyard and Transmiss	sion		\$	12,910,000		13,246,000	\$	13,919,000	\$	15,939,00
SUB-TOTAL EPCM Costs (8% of Sub	htotal)		\$ ¢	169,406,000 13,552,000		185,080,000 14,806,000	\$ \$	215,084,000 17,207,000	\$ \$	299,900,00 23,992,00
Contingency (30% of Su			э \$	50,822,000		55,524,000	φ \$	64,525,000	գ \$	89,970,00
TOTAL ESTIMATED OVE	RNIGHT CAPITAL CO	DST	\$	233,780,000	\$	255,410,000	\$	296,816,000	\$	413,862,00
		EST		NNUAL OPERA	TING COS	STS				
Fixed Operating Costs (2)	(of Conital)		1 \$	16-Hour	¢	12-Hour	¢	8-Hour	¢	4-Hour
Fixed Operating Costs (29) Variable Operating Costs			Դ Տ	4,676,000 437,000		5,108,000 460,000	\$ \$	5,936,000 460,000	\$ \$	8,277,00 460,00
TOTAL ESTIMATED OPE			\$	5,113,000		5,568,000	\$	6,396,000	\$	8,737,00
		ENERGY O	UTPUT UN	IDER AVERAGE	FLOW C	ONDTIONS				
Month		Units	1	6-Hour		12-Hour		8-Hour		4-Hour
Jan				5,723				5,723		5,72
		MWh MWb				5,723		0		
Feb		MWh MWh		0		0		0 1,772		1,77
Feb Mar Apr		MWh MWh MWh		0 1,772 3,591		0 1,772 3,591		1,772 3,591		3,59
[≂] eb Mar Apr May		MWh MWh MWh MWh		0 1,772 3,591 12,839		0 1,772 3,591 12,839		1,772 3,591 12,839		3,59 12,83
Feb Mar Apr May Jun		MWh MWh MWh		0 1,772 3,591 12,839 14,539		0 1,772 3,591 12,839 16,316		1,772 3,591 12,839 16,316		3,59 12,83 16,31
Feb Mar Apr May Jun Jul Aug		MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345		0 1,772 3,591 12,839 16,316 17,853 12,345		1,772 3,591 12,839 16,316 17,853 12,345		3,59 12,83 16,31 17,85 12,34
Feb Mar Apr May Jun Jul Aug Sep		MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079		0 1,772 3,591 12,839 16,316 17,853 12,345 7,079		1,772 3,591 12,839 16,316 17,853 12,345 7,079		3,59 12,83 16,31 17,85 12,34 7,07
Feb Mar Apr May Jun Jul Aug Sep Oct		MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945		0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945		3,59 12,83 16,31 17,85 12,34 7,07 5,94
Feb Mar Apr Jun Jul Aug Sep Oct Nov Dec		MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261		0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261		1,77 3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26
Feb Mar Apr May Jun Jul Aug Sep Oct Nov	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219		0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21
Feb Mar Apr Jun Jul Aug Sep Oct Oct Nov Dec ENERGY OUTPUT (AVEF	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF	RM) FLOV	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 .
Feb Mar Apr May Jun Jul Aug Sep Oct Sep Oct ENERGY OUTPUT (AVEF Month	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91. 4-Hour
Feb Mar Apr May Jun Jul Aug Sep Oct Oct Dec ENERGY OUTPUT (AVEF Month Jan Feb	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 .
Feb Mar Apr May Jun Jul Aug Sep Dot Sep Dot ENERGY OUTPUT (AVEF Month Jan Feb Mar	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34
Feb Mar Apr May Jun Jul Aug Sep Dct Sep Dct ENERGY OUTPUT (AVEF Morth Jan Feb Mar Apr	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340 2,169		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16
Feb Mar Apr May Jun Jul Aug Sep Doct Sep Doct ENERGY OUTPUT (AVEF Morth Jan Feb Mar Apr May	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95
Eeb Mar Apr May Jun Jul Aug Sep Dot Sov Dec ENERGY OUTPUT (AVER Mor ENERGY OUTPUT (AVER Mar Apr May Jun Jun	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12
Eeb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (AVER Morth Jan Eeb Mar Apr May Jun Jul Aug	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91. 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55
Feb Mar Apr May Jun Jul Aug Sep Doct Sov Dec ENERGY OUTPUT (AVER Mor Entropy (AVER) Month Jun Jun Jun Jun Jun Jun Jun Jun Sep	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19
Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (AVER Mor Enter (AVER) Month Jan Feb Mar Apr May Jun Jul Aug Sep Doct Nov	RAGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 // CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5 ,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07
Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (AVER Month Jan Feb Mar Apr May Jun Jul Aug Sep Doct Nov		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 7 CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5 ,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91. 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07 3,17
Feb Mar Apr May Jun Jul Sep Doct Sov Dec ENERGY OUTPUT (AVER Month lan Feb Mar Apr May Jun Jul Sep Doct Nov Dec		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1	0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 7 7 7 7 7 9 1.9 7 7 7 9 1.9 7 7 7 9 1.9 7 7 9 1.9 7 7 7 9 1.9 7 7 7 9 1.9 7 7 9 1.9 7 7 9 1.9 7 7 1 9 1.9 7 7 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 0 7 1.340 2,169 11,553 11		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5 ,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91. 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07 3,17
Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (AVER Man Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (FIRM		MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 PACITY AN	0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 7 7 7 7 7 9 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2		1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2		3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07 3,17 84 .
Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (AVER Month lan Feb Mar Apr May Jun Jul Aug Sep Doct Nov Dec ENERGY OUTPUT (FIRM Metric	Λ)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 PACITY AN	0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 7 7 7 7 7 9 1.9 7 7 7 9 1.9 7 7 7 9 1.9 7 7 9 1.9 7 7 7 9 1.9 7 7 7 9 1.9 7 7 9 1.9 7 7 9 1.9 7 7 1 9 1.9 7 7 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 9 1.9 7 7 1 0 7 1.340 2,169 11,553 11	\$	1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5 ,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170	\$	3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91. 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07 3,17 84. 4-Hour
Eeb Mar Apr May Jun Jul Aug Sep Dct Nov Dec ENERGY OUTPUT (AVER Month Jan Eeb Mar Apr May Jun Jul Aug Sep Dct Nov Dec ENERGY OUTPUT (FIRM	n)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	1 <u>PACITY AN</u> 1	0 1,772 3,591 12,839 14,539 15,024 12,345 7,079 5,945 5,219 3,261 87.3 R MINIMUM (FIF 6-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2 ID ENERGY COS 6-Hour	RM) FLOW	0 1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 / CONDTIONS 12-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2 CS 12-Hour	\$ \$	1,772 3,591 12,839 16,316 17,853 12,345 7,079 5,945 5,219 3,261 91.9 8-Hour 5,371 0 1,340 2,169 14,956 13,634 13,125 11,553 6,199 5,624 7,074 3,170 84.2	\$ \$ \$	3,59 12,83 16,31 17,85 12,34 7,07 5,94 5,21 3,26 91 . 4-Hour 5,37 1,34 2,16 14,95 13,63 13,12 11,55 6,19 5,62 7,07 3,17 84 .

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SOUTH CREEK

					BASI	C SITE PARAMET	ERS				Prir	nt: May/31/18 14:04:59
Northing	Ν	-123.24					Catchme	nt Area at Intake			km ²	79
Easting	E	50.52						d Mean Annual Unit			L/s/km ²	8
Region Estimated Footprint	ha	Lower Mainland 380					Mean Ani	nual Discharge (MAI	D)		m³/s	6.
	na	360										
Month	Jan	Feb	Mar	ESTIMATED N Apr	May	FLOWS TO RESE Jun	RVOIR/II Jul	NTAKE (m³/s) Aug	Sep	Oct	Nov	Dec
Average	2.1	1.4	2.0	4.0	9.6	14.2	16.1	12.4	8.1	6.0	4.6	2.2
Firm (Low Flow)	1.2	0.8	1.4	3.0	7.4	10.4	13.4	14.1	8.1	3.6	6.5	1.4
					DES	SIGN PARAMETEI	25					
						16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity				MW		20		27		40		80
Installed Capacity Gross Head				MW m		45 625		45 625		45 625		81 625
Design Flow, Qd				m ³ /s		9		9		9		16
MAD Multiplier at Qd						1.4		1.4		1.4		2.6
Reservoir Storage Vol	lume			m³		2,398,224		2,398,224		2,398,224		2,398,224
Live Storage Volume				m³		1,058,000		1,058,000		1,058,000		1,058,000
Dam Height at Minimu Dam Height at Full Su				m m		20 27		20 27		20 27		20 27
Dam Type		I		111		CFRD		CFRD		CFRD		CFRD
Dam Crest Length				m		219		219		219		219
Reservoir Surface Are	ea			m ²		148,000		148,000		148,000		148,000
Penstock Length	nath			km km		6 52		6 52		6 52		6 52
Transmission Line Ler Access Road Length	ngth			km km		52 20		52 20		52 20		52 20
5					FSTIM	ATED CAPITAL C	OSTS					
	_	A I I I		<i>c</i> .		16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insuran		, Overhead, Contra	ctor's Pro	otits	\$	35,213,000	\$ ¢	35,213,000	\$ ¢	35,213,000		47,490,000
Access and Site Prepa Cofferdams and Cons		/ater Management			\$ \$	21,869,000 762,000	\$ \$	21,869,000 762,000	\$ \$	21,869,000 762,000		21,869,000 762,000
Intake, Headrace, and		ater management			φ \$	1,433,000	Ψ \$	1,433,000	\$	1,433,000		2,567,000
Dam Construction					\$	17,331,000	\$	17,331,000	\$	17,331,000	\$	17,331,000
Water Conveyance Sy					\$	26,219,000	\$	26,219,000	\$	26,219,000		36,305,000
Powerhouse Construc Switchyard and Trans					\$ \$	45,581,000 27,657,000	\$ \$	45,581,000 27,657,000	\$ \$	45,581,000 27,657,000		81,681,000 29,445,000
SUB-TOTAL	111331011				Ψ \$	176,065,000	\$	176,065,000	\$	176,065,000		237,450,000
EPCM Costs (8% of	f Subtotal)				\$	14,085,000	\$	14,085,000	\$	14,085,000		18,996,000
Contingency (30% o		,	-		\$	52,820,000	\$	52,820,000	\$	52,820,000		71,235,000
TOTAL ESTIMATED (OVERNIG	HI CAPITAL COST			\$	242,970,000	\$	242,970,000	\$	242,970,000	\$	327,681,000
				EST		ANNUAL OPERAT		TS 12-Hour		8-Hour		4-Hour
Fixed Operating Costs	s (2% of C	apital)			\$	4,859,000	\$	4,859,000	\$	4,859,000	\$	6,554,000
Variable Operating Co	•	,			\$	1,257,000	\$	1,257,000	\$	1,257,000		1,585,000
TOTAL ESTIMATED (OPERATI	NG COST			\$	6,116,000	\$	6,116,000	\$	6,116,000	\$	8,139,000
Month				ENERGY O Units		NDER AVERAGE 16-Hour	-	ONDTIONS 12-Hour		8-Hour		4-Hour
Jan				MWh		8,560		8,560		8,560		8,560
Feb				MWh		3,407		3,407		3,407		3,407
Mar Apr				MWh MWh		7,673 14,842		7,673 14,842		7,673 14,842		7,673 14,842
May				MWh		37,430		37,430		37,430		41,253
Jun				MWh		32,507		32,507		32,507		53,216
Jul				MWh		33,590		33,590		33,590		60,194
Aug Sep				MWh MWh		33,590 30,423		33,590 30,423		33,590 30,423		48,052 30,423
Oct				MWh		23,369		23,369		23,369		23,369
Nov				MWh		17,431		17,431		17,431		17,431
Dec ENERGY OUTPUT (A)		MWh GWh/yr		8,585 251.4		8,585 251.4		8,585 251.4		8,585 317.0
			F	-		ER MINIMUM (FIR	M) FLOW					
1				Units		16-Hour	,	12-Hour		8-Hour		4-Hour
Month						6,472		6,472		6,472		6,472
Jan				MWh MWb						1,247		1,247
Jan Feb				MWh		1,247		1,247 5.355				5 355
Jan						1,247 5,355 11,148		5,355 11,148		5,355 11,148		5,355 11,148
Jan Feb Mar Apr May				MWh MWh MWh MWh		1,247 5,355 11,148 32,565		5,355 11,148 32,565		5,355 11,148 32,565		11,148 32,565
Jan Feb Mar Apr May Jun				MWh MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507		5,355 11,148 32,565 32,507		5,355 11,148 32,565 32,507		11,148 32,565 38,872
Jan Feb Mar Apr May Jun Jul				MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507 33,590		5,355 11,148 32,565 32,507 33,590		5,355 11,148 32,565 32,507 33,590		11,148 32,565 38,872 52,179
Jan Feb Mar Apr May Jun				MWh MWh MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507		5,355 11,148 32,565 32,507		5,355 11,148 32,565 32,507		11,148 32,565 38,872
Jan Feb Mar Apr May Jun Jul Aug Sep Oct				MWh MWh MWh MWh MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		11,148 32,565 38,872 52,179 54,844 30,428 14,103
Jan Feb Mar Apr Jun Jun Jul Aug Sep Oct Nov				MWh MWh MWh MWh MWh MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544		11,148 32,569 38,872 52,179 54,844 30,428 14,100 24,544
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	TRM)			MWh MWh MWh MWh MWh MWh MWh MWh		1,247 5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103		11,144 32,563 38,872 52,179 54,844 30,420 14,103
Jan Feb Mar Apr Jun Jul Aug Sep Oct Nov	IRM)			MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	PACITY A	1,247 5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544 5,460 231.0		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544 5,460		11,14 32,56 38,87 52,17 54,84 30,42 14,10 24,54 5,46
Jan Feb Mar Apr Jun Jul Aug Sep Oct Oct ENERGY OUTPUT (F Metric	,			MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr CAl Units		1,247 5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 ND ENERGY COS 16-Hour		5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 CS 12-Hour		5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544 5,460 231.0 8-Hour		11,14 32,56 38,87 52,17 54,84 30,42 14,10 24,54 5,46 277 .
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Sep Oct ENERGY OUTPUT (F Metric Capacity Cost, Depen	, idable Cap			MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr CA \$/MW		1,247 5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 ND ENERGY COS 16-Hour 12,166,000	\$	5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 CS 9,124,000	\$ 4	5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 8-Hour 6,083,000	\$	11,14 32,56 38,87 52,17 54,84 30,42 14,10 24,54 5,46 277 . 4-Hour 4,102,00
Jan Feb Mar Apr Jun Jul Aug Sep Oct Oct ENERGY OUTPUT (F Metric	, idable Cap ed Capacit			MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr CAl Units		1,247 5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 ND ENERGY COS 16-Hour		5,355 11,148 32,565 32,507 33,590 30,428 14,103 24,544 5,460 231.0 CS 12-Hour	\$ \$	5,355 11,148 32,565 32,507 33,590 33,590 30,428 14,103 24,544 5,460 231.0 8-Hour	\$	11,14 32,56 38,87 52,17 54,84 30,42 14,10 24,54 5,46 277. 4-Hour

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SIWASH CREEK

[BASI	C SITE PARAME	TERS				Pri	nt: May/31/18 14:04:5
Northing	Ν	-121.35						ent Area at Intake			km ²	6
Easting	Е	49.58						d Mean Annual Unit			L/s/km ²	4
Region Estimated Footprint	ha	Lower Main 110	nland				Mean An	nual Discharge (MA	D)		m³/s	1.
	na	ΠU										
N (1						FLOWS TO RES		· · · /		0.1		
Month Average		lan Feb 1.6 1.0	Mar 1.4	Apr 3.0	May 7.9	Jun 7.4	Jul 2.8	Aug 0.8	Sep 1.3	Oct 0.6	Nov 2.4	Dec 1.6
Firm (Low Flow)		0.6 0.5	0.5	2.3	6.5	4.4	1.6	0.6	0.6	0.4	2.5	1.1
					DEG	SIGN PARAMETE	De					
						16-Hour	:KS	12-Hour		8-Hour		4-Hour
Dependable Capacit	y			MW		20		27		40		80
Installed Capacity				MW		21		28		41		83
Gross Head				m m ³ /s		437		437		437 11		437 23
Design Flow, Qd MAD Multiplier at Qd	4			III /S		6 3.2		8 4.2		6.3		23 12.6
Reservoir Storage V				m ³		4,150,000		4,150,000		4,150,000		4,150,000
Live Storage Volume				m ³		2,743,000		2,743,000		2,743,000		2,743,000
Dam Height at Minim				m		25		25		25		25
Dam Height at Full S Dam Type	Supply L	evel		m		41 CFRD		41 CFRD		41 CFRD		41 CFRD
Dam Crest Length				m		158		158		158		158
Reservoir Surface A	rea			m²		190,000		190,000		190,000		190,000
Penstock Length	0.0.01			km		4		4		4		4
Transmission Line Le Access Road Length				km km		12 5		12 5		12 5		12 5
ribbebb ribbud Eeligin	1			КШ		-		0		0		0
						ATED CAPITAL (16-Hour	COSTS	12-Hour		8-Hour		4-Hour
Mob, Demob, Insura	nce. Bo	onds, Overhead. C	ontractor's F	Profits	\$	19,196,000) \$	12-Hour 21,781,000	\$	8-Hour 26,772,000	\$	4-Hour 41,050,00
Access and Site Pre	paratio	า			\$	7,574,000) \$	7,574,000	\$	7,574,000	\$	7,574,00
Cofferdams and Con			nent		\$	291,000		291,000	\$	291,000		291,00
Intake, Headrace, an Dam Construction	nd Fore	Jay			\$ ¢	942,000 22,772,000		1,257,000 22,772,000	\$ \$	1,885,000 22,772,000		3,770,00 22,772,00
Water Conveyance S	System				Ψ \$	15,748,000		18,423,000	φ \$	23,053,000		34,167,00
Powerhouse Constru	uction				\$	21,020,000		28,026,000	\$	42,039,000	\$	84,078,00
Switchyard and Tran	smissio	'n			\$	8,437,000		8,782,000	\$	9,473,000		11,547,00
SUB-TOTAL EPCM Costs (8% d	of Subt	ntal)			\$ \$	95,980,000 7,678,000		108,906,000 8,712,000	\$ \$	133,859,000 10,709,000		205,249,00 16,420,00
Contingency (30%		,			\$	28,794,000		32,672,000	\$	40,158,000	•	61,575,00
TOTAL ESTIMATED	OVER	NIGHT CAPITAL (COST		\$	132,452,000	\$	150,290,000	\$	184,726,000	\$	283,244,00
				ES	TIMATED	ANNUAL OPERA	TING CO	STS				
Finad On another Ora		-{ 0				16-Hour		12-Hour	¢	8-Hour	¢	4-Hour
Fixed Operating Cos Variable Operating C					\$ \$	2,649,000 387,000		3,006,000 434,000	\$ \$	3,695,000 438,000		5,665,00 438,00
TOTAL ESTIMATED					\$	3,036,000		3,440,000	\$	4,133,000		6,103,00
				ENERGY		NDER AVERAGE						
Month				Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan				MWh		6,288		6,288		6,288		6,28
Feb				MWh MWh		(2.242		0		C 2 242		2.24
Mar Apr				MWh		3,343 7,807		3,343 7,807		3,343 7,807		3,343 7,80
May				MWh		19,267		24,409		25,127		25,12
Jun				MWh		14,929		19,321		19,321		19,32
Jul Aug				MWh MWh		7,721 2,301		7,721 2,301		7,721 2,301		7,72 2,30
Sep				MWh		3,509		3,509		3,509		3,50
Oct				MWh		1,700)	1,700		1,700		1,70
Nov				MWh		6,223		6,223		6,223		6,22
Dec ENERGY OUTPUT (AVERA	GE)		MWh GWh/yr		4,255 77.3		4,255 86.9		4,255 87.6		4,25 87 .
	•	,		_								
Month				ENERGY OUT		ER MINIMUM (FII 16-Hour	KM) FLOV	V CONDTIONS 12-Hour		8-Hour		4-Hour
Jan				MWh		4,719)	4,719		4,719		4,71
Feb				MWh		C		0		C		
Mar Apr				MWh MWh		0 5,746		0 5,746		0 5,746		5,74
Apr May				MWh		5,740 19,267		5,746 21,479		5,740 21,479		5,74 21,47
Jun				MWh		11,490)	11,490		11,490		11,49
Jul				MWh		4,269		4,269		4,269		4,26
Aug Sep				MWh MWh		1,736 1,552		1,736 1,552		1,736 1,552		1,73 1,55
Oct				MWh		1,552		1,552		1,552		1,55
Nov				MWh		6,575	5	6,575		6,575		6,57
Dec				MWh		2,996		2,996		2,996		2,99
ENERGY OUTSUT	(FIKM)			GWh/yr		59.5)	61.7		61.7		61.
ENERGY OUTPUT (CA	PACITY A	ND ENERGY CO	ST METR					
,												
Metric	andable	Capacity		Units \$/MW/		16-Hour) ¢	12-Hour 5 638 000	¢	8-Hour	¢	4-Hour 3 542 00
Metric Capacity Cost, Depe				\$/MW	\$ \$	6,626,000		5,638,000	\$ \$	4,620,000		3,542,00
Metric	lled Ca) \$) \$		\$ \$ \$		\$ \$	

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SOWAQUA CREEK

					BASI	C SITE PARAME	TERS				Pri	nt: May/31/18 14:04:5
Northing	Ν	-121.24					Catchme	ent Area at Intake			km ²	140
Easting	Е	49.41						d Mean Annual Unit			L/s/km ²	43
Region Estimated Footprint	ha	Lower Mainland 180					Mean Ar	nnual Discharge (MA	D)		m³/s	4.
	IId	100										
						FLOWS TO RES		· · ·				
Month	Ja		Mar	Apr	May	Jun	Jul	Aug	Sep		Nov	Dec
Average Firm (Low Flow)	3.6 1.3		3.1 1.2	6.8 5.2	18.0 14.9	16.9 10.0	6.5 3.6	1.9 1.5	3.1 1.4	1.4 1.0	5.4 5.7	3.6 2.5
				0.2	11.0	10.0	0.0	1.0			0.1	2.0
					DES		RS	10.11		0.11		4.11
Dependable Capacity	,			MW		16-Hour 20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity	,			MW		24		32		48		96
Gross Head				m		242		242		242		242
Design Flow, Qd				m³/s		12		16		24		48
MAD Multiplier at Qd				m³		2.9		3.8		5.8		11.5
Reservoir Storage Vo Live Storage Volume				m³		7,693,000 4,870,000		7,693,000 4,870,000		7,693,000 4,870,000		7,693,000 4,870,000
Dam Height at Minim		rating Level		m		33		33		33		4,870,000 33
Dam Height at Full Si				m		73		73		73		73
Dam Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length				m ₂		261		261		261		261
Reservoir Surface Ar	ea			m ²		427,000 F		427,000		427,000		427,000 F
Penstock Length Transmission Line Le	enath			km km		5 19		5 19		5 19		5 19
Access Road Length				km		5		5		5		5
					ESTIM	ATED CAPITAL	COSTS					
						16-Hour		12-Hour		8-Hour		4-Hour
		ds, Overhead, Contra	ctor's Profi	ts	\$	44,306,000		47,707,000	\$	54,237,000		72,776,000
Access and Site Prep Cofferdams and Cons		Water Management			\$ \$	10,101,000 667,000		10,101,000 667,000	\$ \$	10,101,000 667,000		10,101,000 667,000
Intake, Headrace, an					ф \$	1,967,000		2,623,000	э \$	3,934,000		7,868,00
Dam Construction		-)			\$	103,420,000		103,420,000	\$	103,420,000		103,420,000
Water Conveyance S					\$	24,703,000		29,045,000	\$	36,641,000		55,230,000
Powerhouse Constru-					\$	24,616,000		32,822,000 12,151,000	\$	49,233,000		98,465,000 15,354,000
Switchyard and Trans	smission				ծ \$	11,751,000 221,531,000		238,536,000	\$ \$	12,952,000 271,185,000		363,881,00
EPCM Costs (8% o	f Subtota	al)			\$	17,722,000	•	19,083,000	\$	21,695,000	•	29,110,000
Contingency (30%	of Subto	tal)			\$	66,459,000		71,561,000	\$	81,356,000		109,164,000
TOTAL ESTIMATED	OVERN	IGHT CAPITAL COST	Γ		\$	305,712,000) \$	329,180,000	\$	374,236,000	\$	502,155,000
				ES		ANNUAL OPERA						
Fixed Operating Cost	s (2% of	Capital)			\$	16-Hour 6,114,000) \$	12-Hour 6,584,000	\$	8-Hour 7,485,000	\$	4-Hour 10,043,000
Variable Operating C					\$	468,000		527,000	\$	550,000		550,000
TOTAL ESTIMATED					\$	6,582,000) \$	7,111,000	\$	8,035,000	\$	10,593,000
				ENERGY C	DUTPUT U	NDER AVERAGE	FLOW C	ONDTIONS				
Month				Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan Feb				MWh MWh		6,951 373		6,951 373		6,951 373		6,95 37:
Mar				MWh		4,667		4,667		4,667		4,66
Apr				MWh		9,922		9,922		9,922		9,92
May				MWh		21,712		27,670		30,892		30,892
Jun				MWh MWh		17,296 9,812		23,061 9,812		24,554		24,554
Jul Aug				MWh		2,924		2,924		9,812 2,924		9,812 2,924
Sep				MWh		4,459		4,459		4,459		4,459
Oct				MWh		2,160)	2,160		2,160		2,16
Nov Dec				MWh MWh		7,909 5,408		7,909 5,408		7,909 5,408		7,909 5,408
ENERGY OUTPUT (/	AVERAG	SE)		GWh/yr		93.6		105.3		110.0		5,400 110 .0
			FN	FRGY OUT		ER MINIMUM (FI						
Month				Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan Fab				MWh		4,957		4,957		4,957		4,95
Feb Mar				MWh MWh		(524		0 524		0 524		524
Apr				MWh		7,570		7,570		7,570		7,57
May				MWh		21,712		26,257		26,257		26,25
Jun				MWh		14,602		14,602		14,602		14,602
Jul Aug				MWh MWh		5,425 2,206		5,425 2,206		5,425 2,206		5,42
Sep				MWh		2,200		2,206		2,206 1,973		2,200 1,973
Oct				MWh		1,457		1,457		1,457		1,45
Nov				MWh		8,356	6	8,356		8,356		8,35
Dec ENERGY OUTPUT (I	FIRM)			MWh GWh/yr		3,808 72.6		3,808 77.1		3,808 77.1		3,808 77.
				-						(1.1		11.
				CA Units		ND ENERGY CO 16-Hour	ST METR	ICS 12-Hour		8-Hour		4-Hour
Motric				\$/MW	\$	15,273,000) \$	12,334,000	\$	9,348,000	\$	4-поиг 6,272,000
Metric Capacity Cost, Deper	ndable C	apacity		Ψ/1010 0	Ψ	,					÷	
Capacity Cost, Deper Capacity Cost, Install	ed Capa			\$/MW	\$	12,726,000) \$	10,277,000	\$	7,789,000	\$	5,226,000
Capacity Cost, Deper	ed Capa) \$) \$	10,277,000 3,126,000 4,268,000		7,789,000 3,401,000 4,852,000	\$ \$	

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SILVERHOPE CREEK

			BASIC	SITE PARAMET	ERS				Prin	
Northing N	-121.40				Catchme	nt Area at Intake			km²	235
Easting E	49.29					d Mean Annual Unit			_/s/km ²	7
Region	Lower Mainlan	nd			Mean An	nual Discharge (MA	D)	I	n³/s	12.
Estimated Footprint ha	280									
Month Jar	n Feb	ESTIMATED N Mar Apr	May	FLOWS TO RES	ERVOIR/II Jul	NTAKE (m ³ /s) Aug	Sep	Oct	Nov	Dec
Average 15.2	2 9.6	10.5 13.6	27.4	31.6	21.4	9.7	7.4	12.9	22.9	14.4
Firm (Low Flow) 8.0) 3.3	6.2 9.6	22.8	22.6	13.5	8.4	4.5	9.5	25.4	13.2
				IGN PARAMETE						
Dependable Capacity		MW	1	l6-Hour 20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity		MW		51		51		40 51		80
Gross Head		m		299		299		299		299
Design Flow, Qd		m ³ /s		20		20		20		32
MAD Multiplier at Qd		2		1.7		1.7		1.7		2.6
Reservoir Storage Volume		m ³		5,080,336		5,080,336		5,080,336		5,080,336
Live Storage Volume	eting Lovel	m ³		2,299,000		2,299,000		2,299,000		2,299,000
Dam Height at Minimum Oper Dam Height at Full Supply Lev		m m		33 34		33 34		33 34		33 34
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m		552		552		552		552
Reservoir Surface Area		m²		1,104,000		1,104,000		1,104,000		1,104,000
Penstock Length		km		9		9		9		9
Transmission Line Length Access Road Length		km km		25 1		25 1		25 1		25 1
			F071	·	0070			·		
				TED CAPITAL C		12-Hour		8-Hour		4-Hour
Mob, Demob, Insurance, Bond	ds, Overhead, Contra	actor's Profits	\$	54,071,000	\$	54,071,000	\$	54,071,000	\$	67,555,000
Access and Site Preparation			\$	14,758,000		14,758,000	\$	14,758,000	\$	14,758,000
Cofferdams and Construction			\$	1,803,000		1,803,000	\$	1,803,000	\$	1,803,000
Intake, Headrace, and Foreba Dam Construction	iy		ծ Տ	3,391,000 59,111,000		3,391,000 59,111,000	\$ \$	3,391,000 59,111,000	\$ \$	5,328,000 59,111,000
Water Conveyance System			\$	69,290,000		69,290,000	\$	69,290,000	\$	90,071,000
Powerhouse Construction			\$	52,125,000		52,125,000	\$	52,125,000	\$	81,885,000
Switchyard and Transmission			\$	15,805,000		15,805,000	\$	15,805,000	\$	17,264,000
SUB-TOTAL	-1)		\$	270,354,000		270,354,000	\$	270,354,000	\$	337,775,000
EPCM Costs (8% of Subtota Contingency (30% of Subtot			\$ \$	21,628,000 81,106,000	\$ \$	21,628,000 81,106,000	\$ \$	21,628,000 81,106,000	\$ \$	27,022,000 101,333,000
TOTAL ESTIMATED OVERNI		ST	\$	373,088,000	\$	373,088,000	\$	373,088,000	\$	466,130,000
		FST		NNUAL OPERA	TING COS	STS				
	•			16-Hour		12-Hour		8-Hour		4-Hour
Lived ()pereting ('eete /')u/				=	•		•	=	•	
Fixed Operating Costs (2% of	. ,		\$	7,462,000	\$ ¢	7,462,000	\$	7,462,000	\$	9,323,000
Variable Operating Costs (2% of Variable Operating Costs (\$0.0 TOTAL ESTIMATED OPERAT	005/kWh)			7,462,000 1,569,000 9,031,000		7,462,000 1,569,000 9,031,000	\$ \$ \$	7,462,000 1,569,000 9,031,000	\$ \$ \$	9,323,000 1,762,000 11,085,000
Variable Operating Costs (\$0.0	005/kWh)	ENERGY O	\$ \$ \$	1,569,000 9,031,000	\$ \$	1,569,000 9,031,000	\$	1,569,000	\$	1,762,000
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month	005/kWh)	Units	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour	\$	1,569,000 9,031,000 8-Hour	\$	1,762,000 11,085,000 4-Hour
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan	005/kWh)	Units MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215	\$	1,569,000 9,031,000 8-Hour 20,215	\$	1,762,000 11,085,000 4-Hour 20,215
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb	005/kWh)	Units MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511	\$	1,569,000 9,031,000 8-Hour 20,215 14,511	\$	1,762,000 11,085,000 4-Hour 20,215 14,511
Variable Operating Costs (\$0.0 TOTAL ESTIMATED OPERAT Month Jan Feb Mar	005/kWh)	Units MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511 19,473	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr	005/kWh)	Units MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511	\$ \$ FLOW CC	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511	\$	1,569,000 9,031,000 8-Hour 20,215 14,511	\$	1,762,000 11,085,000 4-Hour 20,215 14,51 19,473 24,368
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun	005/kWh)	Units MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793	\$ \$ FLOW CC	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,665
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul	005/kWh)	Units MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$ \$ FLOW CC	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug	005/kWh)	Units MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971	\$ \$ FLOW CC	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul	005/kWh)	Units MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,666 39,622 17,977 13,267
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep	005/kWh)	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,666 39,622 17,977 13,267 23,926 41,042
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,641
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ \$ UTPUT UN	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$ \$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793	\$	1,762,000 11,085,000 4-Hour 20,215
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,641 352.5
Variable Operating Costs (\$0. TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,977 13,267 23,926 41,042 26,641 352.5 4-Hour
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,641 352.5 4-Hour 12,423 3,924
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,644 352.5 4-Hour 12,423 3,924 11,458
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,641 352.5 4-Hour 12,423 3,924 11,458 17,267
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jun Jun Jun Jun Jun Jun Jun	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,641 352.5 4-Hour 12,423 3,924 11,458 17,267 46,124
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jun Jun Jun Jun Jun Jun Jun	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793	\$	1,762,000 11,085,000 4-Hour 20,215 14,511 19,473 24,368 54,767 56,665 39,623 17,971 13,267 23,926 41,042 26,644 352.5 4-Hour 12,423 3,924 11,458 17,267
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,665 39,623 17,977 13,267 23,926 41,042 26,644 352.5 4-Hour 12,423 3,924 11,458 17,267 46,124 40,607
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Ott Nov Dec ENERGY OUTPUT (AVERAG	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089	\$	1,569,000 9,031,000 8.Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8.Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,665 39,622 17,977 13,267 23,926 41,042 26,644 352.5 44,042 26,644 352.5 44,042 26,644 352.5 46,124 40,607 25,048 15,618 8,085
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,665 39,622 17,977 13,267 23,926 41,042 26,644 352.5 44,042 26,644 352.5 44,042 26,644 352.5 44,042 26,644 352.5 44,042 26,644 3,924 11,458 17,267 46,124 40,607 25,048 15,618 8,088 17,570
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793	\$	1,569,000 9,031,000 8.Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8.Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793	\$	1,762,000 11,085,000 4-Hour 20,215 14,517 19,473 24,368 54,767 56,665 39,622 17,977 13,267 23,926 41,042 26,644 352.5 4-Hour 12,423 3,922 11,458 17,267 46,122 40,607 25,048 15,618 8,088 17,570 45,688
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1	1,569,000 9,031,000 IDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570	\$	1,762,000 11,085,000 4-Hour 20,219 14,511 19,473 24,368 54,763 56,669 39,623 17,977 13,265 23,926 41,042 26,644 352.4 40,607 25,048 15,618 8,089 17,570
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jan Feb Mar Apr Month Jun Jul Aug Sep Oct Nov Dec	005/kWh) TING COST	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1 <u>PUT UNDE</u> 1	1,569,000 9,031,000 iDER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$	1,569,000 9,031,000 8.Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8.Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 24,469	\$	1,762,000 11,085,000 4-Hour 20,219 14,511 19,473 24,366 54,76 56,663 39,622 17,97 13,26 23,920 41,042 26,64 352,4 41,042 26,64 352,4 41,042 26,64 352,4 11,456 17,26 46,124 40,600 25,044 15,611 8,088 17,570 45,688 24,468 24,468
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM)	ee)	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1 <u>PUT UNDE</u> 1 PACITY AN	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3 D ENERGY COS 6-Hour	\$ FLOW CO	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$	1,762,000 11,085,000 4-Hour 20,219 14,511 19,473 24,366 54,76 56,663 39,622 17,97 13,266 23,920 41,042 26,64 352,4 40,600 25,044 15,611 8,083 17,570 45,683 24,464 268,3 4-Hour
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable Ca	apacity	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1 9 9 9 9 1 1 1 1 1 1 1 1 1 1 1 1	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3 ID ENERGY COM 6-Hour 18,654,000	\$ FLOW CO RM) FLOW	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3 CS 12-Hour 13,991,000	\$ \$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048	\$ \$	1,762,00 11,085,00 4-Hour 20,21: 14,51 19,47: 24,36i 54,76 56,66i 39,62: 17,97 13,26i 23,92i 41,04: 26,64 352.i 4-Hour 12,42: 3,92: 11,45i 17,26i 46,12: 40,60i 25,04: 15,61: 8,08: 17,57i 45,68: 24,46i 268.i 4-Hour 5,827,000
Variable Operating Costs (\$0.1 TOTAL ESTIMATED OPERAT Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVERAG Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM)	apacity	Units MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTI Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	\$ \$ UTPUT UN 1 <u>PUT UNDE</u> 1 <u>PACITY AN</u> 1	1,569,000 9,031,000 DER AVERAGE 6-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 R MINIMUM (FIF 6-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3 D ENERGY COS 6-Hour	\$ FLOW CO RM) FLOW	1,569,000 9,031,000 DNDTIONS 12-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 / CONDTIONS 12-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$ \$	1,569,000 9,031,000 8-Hour 20,215 14,511 19,473 24,368 41,859 36,793 38,019 17,971 13,267 23,926 36,793 26,641 313.8 8-Hour 12,423 3,924 11,458 17,267 41,859 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 25,048 15,618 8,089 17,570 36,793 24,469 251.3	\$ \$	1,762,00 11,085,00 4-Hour 20,21: 14,51 19,47: 24,36i 54,76 56,66i 39,62: 17,97 13,26i 23,92i 41,04: 26,64 352,1 4-Hour 12,42: 3,92: 11,45i 17,26i 46,12: 40,60i 25,04i 15,61: 8,08i 17,57i 45,68i 24,46i 268,1 4-Hour

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET COGBURN CREEK

					BASIC	SITE PARAME	TERS					Pri	nt: May/31/18 14:04:5
Northing	Ν	-121.62						ent Area a	at Intake			km ²	78
Easting	E	49.57					Estimate	d Mean	Annual Unit	Runoff		L/s/km ²	4
Region		Lower Mainland	ł				Mean Ar	nnual Dis	charge (MA	D)		m³/s	2.
Estimated Footprint	ha	200											
						FLOWS TO RES		INTAKE		_	2 /		
Month Average	Jan 2.0	Feb 1.3	Mar 1.7	Apr 3.8	May 10.1	Jun 9.5	Jul 3.7		Aug 1.1	Sep 1.7	Oct 0.8	Nov 3.0	Dec 2.0
Firm (Low Flow)	0.7	0.6	0.7	2.9	8.4	5.6	2.0		0.8	0.8	0.5	3.2	1.4
					DES	GIGN PARAMETE	RS						
						16-Hour		12-Hou	r		8-Hour		4-Hour
Dependable Capacity Installed Capacity				ЛVV ЛVV		20 21		27 29			40 43		80 86
Gross Head				n		474		29 474			474		474
Design Flow, Qd				n ³ /s		5		7			11		22
MAD Multiplier at Qd						2.4		3.1			4.7		9.4
Reservoir Storage Vol	lume			n ³		3,340,500			10,500		3,340,500		3,340,500
Live Storage Volume	um Oporati			n ³		2,181,000			31,000		2,181,000		2,181,000
Dam Height at Minimu Dam Height at Full Su				n n		22 54		22 54			22 54		22 54
Dam Type						CFRD		CFR	RD		CFRD		CFRD
Dam Crest Length				n		378		378			378		378
Reservoir Surface Are	ea			n ²		202,000		202,	,000		202,000		202,000
Penstock Length Transmission Line Ler	nath			km km		10 21		10 21			10 21		10 21
Access Road Length	ngui			śm		15		15			15		15
					ESTIM	ATED CAPITAL (COSTS						
	D ·			_		16-Hour		12-Hou		*	8-Hour		4-Hour
Mob, Demob, Insurand Access and Site Prepa		Overnead, Contra	ctor's Profits	5	\$ \$	43,107,000 16,662,000			6,578,000 6,662,000	\$ \$	53,116,000 16,662,000		71,167,000 16,662,000
Cofferdams and Cons		ater Management			э \$	374,000		10	374,000	э \$	374,000		374,00
Intake, Headrace, and		gg			\$	900,000			1,200,000	\$	1,800,000	\$	3,600,00
Dam Construction					\$	84,913,000			4,913,000	\$	84,913,000		84,913,00
Water Conveyance Sy Powerhouse Construct					\$	35,291,000			1,262,000	\$	51,587,000		76,312,00
Switchyard and Trans					ծ Տ	21,764,000 12,525,000			9,019,000 2,883,000	\$ \$	43,528,000 13,599,000		87,057,000 15,748,000
SUB-TOTAL					\$	215,536,000			2,891,000	\$	265,579,000		355,833,00
EPCM Costs (8% of					\$	17,243,000) \$	18	8,631,000	\$	21,246,000	\$	28,467,000
Contingency (30% o TOTAL ESTIMATED (r		\$ \$	64,661,000 297,440,000			9,867,000 1,389,000	\$ \$	79,674,000 366,499,000		106,750,000 491,050,00 0
					Ţ				1,303,000	Ψ	300,433,000	Ψ	431,030,000
				EST		ANNUAL OPERA 16-Hour	TING CO	STS 12-Houi	r		8-Hour		4-Hour
Fixed Operating Costs	•	. ,			\$	5,949,000		(6,428,000	\$	7,330,000		9,821,000
Variable Operating Co					\$ \$	477,000 6,426,000			529,000 6,957,000	\$ \$	602,000 7,932,000		602,000 10,423,00 0
							-			Ŧ	- , ,	•	
Month				Units		NDER AVERAGE 16-Hour		12-Hou			8-Hour		4-Hour
Jan				/Wh		7,250			7,250		7,250		7,250
Feb Mar				//Wh //Wh		1,011 5,115			1,011 5,115		1,011 5,115		1,01
Apr				//Wh		10,874			10,874		10,874		5,11 10,87
May				/Wh		19,830			25,160		33,489		33,489
Jun				/Wh		15,474			20,633		26,911		26,91
Jul Aug				//Wh //Wh		10,754 3,205			10,754 3,205		10,754 3,205		10,75 3,20
Sep				//Wh		4,887			3,205 4,887		4,887		4,88
Oct			Ν	/Wh		2,367	,		2,367		2,367		2,36
Nov Dec				/Wh /Wh		8,668			8,668 5 027		8,668		8,66
ENERGY OUTPUT (A	VERAGE)			GWh/yr		5,927 95.4			5,927 105.9		5,927 120.5		5,92 120 .
			EN	ERGY OUT	PUT UNDE	R MINIMUM (FII	RM) FLOV		TIONS				
Month				Units		16-Hour		12-Hou	r		8-Hour		4-Hour
Jan Feb				//Wh //Wh		5,065 C			5,065 0		5,065 C		5,06
Mar				//Wh		1,176			1,176		1,176		1,170
man				۸Wh		8,296	;		8,296		8,296	i	8,29
Apr				/Wh		19,830			25,160		28,408		28,40
Apr May				ЛWh		15,474 5,946			16,004 5,946		16,004 5,946		16,00 5,94
Apr May Jun				ЛWh		0.0+0							2,41
Apr May Jun Jul			Ν	//Wh //Wh		2,418	}		2,418		2,418	5	
Apr May Jun Jul Aug Sep			N N N	/Wh /Wh		2,418 2,162	2		2,162		2,162	2	2,16
Apr May Jun Jul Aug Sep Oct			N N N	MWh MWh MWh		2,418 2,162 1,597	,		2,162 1,597		2,162 1,597		2,16 1,59
Apr May Jun Jul Aug Sep Oct Nov			N N N N	AWh AWh AWh AWh		2,418 2,162 1,597 9,158	<u>,</u> ,		2,162 1,597 9,158		2,162 1,597 9,158		2,16 1,59 9,15
Apr May Jun Jul Aug Sep Oct Nov Dec	IRM)		N N N N N	MWh MWh MWh		2,418 2,162 1,597	2 7 8		2,162 1,597		2,162 1,597		2,16 1,59
Apr May Jun Jul Aug Sep Oct Nov Dec	IRM)		N N N N N	AWh AWh AWh AWh AWh GWh/yr	PACITY AI	2,418 2,162 1,597 9,158 4,174	2 3 1	ICS	2,162 1,597 9,158 4,174		2,162 1,597 9,158 4,174		2,16 1,59 9,15 4,17
Apr May Jun Jul Sep Dct Oct SNERGY OUTPUT (F Metric				//Wh //Wh //Wh //Wh GWh/yr CAI Units		2,418 2,162 1,597 9,158 4,174 75.3 ND ENERGY CO 16-Hour	ST METR	12-Hou	2,162 1,597 9,158 4,174 81.2		2,162 1,597 9,158 4,174 84.4 8-Hour		2,16 1,59 9,15 4,17 84 . 4-Hour
Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (F Metric Capacity Cost, Depen	dable Cap		N N N N C S	AWh AWh AWh AWh GWh/yr CAl Units 6/MW		2,418 2,162 1,597 9,158 4,174 75.3 ND ENERGY CO 16-Hour 14,845,000	2 3 5 5 5 5 5 5	12-Hou	2,162 1,597 9,158 4,174 81.2 r 2,030,000	\$	2,162 1,597 9,158 4,174 84.4 8-Hour 9,146,000))) \$	2,16 1,59 9,15 4,17 84 . 4-Hour 6,127,00
Apr May Jun Jul Aug Sep Oct Oct Dec ENERGY OUTPUT (F Metric	dable Cap		M M M M M M M M M M M M M M M M M M M	//Wh //Wh //Wh //Wh GWh/yr CAI Units		2,418 2,162 1,597 9,158 4,174 75.3 ND ENERGY CO 16-Hour	ST METR	12-Hou 12 1	2,162 1,597 9,158 4,174 81.2	\$ \$ \$	2,162 1,597 9,158 4,174 84.4 8-Hour	5	2,16 1,59 9,15 4,17 84 . 4-Hour

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET PITT RIVER

			BASIC SIT	TE PARAMETE	ERS				Pri	nt: May/31/18 14:04:59
Northing N	-122.71					t Area at Intake			km ²	43
Easting E	49.70			ſ	Estimated	Mean Annual Unit	Runoff		L/s/km ²	10
Region	Lower Mainla	and		ı	Mean Ann	ual Discharge (MA	D)		m³/s	31
Estimated Footprint ha	410									
		ESTIMATED M						•		_
	Jan Feb 19.1 19.3	Mar Apr 11.9 23.2	May 51.5	Jun 88.0	Jul 100.1	Aug 73.0	Sep 55.9	Oct 45.5	Nov 36.0	
	32.9 22.5	12.5 11.4	39.6	86.3	69.0	43.8	24.5	14.0	9.6	7.4
			DESIGN	PARAMETER	s					
Dan an dable. Oan a site		N 41 47	16-H		1	2-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity		MW MW		20 24		27 32		40 48		80 96
Gross Head		m		38		38		38		38
Design Flow, Qd		m³/s		76		102		152		305
MAD Multiplier at Qd			2	2.4		3.3		4.9		9.8
Reservoir Storage Volume		m ³		1,344,500		41,344,500		41,344,500		41,344,500
Live Storage Volume	nereties Level	m ³		25,857,000		25,857,000		25,857,000		25,857,000
Dam Height at Minimum O Dam Height at Full Supply		m m		31 38		31 38		31 38		31 38
Dam Type				CFRD		CFRD		CFRD		CFRD
Dam Crest Length		m	3	353		353		353		353
Reservoir Surface Area		m²		2,787,000		2,787,000		2,787,000		2,787,000
Penstock Length Transmission Line Length		km km	0) 22		0 22		0 22		0 22
Access Road Length		km	1			1		1		1
			ESTIMATE	D CAPITAL CO	DSTS					
		tractoria Draft	16-H	lour	1	2-Hour	•	8-Hour	^	4-Hour
Mob, Demob, Insurance, B Access and Site Preparatic		uractor's Profits	\$ \$	31,194,000 12,018,000	\$ \$	34,728,000 12,018,000	\$ \$	41,796,000 12,018,000		63,001,000 12,018,000
Cofferdams and Constructi		nt	э \$	4,996,000	э \$	4,996,000	э \$	4,996,000		4,996,000
Intake, Headrace, and Fore			\$	12,608,000	\$	16,810,000	\$	25,215,000		50,431,000
Dam Construction			\$	53,455,000	\$	53,455,000	\$	53,455,000	\$	53,455,000
Water Conveyance System	n		\$	762,000	\$	1,016,000	\$	1,524,000		3,047,000
Powerhouse Construction Switchyard and Transmissi	ion		ծ Տ	27,837,000 13,101,000	\$ \$	37,116,000 13,502,000	\$ \$	55,674,000 14,303,000		111,349,000 16,706,000
SUB-TOTAL			\$	155,971,000	\$	173,641,000	\$	208,981,000		315,003,000
EPCM Costs (8% of Sub			\$	12,478,000	\$	13,891,000	\$	16,718,000	\$	25,200,000
Contingency (30% of Sub TOTAL ESTIMATED OVER		Net	\$ \$	46,791,000 215,240,000	\$ \$	52,092,000 239,624,000	\$ \$	62,694,000 288,393,000		94,501,000 434,704,000
	RNIGHT CAPITAL CC		-		·		φ	200,393,000	φ	434,704,000
		EST	IMATED ANN 16-H	UAL OPERAT		rs 2-Hour		8-Hour		4-Hour
Fixed Operating Costs (2%	. ,		\$	4,305,000	\$	4,792,000	\$	5,768,000		8,694,000
Variable Operating Costs (TOTAL ESTIMATED OPER			\$ \$	606,000 4,911,000	\$ \$	647,000 5,439,000	\$ \$	647,000 6,415,000		647,000 9,341,000
			Ŧ		•		Ŷ	0,410,000	Ŷ	0,041,000
Month		Units	16-H	R AVERAGE F lour		2-Hour		8-Hour		4-Hour
Jan		MWh		6,438		6,438		6,438		6,438
Feb		MWh MWh		1,826		1,826		1,826		1,826
Mar Apr		N/IVV n		2,791				2,791		2,791
May				5 272		2,791 5 272				5 272
iniay		MWh MWh		5,272 15,925		2,791 5,272 15,925		5,272 15,925		5,272 15,925
Jun		MWh MWh MWh		15,925 17,300		5,272 15,925 19,976		5,272 15,925 19,976		15,925 19,976
Jun Jul		MWh MWh MWh MWh		15,925 17,300 17,877		5,272 15,925 19,976 23,484		5,272 15,925 19,976 23,484		15,925 19,976 23,484
Jun Jul Aug		MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131		5,272 15,925 19,976 23,484 17,131		5,272 15,925 19,976 23,484 17,131		15,928 19,976 23,484 17,13
Jun Jul Aug Sep		MWh MWh MWh MWh		15,925 17,300 17,877		5,272 15,925 19,976 23,484		5,272 15,925 19,976 23,484		15,925 19,976 23,484
Jun Jul Aug Sep Oct Nov		MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173		15,925 19,976 23,484 17,13 12,697 10,686 8,175
Jun Jul Aug Sep Oct Nov Dec	AGE)	MWh MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067		15,925 19,976 23,484 17,13 12,697 10,686 8,173 5,067
Jun Jul Aug Sep Oct Nov	AGE)	MWh MWh MWh MWh MWh MWh MWh MWh GWh/yr		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173		15,925 19,976 23,484 17,13 12,697 10,686 8,175
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units	PUT UNDER M 16-H	15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRM		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour		15,925 19,976 23,484 17,13 12,697 10,686 8,175 5,067 129.5
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month Jan	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRM bour 8,316		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316		15,925 19,976 23,484 17,13 12,697 10,686 8,173 5,067 129.5 4-Hour 8,316
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month Jan Feb	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRM Iour 8,316 2,499		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499		15,929 19,976 23,484 17,13 12,697 10,686 8,175 5,067 129.9 4-Hour 8,316 2,499
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month Jan Feb Mar	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRM bour 8,316		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316		15,929 19,976 23,484 17,13 12,697 10,686 8,175 5,067 129.9 4-Hour 8,316
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month Jan Feb Mar Apr May	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTH Units MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRM Iour 8,316 2,499 2,931 2,593 13,133		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133		15,929 19,976 23,484 17,13 12,697 10,686 8,175 5,067 129.9 4-Hour 8,316 2,499 2,937 2,595 13,135
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Month Jan Feb Mar Apr May Jun	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRF Iour 8,316 2,499 2,931 2,593 13,133 17,300		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600		15,929 19,976 23,484 17,13 12,697 10,686 8,175 5,067 129 ,9 4-Hour 8,316 2,499 2,937 2,595 13,133 19,600
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mer Month Jan Feb Mar Apr May Jun Jul	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRF Iour 8,316 2,499 2,931 2,593 13,133 17,300 16,199		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199		15,929 19,970 23,484 17,13 12,69 10,680 8,173 5,06 129 ,9 4-Hour 8,310 2,499 2,93 2,593 2,593 13,133 19,600 16,199
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mer Month Jan Feb Mar Apr May Jun Jul Aug	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRF Iour 8,316 2,499 2,931 2,593 13,133 17,300		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276		15,929 19,970 23,484 17,13 12,69 10,680 8,173 5,06 129 ,9 4-Hour 8,310 2,499 2,93 2,593 2,593 13,133 19,600 16,199 10,270
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER MERGY OUTPUT (AVER Mar Jun Jun Jun Jun Jun Jun Jun Jun Sep Oct	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRI 0000 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291		15,92: 19,97(23,48 17,13 12,69 10,68 8,17: 5,06 129. 4-Hour 8,31(2,49 2,93 2,59 13,13 19,60 16,19 10,27(5,555 3,29
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mar Man Feb Mar Apr May Jun Jul Aug Sep Oct	AGE)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRT Iour 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291 2,179		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8-Hour 8.316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179		15,92: 19,97(23,48 17,13 12,69 10,68 8,17: 5,06 129. 4-Hour 8,31(2,49 2,93 2,59 13,13 19,60 16,19 10,27(5,55 3,29 2,17
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER MERGY OUTPUT (AVER Mar Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	- 	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh		15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRI 0000 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291		15,92 19,97 23,48 17,13 12,69 10,68 8,17 5,06 129. 4-Hour 8,31 2,49 2,93 2,59 13,13 19,60 16,19 10,27 5,55 3,29 2,17 1,73
Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (AVER MERGY OUTPUT (AVER Mar Jun Jul Aug Sep Dot Nov Dec	- 	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	16-H	15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRF Iour 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291 2,179 1,739 86.0	1	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8-Hour 8.316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739		15,92 19,97 23,48 17,13 12,69 10,68 8,17 5,06 129 . 4-Hour 8,31 2,49 2,93 2,59 13,13 19,60 16,19 10,27 5,55 3,29 2,17 1,73
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM) Metric)	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	16-H	15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRI Iour 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291 2,179 1,739 86.0	1 <u>T METRIC</u> 1	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3 :S 2-Hour		5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3		15,92 19,97 23,48 17,13 12,69 10,68 8,17 5,06 129 . 4-Hour 8,31 2,49 2,93 2,59 13,13 19,60 16,19 10,27 5,55 3,29 2,17 1,73 88 . 4-Hour
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM) Metric Capacity Cost, Dependable	e Capacity	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	16-H PACITY AND E	15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRP IOUR 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291 2,179 1,739 86.0 ENERGY COS IOUR 10,762,000	1 <u>T METRIC</u> 1 \$	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3 :S 2-Hour 8,986,000	\$	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3 8-Hour 7,210,000	\$	15,92 19,97 23,48 17,13 12,69 10,68 8,17 5,06 129 . 4-Hour 8,31 2,49 2,93 2,59 13,13 19,60 16,19 10,27 5,55 3,29 2,17 1,73 88 . 4-Hour 5,434,00
Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (AVER Mar Apr May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (FIRM)	e Capacity	MWh MWh MWh MWh MWh MWh MWh GWh/yr ENERGY OUTF Units MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	16-Н РАСІТҮ AND Е 16-Н	15,925 17,300 17,877 17,131 12,697 10,686 8,173 5,067 121.2 IINIMUM (FIRI Iour 8,316 2,499 2,931 2,593 13,133 17,300 16,199 10,276 5,558 3,291 2,179 1,739 86.0	1 <u>T METRIC</u> 1	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 CONDTIONS 2-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3 :S 2-Hour	\$ \$	5,272 15,925 19,976 23,484 17,131 12,697 10,686 8,173 5,067 129.5 8-Hour 8,316 2,499 2,931 2,593 13,133 19,600 16,199 10,276 5,558 3,291 2,179 1,739 88.3	\$	15,92 19,97 23,48 17,13 12,69 10,68 8,17 5,06 129 . 4-Hour 8,31 2,49 2,93 2,59 13,13 19,60 16,19 10,27 5,55 3,29 2,17 1,73 88 .

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET NAHATLATCH RIVER

				BAS	IC SITE PARAMET	ERS				Print	,
Northing	Ν	-122.00		-	-		nt Area at Intake			km ²	93
Easting	E	49.90					I Mean Annual Unit			L/s/km ²	Ę
Region Estimated Footprint	ha	Lower Mainland 490	1			Mean Anr	nual Discharge (MA	D)		m³/s	34
-stimated Footprint	ha	490									
					Y FLOWS TO RES		· · · /				
Month	Jan 19.7	Feb 14.2	Mar Ap 19.3 36.			Jul 98.9	Aug 44.6	Sep 27.4	Oct 34.8	Nov 36.8	Dec 22.9
Average Firm (Low Flow)	9.7	7.0	9.1 20.			98.9 48.4	29.0	27.4	26.9	46.2	22.9
	-	-				-				-	
				DE	SIGN PARAMETE		40		0.11		4.11
Dependable Capacity			MW		16-Hour 20		12-Hour 27		8-Hour 40		4-Hour 80
Installed Capacity			MW		84		84		84		84
Gross Head			m		166		166		166		166
Design Flow, Qd			m³/s		61		61		61		61
MAD Multiplier at Qd	l		m ³		1.8		1.8		1.8		1.8
Reservoir Storage Vol _ive Storage Volume	lume		m ³		6,809,505 1.776.000		6,809,505 1,776,000		6,809,505 1,776,000		6,809,505 1,776,000
Dam Height at Minimu	ım Operati	na l evel	m		19		19		19		1,770,000
Dam Height at Full Su			m		20		20		20		20
Dam Type					CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m ₂		332		332		332		332
Reservoir Surface Are	ea		m ²		1,059,000		1,059,000		1,059,000		1,059,000
Penstock Length Transmission Line Ler	nath		km km		5 63		5 63		5 63		5 63
Access Road Length	igui		km		1		1		1		1
-				FOTH	ATED CAPITAL C	0979					
				ESTIN	16-Hour		12-Hour		8-Hour		4-Hour
Mob, Demob, Insurand		Overhead, Contra	ctor's Profits	\$	60,357,000	\$	60,357,000	\$	60,357,000	\$	60,357,0
Access and Site Prepa				\$	18,427,000		18,427,000	\$	18,427,000	\$	18,427,00
Cofferdams and Const		ater Management		\$	5,340,000		5,340,000	\$	5,340,000	\$	5,340,0
ntake, Headrace, and Dam Construction	гогерау			Ф \$	10,043,000 22,015,000		10,043,000 22,015,000	\$ \$	10,043,000 22,015,000	\$ \$	10,043,0 22,015,0
Vater Conveyance Sy	ystem			\$	64,107,000		64,107,000	\$	64,107,000	\$	64,107,0
Powerhouse Construc				\$	86,951,000		86,951,000	\$	86,951,000	\$	86,951,0
Switchyard and Transi	mission			\$	34,546,000		34,546,000	\$	34,546,000	\$	34,546,0
SUB-TOTAL EPCM Costs (8% of	Subtatal)			\$ ¢	301,786,000 24,143,000	\$ \$	301,786,000 24,143,000	\$ \$	301,786,000 24,143,000	\$ \$	301,786,0 24,143,0
Contingency (30% of				э \$	90,536,000	\$ \$	90,536,000	φ \$	90,536,000	э \$	24,143,00 90,536,00
TOTAL ESTIMATED (г	\$	416,465,000	\$	416,465,000	\$	416,465,000	\$	416,465,00
				ESTIMATED	ANNUAL OPERA		TS				
				LUTIMATED	16-Hour		12-Hour		8-Hour		4-Hour
Fixed Operating Costs	•	• •		\$	8,329,000	\$	8,329,000	\$	8,329,000	\$	8,329,00
Variable Operating Co TOTAL ESTIMATED (\$ \$	2,213,000 10,542,000	\$ \$	2,213,000 10,542,000	\$ \$	2,213,000 10,542,000	\$ \$	2,213,00 10,542,00
						•		Ŧ	10,012,000	Ŧ	
Month			ENER Uni		JNDER AVERAGE 16-Hour		ONDTIONS 12-Hour		8-Hour		4-Hour
Jan			MWh	13	15,597		15,597		15,597		15,59
Feb					- /						
Mar			MWh		12,476		12,476		12,476		12,4
Apr			MWh		19,849		19,849		19,849		19,84
			MWh MWh		19,849 36,433		19,849 36,433		19,849 36,433		19,84 36,43
May			MWh MWh MWh		19,849 36,433 66,274		19,849 36,433 66,274		19,849 36,433 66,274		19,8 36,4 66,2
May Jun			MWh MWh		19,849 36,433 66,274 60,420		19,849 36,433		19,849 36,433 66,274 60,420		19,8 36,4 66,2 60,4
May Jun Jul Aug			MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863		19,849 36,433 66,274 60,420 62,434 45,863		19,849 36,433 66,274 60,420 62,434 45,863		19,8 36,4 66,2 60,4 62,4 45,8
May Jun Jul Aug Sep			MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259		19,849 36,433 66,274 60,420 62,434 45,863 27,259		19,849 36,433 66,274 60,420 62,434 45,863 27,259		19,8 36,4 66,2 60,4 62,4 45,8 27,2
May Jun Jul Aug Sep Oct			MWh MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,8 36,4 66,2 60,4 62,4 45,8 27,2 35,8
May Jun Jul Sep Oct Nov			MWh MWh MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635		19,84 36,43 66,2 60,44 62,43 45,86 27,25 35,83 36,63
May Jun Jul Aug Sep Oct Nov Dec ENERGY OUTPUT (A	VERAGE)		MWh MWh MWh MWh MWh MWh MWh	r	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850		19,84 36,43 66,27 60,42 62,43 45,86 27,25 35,85 36,63 23,51
May Jun Jul Aug Sep Oct Nov Dec	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh MWh GWh /y		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510		12,47 19,84 36,43 66,27 60,42 62,43 45,86 27,25 35,85 36,63 23,51 442
May Jun Jul Sep Oct Nov Dec	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 / CONDTIONS 12-Hour		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour		19,84 36,43 66,27 60,42 62,43 45,86 27,25 35,85 36,63 23,57 442 4-Hour
May Jun Jul Sep Dot Ooc ENERGY OUTPUT (A Month Jan	VERAGE)		MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 (CONDTIONS 12-Hour 9,629		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629		19,84 36,43 66,27 60,42 62,43 45,86 27,25 35,85 36,63 23,57 442 4-Hour 9,62
May Jun Jul Sep Dot Ooc ENERGY OUTPUT (A Month Jan Feb	VERAGE)		MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 (CONDTIONS 12-Hour 9,629 5,854		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854		19,84 36,43 66,27 60,42 62,43 45,86 27,25 35,85 36,63 23,57 442 4-Hour 9,62 5,85
May Jun Jul Sep Dot Ooc ENERGY OUTPUT (A Month Jan Feb Mar	VERAGE)		MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330		19,84 36,43 66,22 60,44 62,43 45,86 27,24 35,84 36,63 23,5 442 4-Hour 9,67 5,88 9,33
May lun lul Sep Dot Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month lan Feb Mar Apr	VERAGE)		MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 (CONDTIONS 12-Hour 9,629 5,854		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854		19,84 36,43 66,22 60,44 45,86 27,24 35,84 36,63 23,55 442 4-Hour 9,62 5,84 9,33 20,33
May Jun Jul Sep Doct Nov Dec ENERGY OUTPUT (A ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420		19,8 36,4 66,2 60,4 62,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4
May Jun Jul Sep Doct Nov Dec ENERGY OUTPUT (A Month lan Feb Mar Apr May Jun Jun	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751		19,8 36,4: 66,2 60,4: 45,8 27,2: 35,8 36,6 23,5 442 4-Hour 9,6: 5,8 9,3: 20,3: 66,2 60,4: 49,7
May Jun Jul Sep Doct Sov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jun Jul	\VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847		19,8 36,4: 66,2 60,4: 45,8 27,2: 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4: 49,7 29,8
May Jun Jul Sep Doct Nov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul Jul Sep	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364		19,8 36,4 66,2 60,4 62,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3
May Jun Jul Sep Dot Sov Dec ENERGY OUTPUT (A Month Jan Feb Mar Apr May Jun Jul	VERAGE)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847		19,8 36,4 66,2 60,4 62,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3 27,7
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Mar Man Feb Mar Apr May Jun Jul Aug Sep Dot Nov			MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh GWh/y H MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UNE ts	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344		19,8 36,4 66,2 60,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3 27,7 45,9 22,3
May un ul Sep Dot Jov Dec ENERGY OUTPUT (A Month an Feb Mar Mar May un ul Sep Dot Jov Dec			MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UNE ts	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954		19,8 36,4 66,2 60,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3 27,7 45,9 22,3
May un ul Sep Dot Jov Dec ENERGY OUTPUT (A Month an Feb Mar Mar May un ul Sep Dot Jov Dec			MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh GWh/y H MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UNE ts	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344		19,8 36,4 66,2 60,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3 27,7 45,9 22,3
May un ul Sep Doct Jov Dec ENERGY OUTPUT (A Month an Seb Mar Mar May un ul Sep Doct Jov Dec ENERGY OUTPUT (F	IRM)		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UND ts r CAPACITY / ts	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 AND ENERGY COS 16-Hour	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 7 7 7 7 7 7 7 7 7 7 7 7 8 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 8 7 8 7 8 7 8 7 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 8 8 8 8 8 8 8 8 9 8 8 7 8 8 8 8		19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8		19,8 36,4 66,2 60,4 45,8 27,2 35,8 36,6 23,5 442 4-Hour 9,6 5,8 9,3 20,3 66,2 60,4 49,7 29,8 24,3 27,7 45,9 22,3 37 1 4-Hour
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	IRM) dable Cap		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	OUTPUT UND ts r CAPACITY / ts \$	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 AND ENERGY COS 16-Hour 20,805,000	RM) FLOW	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 CONDTIONS 12-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 CS 12-Hour 15,604,000	\$	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 8-Hour 10,402,000	\$	19,8 36,4: 66,2 60,4: 62,4: 45,8: 27,2: 35,8: 36,6: 23,5 442 4-Hour 9,6: 5,8: 9,3: 20,3: 66,2: 60,4: 49,7: 29,8: 24,3: 27,7 45,9: 22,3: 371 4-Hour 5 ,201,00
May Jun Jul Aug Sep Dot Nov Dec ENERGY OUTPUT (A Month Jun Jun Jun Jun Jun Jun Jun Jun Jun Jun	dable Cap		MWh MWh MWh MWh MWh MWh MWh MWh GWh/y ENERGY Uni MWh MWh MWh MWh MWh MWh MWh MWh MWh MWh	r ts CAPACITY / ts \$	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 DER MINIMUM (FIF 16-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 AND ENERGY COS 16-Hour	<u>ST METRIC</u> \$	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 7 7 7 7 7 7 7 7 7 7 7 7 8 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 8 7 8 7 8 7 8 7 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 8 8 8 8 8 8 8 8 9 8 8 7 8 8 8 8	\$	19,849 36,433 66,274 60,420 62,434 45,863 27,259 35,850 36,635 23,510 442.6 8-Hour 9,629 5,854 9,330 20,358 66,274 60,420 49,751 29,847 24,364 27,715 45,954 22,344 371.8		19,84 36,43 66,22 60,44 62,43 45,86 27,24 35,84 36,63 23,55 442 442 442 442 442 442 442 442 442 4

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BC HYDRO SMALL STORAGE HYDRO REGIONAL ASSESSMENT

SHORTLISTED SITE DATA SHEET SPUZZUM CREEK

					BASIC	SITE PARAMET	ERS				Pri	nt: May/31/18 14:04:5
Northing	N	-121.53					Catchme	ent Area at Intake			km ²	15
Easting	E	49.68						d Mean Annual Unit			L/s/km ²	4
Region Estimated Footprint	ha	Lower Mainland 120					Mean Ar	nual Discharge (MA	D)		m³/s	4.
	ha	120										
Mauth	lan	Fab				FLOWS TO RES			Can	Oat	Nev	Dee
Month Average	Jan 4.1	Feb 2.6	Mar 3.5	Apr 7.8	May 20.5	Jun 19.2	Jul 7.4	Aug 2.2	Sep 3.5	Oct 1.6	Nov 6.2	Dec 4.1
Firm (Low Flow)	1.5	1.2	1.4	5.9	17.0	11.4	4.1	1.7	1.5	1.1	6.5	2.9
					DES	IGN PARAMETE	RS					
						16-Hour		12-Hour		8-Hour		4-Hour
Dependable Capacity Installed Capacity	1		MW MW			20 30		27 30		40 40		80 81
Gross Head			m			30 419		30 419		40 419		419
Design Flow, Qd			m ³ /s	3		9		9		12		23
MAD Multiplier at Qd			2			1.8		1.8		2.5		4.9
Reservoir Storage Vo	olume		m ³ m ³			2,989,569		2,989,569		2,989,569		2,989,569
Live Storage Volume Dam Height at Minimu	um Onera	ting Level	m° m			990,000 14		990,000 14		990,000 14		990,000 14
Dam Height at Full Su	•	•	m			18		18		18		18
Dam Type						CFRD		CFRD		CFRD		CFRD
Dam Crest Length			m m²			178		178		178		178
Reservoir Surface Are Penstock Length	ea		m km			199,000 10		199,000 10		199,000 10		199,000 10
Transmission Line Le	ngth		km			10		10		10		10
Access Road Length	-		km			10		10		10		10
					ESTIMA	ATED CAPITAL C	OSTS					
Mob Demob Insures	Dee Pand	e Overhead Contra	otor's Drofita			16-Hour 26,754,000	¢	12-Hour 26 754 000	٩	8-Hour	۴	4-Hour
Mob, Demob, Insuran Access and Site Prep		s, Overneau, Contra	LIUI S MOIIIS		\$ \$	26,754,000 12,369,000	\$ \$	26,754,000 12,369,000	\$ \$	31,609,000 12,369,000	\$ \$	49,329,00 12,369,00
Cofferdams and Cons		Vater Management			\$	761,000	\$	761,000	\$	761,000	\$	761,00
Intake, Headrace, and	d Forebay	1			\$	1,430,000	\$	1,430,000	\$	1,915,000	\$	3,830,00
Dam Construction Water Conveyance S ¹	vetem				\$ ¢	7,940,000 45,891,000	\$ \$	7,940,000 45,891,000	\$ \$	7,940,000 53,939,000	\$ \$	7,940,00 79,889,00
Powerhouse Construct					φ \$	30,615,000	э \$	30,615,000	գ \$	40,992,000	φ \$	81,984,00
Switchyard and Trans	smission				\$	8,009,000	\$	8,009,000	\$	8,521,000	\$	10,541,00
SUB-TOTAL		、 、			\$	133,769,000	\$	133,769,000	\$	158,046,000	\$	246,643,00
EPCM Costs (8% of Contingency (30% of					\$ \$	10,702,000 40,131,000	\$ \$	10,702,000 40,131,000	\$ \$	12,644,000 47,414,000	\$ \$	19,731,00 73,993,00
TOTAL ESTIMATED			-		\$	184,602,000	\$	184,602,000	\$	218,104,000	\$	340,367,00
				EST		NNUAL OPERA		STS				
	(00) 54					16-Hour		12-Hour	<u>^</u>	8-Hour	•	4-Hour
Fixed Operating Costs Variable Operating Co					\$ \$	3,692,000 781.000	\$ \$	3,692,000 781,000	\$ \$	4,362,000 856,000	\$ \$	6,807,00 1,069,00
TOTAL ESTIMATED					\$	4,473,000	\$	4,473,000	\$	5,218,000	\$	7,876,00
			FN	FRGY OI		IDER AVERAGE	FLOW C	ONDTIONS				
Month				Units		16-Hour		12-Hour		8-Hour		4-Hour
Jan Feb			MW MW			9,969 5,161		9,969 5,161		9,969 5,161		9,96 5,16
Mar			MW			9,195		9,195		9,195		9,19
Apr			MW			19,548		19,548		19,548		19,54
May			MW			26,296		26,296		33,907		57,13
Jun Jul			MW MW			21,731 19,331		21,731 19,331		29,098 19,331		48,37 19,33
Aug			MW			5,761		5,761		5,761		5,76
Sep			MW			8,785		8,785		8,785		8,78
Oct Nov			MW MW			4,256 15,581		4,256 15,581		4,256 15,581		4,25 15,58
Dec			MW			10,654		10,654		10,654		10,65
ENERGY OUTPUT (A	AVERAGE	Ξ)	GW	h/yr		156.3		156.3		171.2		213.
			ENER	GY OUTP	UT UNDE	R MINIMUM (FIR	M) FLOW	V CONDTIONS				
Month Jan			MW	Units /h		16-Hour 6,041		12-Hour 6,041		8-Hour 6,041		4-Hour 6,04
Feb			MW			1,817		1,817		1,817		6,04 1,81
Mar			MW	'h		3,642		3,642		3,642		3,64
Apr Mov			MW			14,913		14,913		14,913		14,91
May Jun			MW MW			26,296 21,731		26,296 21,731		33,907 28,769		48,00 28,76
Jul			MW			10,688		10,688		10,688		10,68
Aug			MW			4,347		4,347		4,347		4,34
Sep			MW			3,886		3,886		3,886		3,88
Oct Nov			MW MW			2,871 16,463		2,871 16,463		2,871 16,463		2,87 16,46
Dec			MW	′h		7,502		7,502		7,502		7,50
ENERGY OUTPUT (F	FIRM)		GW	h/yr		120.2		120.2		134.8		148.
						ND ENERGY COS	ST METR					
Metric Capacity Cost, Depen	ndable Co	nacity	\$/M	Units W	\$	1 6-Hour 9,230,000	\$	12-Hour 6,923,000	\$	8-Hour 5,453,000	\$	4-Hour 4,255,00
					¢ ¢	6,116,000	э \$	6,116,000	ъ \$	5,397,000	ъ \$	4,255,00
	ed Capac	ity	2/IVI	VV	Ψ	0,110.000	U	0,110.000		0.001.000	u	7,211.00
Capacity Cost, Installe Energy Cost (Average Energy Cost (Firm)		ity	\$/M \$/G \$/G	Wh	\$	1,181,000 1,536,000	\$	1,181,000 1,536,000	\$ \$	1,274,000 1,617,000	\$ \$	1,592,00 2,285,00

NOTES:

1. VALUES PRESENTED ARE BASED ON CONCEPTUAL LEVEL DESIGN. ASSUMPTIONS MADE DURING THIS ASSESSMENT ARE NOTED IN THE ACCOMPANYING REPORT.

0	31MAY'18	ISSUED WITH REPORT VA103-647/1-1	SDR	KLA
REV	DATE	DESCRIPTION	PREP'D	RVW'D