Utilities Consumers' Group
(UCG)

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 1**

"On December 17, 2020, the Commissioner in Executive Council designated the Project as a regulated project under Part 3 of the Public Utilities Act pursuant to OIC 2020/180."

QUESTION:

a) Please provide a copy of all information provided to the Commissioner in Executive Council by YEC or other parties that convinced the Yukon government to designate this proposed Battery Energy Storage System project as a regulated project and details of the process that led to this designation.

ANSWER:

(a)

OIC 2020/180 designating the Project as a "regulated project" under Part 3 of the *Public Utilities Act* is a specific direction of the Yukon Government. Questioning the reasoning behind the enactment of this or any OIC is not within the jurisdiction of the Board.

REFERENCE: **YEC 2017-2018 GRA, page 5-31 and page 5-36**

"Battery Project – (forecast WIP cost of approximately $8.856 million by end of 2018 for planning, engineering, permitting, long-lead equipment procurement, civil work - project planned for completion in 2019)."

"Depending on the option selected, the TGS study indicates forecast costs for the Battery project between $21.7 and $27.4 million (including costs for planning, permitting and construction) for an initial 15 to 20 year life, after which a replacement battery is estimated to cost between $17.4 and $22.1 million (2016$)."

Board Order 2018-10: Reasons for Decision, December 27, 2018, pages 87-88

"Battery Project – (forecast WIP cost of approximately $8.856 million by end of 2018 for planning, engineering, permitting, long-lead equipment procurement, civil work - project planned for completion in 2019)."

"Depending on the option selected, the TGS study indicates forecast costs for the Battery project between $21.7 and $27.4 million (including costs for planning, permitting and construction) for an initial 15 to 20 year life, after which a replacement battery is estimated to cost between $17.4 and $22.1 million (2016$).

Proposed Battery Energy Storage System Project Application, pages 3 and 32

"The Project will involve a grid-sized BESS with 40 MWh of useful energy storage capacity and 20 MW of inverter and transformer capacity that together will provide 7.2 MW of dependable capacity (i.e., displace four 1.8 MW diesel rental units) to the YIS for 20 years, starting in the winter of 2022/23."

> "The preliminary capital cost estimate (2020$, +/- 30% accuracy) is $31.7 million; after the $16.5 million funding from the Federal government's Investing in Canada Infrastructure Program ("ICIP"), the preliminary net capital cost estimate for Yukon Energy is $15.2 million."
>
> "During the review of YEC's 2017/18 GRA, the YUB noted a concern that the technology used for battery storage has not been tested in a northern climate. Small scale lithium ion battery energy storage facilities have been successfully applied in the northern regions, including the Raglan Mine [Nunavik, Northern Quebec] completed in 2015; and Colville Lake completed by Northwest Territories Power Corporation in 2016.") for an initial 15 to 20 year life, after which a replacement battery is estimated to cost between $17.4 and $22.1 million (2016$)."

QUESTION:

a) Please provide a comparison of the current project proposal to the battery energy storage project contained within YEC's 2016-2030 Resource Plan and its 2017-2018 General Rate Application.

b) Please confirm that the current price estimate for the proposed Battery Energy Storage System is now between $22.19 million and $41.21 million provide 7.2 MW of dependable capacity and displace four 1.8 MW diesel rental units.

c) Please provide a comparison of the ongoing capital and operating costs of the proposed Battery Energy Storage System and the costs of four 1.8 MW diesel rental units.

d) Please provide a detailed year-by-year breakdown, with explanations, of the actual and forecast costs (both up to and after placing into service) for the proposed Battery Energy Storage System project.

e) Please confirm that the proposed cost of between $22.19 million and $41.21 million is only for an initial 15-20 year life after which battery replacement will be required. Please confirm the estimated cost of battery replacement.

f) Please confirm YEC's understanding that being awarded funding from Canada to support development of the proposed Battery Energy Storage System does not justify the project as being viable from a YUB perspective.

g) Please provide a table showing the impact the proposed Battery Energy Storage System project will have on the bills of ratepayers in the year it is scheduled to commence operation and each of the first 10 years of operation.

h) Please provide a comparison of the projects referenced in Northern Quebec and the Northwest Territories to YEC's proposed Battery Energy Storage System and explain in detail the capital and operating costs, the operating environment and alternatives considered to these other projects versus YEC's proposed project.

i) Please confirm that the last revenue requirement for YEC approved by the YUB was related to 2018 and that current rates do not recover any costs associated with the planning or commissioning of the proposed Battery Energy Storage System.

ANSWER:

(a)

The 2016 Resource Plan identified a lithium-ion battery as a preferred resource option, which was included in the 2017-18 General Rate Application. Resources considered in long-term planning exercises use initial project assumptions based on meeting load requirements. The feasibility engineering study completed by Hatch refined the design and cost estimates for the project based on a more detailed assessment of system requirements and current technical information.

(b)

Correct. The proposed BESS has a capital cost estimate of $31.7M with an accuracy +/- 30% resulting in a range of costs between $22.19M and $41.21M; and after the $16.5 million funding from the Federal Government's Investing in Canada Infrastructure Program (ICIP), the preliminary net capital cost estimate for Yukon Energy is $15.2 million.

The proposed BESS would provide 7.2 MW of dependable capacity, displacing four 1.8 MW diesel rental units.

(c)

Please see Table 4-3 in the Application and response to YUB-YEC-1-30(a).

(d)

Table 4-3 in the Application provides BESS project costs and savings by year for each of the 20 operating years. Capital costs details are provided in Table 3-4 and will be incurred in 2021 and 2022.

(e)

Battery replacement costs are not included in this estimate, which is for a 20 year project life. A determination of the best replacement for the BESS after the 20-year project life will be made when the batteries come to end-of-life, based on the current technology and grid requirements at that time, as well as any potential for project life extension. The cost will also be determined at that time, as there is uncertainty with regard to the price of technology options 20 years in the future. Please see also response to YUB-YEC-1-12(a).

(f)

As outlined in the Project Justification of the Application, YEC is proposing the BESS project as it provides a net ratepayer benefit compared to temporary diesel rentals. The provision of funding reduces the cost of the project, but is not a justification of project viability. The YUB must consider whether project costs are prudently incurred and reasonable.

(g)

Please see response to YUB-YEC-1-58(b) and (c).

(h)

UCG is requesting detailed information regarding capital and operating costs, operating environment and alternatives considered by developers of other projects of different scale and scope completed in Quebec and Northwest Territories. The requested information is not directly relevant to the assessment of the need and justification for the BESS project.

The application simply references the Raglan Mine [Nunavik, Northern Quebec] and the Colville lake project as examples of other battery projects completed in northern regions with cold climate conditions. The nature of the projects and developers are very different (i.e., one developer is a mine), compared to the current project and detailed information regarding costs, or alternatives considered for these other projects will not provide any material assistance to the Board in its review.

(i)

Confirmed. The last YUB approved revenue requirement for YEC was for the 2018 test year (as part of the 2017/18 GRA). The BESS was not forecast to come into service at that time and related BESS costs were not been included in rate base or customer rates as approved at that time.

REFERENCE: **YEC 2019 Annual Report, page 21**

"We received $16.5 million in federal funding to support the construction of our new battery storage system. Once completed, the new battery will be one of the largest grid-connected batteries in Canada."

YEC Website https://yukonenergy.ca/energy-in-yukon/projects-facilities/battery-storage/battery-timeline

"We received $16.5 million in federal funding to support the construction of our new battery storage system. Once completed, the new battery will be one of the largest grid-connected batteries in Canada."

February 21, 2021 News Release, YEC Website (https://yukonenergy.ca/media/site_documents/CORRECTED_Yukon_Energy_announces_battery_location_and_agreement_02222021.pdf)

"Yukon Energy announced today that the site on Robert Service Way near the Alaska Highway will be the future home of its grid-scale energy storage project in Whitehorse. Once complete, the 7 megawatt / 40 megawatt-hour battery will be the largest grid-connected battery in the North, and one of the largest in Canada." [Emphasis added]

QUESTION:

a) Please confirm YEC's intention to proceed with the proposed Battery Energy Storage System project even if the YUB denies recovery of the costs through rates charged to Yukoners.

b) Please confirm that YEC's timeline to have the proposed Battery Energy Storage System installed and operational by November 2022 includes completion of the YUB review process and the issuance by the Minister of Justice of an energy project certificate and an energy operation certificate by the end of June 2021.

ANSWER:

(a)

Yukon Energy is proceeding with planning activities required to obtain authorizations and approvals necessary for procurement to be initiated in July 2021 and to allow for initial civil construction to commence in August 2021. Part of this regulatory review process includes a Part 3 review where the YUB will provide its report and recommendations to the Minister of Justice regarding the need and justification for the project. The Board's report will inform the Minister's decision regarding the issuance of an Energy Project Certificate and Energy Operation Certificate for the Project and any applicable terms and conditions. Outcomes of this process will inform whether, and how, Yukon Energy can proceed with the Project.

The Project is not forecast to be completed until late 2022 and Project costs would not be reviewed by the Board until the next GRA (after 2021). The YUB will only be able to review costs for the Project if YEC is able to secure the necessary Energy Project Certificate and is able to proceed with completion of the Project.

(b)

The current timeline outlined in Section 3.1 of the Application anticipates completion of the Part 3 review, issuance of decision documents and securing all needed permits and approvals by the end of June to commence procurement and construction in July 2021.

A Project Energy Certification would be required to be issued in July 2021 prior to commencing construction; an Energy Operation Certificate would be issued after the project is commissioned and prior to the Project commencing operation.

Project timelines are subject to ongoing review and updating as required.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 3**

"The preliminary capital cost estimate (2020$, +/- 30% accuracy) is $31.7 million; after the $16.5 million funding from the Federal government's Investing in Canada Infrastructure Program ("ICIP"), the preliminary net capital cost estimate for Yukon Energy is $15.2 million."

QUESTION:

a) Please confirm whether there are any conditions related to the sue [sic] of the funding from the Investing in Canada Infrastructure Program.

ANSWER:

(a)

Please see response to YUB-YEC-1-47(a).

REFERENCE: **Proposed Battery Energy Storage System Project Application, pages 6-7, 10**

"Yukon Energy must have sufficient dependable capacity under its N-1 Dependable Capacity Criterion to meet its winter non-industrial peak load without its largest generator (currently the 37 MW Aishihik Hydro connected to Whitehorse by transmission). For the BESS to contribute to this N-1 capacity reserve, it needs to be able to reduce the non-industrial peak demand during the day, and then be recharged overnight, for up to two weeks during the coldest winter months."

"The purpose for the BESS in N-1 events is to reduce the daytime peaks. Given the extensive daily time period related to these peaks, the available energy capacity of the BESS will determine the maximum power reduction that can be achieved, since it will dictate the duration that energy can be supplied throughout the day. In the above figure, the BESS must supply energy over the entire period above the red "flat load" line to achieve 7.2 MW dependable capacity replacement associated with displacing four rented diesel units."

"Rented or permanent thermal generation options to provide N-1 capacity reserve cannot provide these additional benefits."

QUESTION:

a) Please provide the actual dependable capacity shortfall for each of the last 10 years and forecast for the next 10 years.

b) Please explain how there is a current and growing need for new capacity to meet requirements under the single contingency (N-1) criterion and provide an explanation of how the design and capacity of the proposed Battery Energy Storage System will be able to fill in that supply need.

c) If the proposed Battery Energy Storage System is replacing 4 rented diesel units, will they be physically removed from YEC property?

ANSWER:

(a)

YEC has rented temporary diesel units when necessary in order to address any dependable capacity shortfalls forecast in the last 10 years, starting after the 2016 Resource Plan identified an existing capacity shortfall. The forecasted dependable capacity gap without temporary diesel units is shown on Table 4-1 on page 28 of the Application.

(b)

Please refer to Table 4-1 on page 28 of the Application which shows the capacity growth and the current and increasing N-1 contingency shortfall. This increase in N-1 requirements is driven primarily by population growth, increased use of electricity, and electrification policy initiatives to address climate change (e.g., electric vehicles and increased electric heating). The BESS project will allow daytime peak loads to be shifted to the lower load hours at high, enabling it to provide 7.2 MW of additional dependable capacity to address this growing need.

(c)

The BESS project eliminates the need for four additional diesel units to address a part of the current existing dependable capacity shortfall. However, units may not be physically removed as the capacity shortfall is projected to increase due to load growth. In the absence of the BESS project, 4 additional diesel rental units would need to be added to the system.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 5**

"In order to have the Project in service by November 2022 (i.e., available for winter 2022/23), long lead BESS and related equipment need to be ordered by approximately mid-2021 and initial site preparation activities also need to be completed in August 2021. Yukon Energy is proceeding with the necessary work to advance the Project to a final "go" decision point targeted for July 1, 2021. A competitive procurement process has been initiated to select battery vendors qualified to design a battery able to meet Yukon Energy's operational requirements and Yukon's northern climate; selected vendors will then be evaluated based on technical specifications, prices, and other components. Thermal management and heating of the system will be critical for Yukon Energy when selecting the BESS vendor."

QUESTION:

a) Please provide an update on the battery vendor selection process, the documentation for the RFP process and the specific criteria upon which vendors will be evaluated.

b) Please confirm that all costs being incurred for the vendor selection process are not being recovered through existing rates and will form part of the final project costs.

c) Please confirm that none of the costs related to the proposed Battery Energy Storage System will be added to YEC's rate base until the project is in-service and the YUB has approved proposed additions to rate base.

ANSWER:

(a)

Please see response to YUB-YEC-1-13.

(b)

Confirmed. The forecast cost of procurement of the battery is captured in the Owner's Cost category of the capital cost estimate and will form part of the final project costs.

(c)

Not confirmed as regards adding to rate base. Projects are added to rate base after they are completed and in service. However, project costs included in rate base are not included in customer rates until they have been reviewed and approved by the YUB as part of a general rate application proceeding.

REFERENCE: **Proposed Battery Energy Storage System Project Application, pages 10-11**

"Hatch concluded that use of the BESS to provide supplementary reserve has the greatest economic benefit among the identified additional uses. The benefits of the BESS use for operating reserve when excess water is available were noted to be two-fold:

- A direct reduction in diesel and LNG genset operation hours and energy generation; and
- Improved efficiency of the hydro-turbines by operating them at their most efficient output more frequently, leading to more energy production with the same amount water flow."

QUESTION:

a) Please provide details of the reductions to YEC revenue requirements and ratepayers bills as a result of the benefits identified.

ANSWER:

(a)

See Table 4-3 in the Application and response to YUB-YEC-1-58. YEC is not attempting to forecast overall revenue requirements, rates, or components of YEC revenue requirement, in the Application, i.e., such matters are addressed in a GRA.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 10**

"Yukon Energy is also exploring options for potential use of BESS to stabilize hydro operation during periods of downstream winter ice formation, reducing downstream winter flooding and icing problems and enhancing hydro unit efficiencies."

QUESTION:

a) Please provide details of the other potential uses of the proposed Battery Energy Storage System being investigated and how these other uses will benefit Yukon ratepayers.

b) Please provide details of the net benefits (i.e., reductions to revenue requirements) expected from these potential uses.

ANSWER:

(a) and **(b)**

The Application reviews primary BESS use (N-1 capacity reserve) in Section 3.1.2.1 and other BESS uses in section 3.1.2.2. The benefits of these uses are detailed in the application (see Section 4.2.3 which reviews net ratepayer cost savings related to primary BESS use and other use cases. Net benefits are summarized in Table 4.3: Annual Ratepayer Impacts from BESS (20 MW/ 40 MWh).

To the extent other BESS uses and their net benefit are defined and readily quantifiable they are described in the Application, and specifically in Table 4.3.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 11**

"YEC cost saving and GHG reduction benefits from the BESS operating reserve use result from the reduction in thermal generation that otherwise is required when hydro units are used for operating reserve. Requirements to recharge the battery as a result of this use are infrequent, and would use excess hydro generation at minimal incremental YEC cost. Potential thermal generation reduction benefits from this BESS reserve use will be greater in years with higher water flows and lower in years with lower water availability."

QUESTION:

a) Please provide details for the next 10 years of the expected water flow / water availability and indicate when the proposed Battery Energy Storage System would be used.

ANSWER:

(a)

The requested information cannot be provided. Yukon Energy cannot forecast actual water flow/ availability for the period requested (i.e., typically YEC can only forecast actual water flows for a period of up to about 18 months); and similarly, cannot indicate when the BESS would be used over the next 10 years.

See response to YUB-YEC-1-66(c) regarding information on long term average water flows.

REFERENCE: **Proposed Battery Energy Storage System Project Application, pages 18 and 30**

"In summary, it is concluded that the specified need to meet near term forecast requirements for reliable and flexible new capacity on the Yukon grid would best be met through development of the Project. Compared to the feasible and best alternative available today (i.e., diesel rental), at forecast grid loads the Project provides a cheaper and renewable focused energy option for Yukon Energy and Yukon ratepayers."

"Standing Offer Program (SOP) and Micro-Generation Program: The SOP is outlined in the Independent Power Production (IPP) Policy of the Yukon territorial government issued in 2015. The SOP is included in the 10-Year Renewable Electricity Plan with 40 GWh / year of energy delivered by the IPP sector by the year 2024. The Micro-Generation Policy issued by the Yukon government in October 2013 is applicable to projects up to 50 kW. The micro-generation included in the 10-Year Renewable Electricity Plan envisions 6.5 GWh / year of delivered energy by the year 2024. However, no dependable capacity is available from SOP and micro-generation projects because they will be comprised of intermittent renewable resources such as wind and solar."

"Demand Side Management (DSM): DSM involves using incentives, electricity rate structures, and building and appliance codes and standards to encourage customers to reduce the amount of electricity they use. The current focus of the DSM programs is on measures that deliver peak capacity savings (i.e., reductions in peak electricity consumption). The DSM programs are expected to reduce peak demand by 7 MW by 2030/31."

QUESTION:

a) Does YEC currently have a planning strategy to consider facility and non-facility alternatives in tandem to address long-term system constraints / needs such that an optimized and economic solution is proposed to meet the identified constraint or need? Please explain this strategy in detail and how it has been used in related to the proposed Battery Energy Storage Project.

b) Please describe the key linkages between YEC's infrastructure planning process and its electricity supply planning process, with an emphasis on any considerations relevant to the role of integrated resource planning alternatives. For example, if an integrated resource planning alternative was under consideration to address an infrastructure planning need, could and would YEC take into account as part of its evaluation the impact (if any) of this alternative on its electricity supply needs and costs?

c) In relation to longer-term system needs that may not materialize, does YEC believe that there is any opportunity to incorporate this planning information on system needs into its DSM plans and activities to allocate more of its DSM efforts to the areas where these longer-term needs have been identified, without negatively impacting the overall performance of its DSM efforts?

d) Does YEC agree that in addition to cost, reliability, safety, sustainability and broadly protecting the interests of customers are relevant factors in evaluating and comparing alternative solutions to system needs?

e) Does YEC agree that the YUB has the jurisdiction to review the reasonableness of final project costs before any costs are recovered from ratepayers? When would ratepayers be expected to start paying the costs of the proposed Battery Energy Storage System assuming that YEC was given approval to proceed?

f) Does YEC believe that it is equally incented between developing facility infrastructure and pursuing alternatives like DSM investments?

g) Please indicate whether YEC has or expects to make capacity funding available to Indigenous communities in order to facilitate their participation in relation to the planning and development of the proposed Battery Energy Storage System.

h) Please confirm that YEC is committed to working with Indigenous peoples to achieve benefits for them resulting from YEC's projects and operations, including opportunities in training and education, employment, procurement, business development and community development.

i) Please outline the current areas of public policy that YEC believes are being supported by and align with the proposed Battery Energy Storage System project.

ANSWER:

(a)

Yes. Please see Yukon Energy's 10-Year Renewable Electricity Plan provided as Attachment 1 to this response.

The plan expanded on work completed for Yukon Energy's 2016 Resource Plan, with a specific focus on advancing renewable energy projects to meet renewable portfolio standards articulated in 'Our Clean Future: A Yukon Strategy for Climate Change, Energy and a Green Economy', and updating load forecasts to anticipate additional load growth arising from electrification initiatives supported in 'Our Clean Future: A Yukon Strategy for Climate Change, Energy and a Green Economy'.

The updates conducted for the 10-Year Renewable Electricity Plan consisted of a new long term load forecast, expansion of existing hydro inventory, update of financial resource attributes, portfolio analysis and an action plan charting the path for resource development and implementation over the next 10 years.

YEC's load forecasts have identified a growing gap in then N-1 Resource Capacity; and the 10-Year Renewable Electricity Plan examines a wide range of near term resource supply options to address forecast energy and capacity shortfalls. Yukon Energy currently rents diesel gensets to address the capacity gap; however, a Battery Energy Storage System was identified in the Resource Plan as one available near-term renewable option to address the capacity gap and reduce the number diesel gensets required to be rented.

See also discussion of alternatives provided in Section 4.2 of the Application.

(b)

The question is not clear and it is not clear what the author means by" YEC's infrastructure planning process" and "its electricity supply planning process". Details of Yukon Energy's integrated resource planning process are outlined in the response to part (a) above which provides a link to the 10-Year Renewable Electricity Plan.

(c)

The question is not clear as to what is meant by “longer term system needs that may not materialize” or “areas where these longer-term needs have been identified”.

As noted in part (a) of this response, the 10-Year Renewable Electricity Plan includes updated information regarding long term load forecasts and other information including an expansion of the existing hydro inventory, an update of financial resource attributes, portfolio analysis and an action plan charting the path for resource development and implementation over the next 10 years. Yukon Energy undertakes updates to its resource plan on an ongoing basis to consider new information as required. These updates will consider DSM, as well as new information on other electricity or capacity supply alternatives. The 10-Year Renewable Electricity Plan also considered a number of load forecast scenarios to evaluate the impact of key uncertainties.

As noted at page 30 of the Application, the current focus of DSM programs is on measures that deliver peak capacity savings (i.e., reductions in peak electricity consumption) and are expected to reduce peak demand by 7 MW by 2030/31.

(d)

YEC agrees that ratepayer interests are addressed in the planning process through consideration of criteria such as cost, reliability, safety, sustainability.

(e)

The Board must complete a review, during a YEC general rate application (GRA) process, of Project costs and determine that such costs were prudently incurred prior to such costs being included in rates. This prudence review of the BESS project is not part of YEC’s 2021 GRA (as the project is not forecast to come into service until 2022) and would therefore need to be part of YEC’s next GRA.

(f)

The question is not clear. Yukon Energy’s planning requirements are outlined in the 2016 Resource Plan and the 10-year Renewable Electricity Plan.

As the primary provider of bulk generation and transmission on the Yukon integrated system Yukon Energy is required to ensure sufficient generation and capacity is available to provide safe and reliable service to the Yukon Integrated System. Yukon Energy must also plan its system in a manner that meets regulatory requirements, and Yukon government policy objectives and guidance provided by the Yukon Government.

The 2016 Resource Plan and 10-Year Renewable Electricity Plan identify how DSM programs and supply and capacity projects are required and being planned to supply ongoing system needs in a manner that adheres to regulatory requirements and government policy directions. OIC 2021/16 provides direction to enable YEC to recover costs reasonably incurred to provide or participate in a demand-side management program.

(g)

To date, YEC has not provided capacity funding to its First Nations partners on the project. A Project Agreement with each First Nation will determine the specific benefits to be provided for the project, including consideration of any capacity funding if appropriate.

(h)

Confirmed.

(i)

Please see responses to YUB-YEC-1-1(f) and YUB-YEC-1-1(g).

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 22**

"As discussed in Section 4 below, the 10-Year Renewable Electricity Plan outlines a number of new projects being planned over the next decade to meet Yukon's growing electricity needs. Many of these projects connect to the grid via the Whitehorse Rapids facility, including the BESS, diesel retirement replacement, hydro uprating projects, and the rental diesel units required to meet N-1 planning criterion. Accordingly, YEC is undertaking the Whitehorse Interconnection Project to facilitate the connection of these required capacity resources to the grid in the Whitehorse area.

The Whitehorse Interconnection Project will require design and engineering to change the interconnection configuration for generation assets at Whitehorse to avoid creation of a new N-1 contingency at the S-150 substation. This will likely include routing several connections to the Riverside substation. Completion of this project will facilitate the connection of the BESS and the other identified generation projects to the Whitehorse Rapids facility."

QUESTION:

a) Please explain whether the Whitehorse Interconnection Project would be required at the existing planned level if the Battery Energy Storage System project did not proceed.

ANSWER:

(a)

Please see response to YUB-YEC-1-3(e).

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 22**

"An assessment by the Yukon Environment and Socio-economic Assessment Board (YESAB) Designated Office (DO) is required under the Yukon Environmental and Socio-economic Assessment Act (YESAA) related to specific land use activities required to construct and operate the Project. Land use assessments by NAV Canada and Transport Canada for aviation safety will also be required.

The YESAA assessment has not been initiated at this time. Yukon Energy is undertaking procurement to select a contractor to complete desktop studies required to complete the baseline studies and effects assessment as required to complete the YESAA Project Proposal. This work is targeted to be completed in March 2021 with the Project Proposal filing with the DO by March 31, 2021. The YESAA assessment process is expected be completed and Decision Documents issued by Decision Bodies before the end of June 2021."

QUESTION:

a) Please provide an update on the preparation of project proposal filing to the Yukon Environment and Socio-economic Assessment Board Designated Office.

b) Please provide details of the amount of YESAB-related costs that have been incurred to date and forecast, separated by year. Please ensure that the detail provided is not simply a single number but an actual breakdown of the types of costs incurred.

c) Please confirm that all YESAB-related costs have been incorporated into the total estimated cost of the proposed Battery Energy Storage System project proposed to be recovered from Yukon ratepayers.

ANSWER:

(a)

Please see response to JM-YEC-1-26.

(b)

Please see the Table below.

	2020	2021 actual	2021 forecast
YEC Cost	$ 4,882	$ 4,881	$ 10,000
Consultants and contractors	$ 7,331	$ -	$ 30,000
Total	**$ 12,213**	**$ 4,881**	**$ 40,000**

(c)

The costs of the YESAA assessment process are captured in the Owners Cost category of the capital costs shown in the Application and will form part of the final project costs that are proposed to be recovered from ratepayers.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 23**

"While the assessment and YESAA review is yet to be completed – due to the nature of the Project and due to the outcomes of consultation and site selection processes undertaken to date, the Project is not expected to have any significant environmental effects (e.g., impacts on aquatic environment, vegetation, wildlife or wildlife habitat) or socio-economic effects (e.g., recreation, human health, aesthetic quality, transportation, economy and ratepayers). This conclusion reflects careful consideration of the Project design, as well as consideration of standard mitigation measures that reduce or eliminate potential adverse effects. Some residual effects will occur (e.g., physical presence of the facilities will result in an altered landscape and other changes as long as the facilities are in place), but these are not expected to be significant given the developed and industrial nature of the immediate surroundings that have been persistent on the landscape for the last 55 years or more. The selected site is sheltered from related roadways and is not adjacent to any potentially non-compatible land use.

The Project will also have positive environmental and socio-economic effects. Notably, the Project is expected to provide for reduced greenhouse gas and particulate emissions resulting from the displacement of thermal generation emissions, reduced impacts from YIS disruptions, and enhanced ability to integrate new renewable generation. Other positive effects include the potential for local jobs and business activity during the construction period (including opportunities for KDFN and TKC), savings for Yukon ratepayers compared to what would be required with continued reliance on diesel rentals, and potential business, employment and investment opportunities for KDFN and TKC."

QUESTION:

a) Please provide copies of all internal and external analyses, correspondence and notes that led to these conclusions related to the anticipated environmental socio-economic effects.

b) Please provide YEC's opinion on whether the YUB's determinations on the proposed Battery Energy Storage System project should wait for conclusions of the YESAB to be determined and published.

ANSWER:

(a)

Please see YUB-YEC-1-46(a) which provides the "Grid Scale Battery What We Heard" report prepared by Stantec that summarizes the public and stakeholder engagement process for the Project.

Attachment 1 to this response provides a letter report developed by EDI Environment Dynamics in August 2020. This provides an initial environmental evaluation of sites assessed by YEC for the Project.

(b)

The determinations to be made by the YUB are not dependent on the conclusions of the YESAA process; and, as was the case for prior YUB Part 3 reviews, the YUB should not need to wait on the results of that process to complete its review and recommendations to the Minister of Justice.

The following is noted in this regard – further details are provided in Section 3.4 and 6.2 of the Application:

1. The Project requires only a Designated Office level assessment which is a less onerous review process, compared to an Executive Committee assessment. It is expected that the Designated Office review can be completed on a timely basis.

2. The Project assessable activities relate to land use activities and construction activities for a 1.7 km 34.5 kV transmission line. The project will be located on a greenfield site on land which will be zoned for utility use at the northeast corner of the Alaska Highway and Robert Service Way (south access road) on KDFN Category B Settlement land within an existing environmental and socio-economic setting that has seen commercial and industrial development activities over a sustained period of time. Most of the proposed 1.7 km transmission line connecting the Project to Yukon Energy's Whitehorse Rapids facility fenceline will follow a pre-existing trail and right-of-way (ROW). Given the nature of the land use activities and the fact that the transmission line is short and largely along existing easements or ROWs, the regulatory risk related to the assessment to be undertaken by YESAA for the BESS is considered very low.

As noted in Section 6.2 of the Application, due to the nature of the project, there are no anticipated material risks of major design modifications resulting from the regulatory approvals and review process for this specific project. The Project will be built using conventional construction technologies suited for northern climate conditions and following all applicable construction and design practices for works of this nature, including building and electrical codes and adhering to industry best practices. No special added costs are anticipated at this time to be required to comply with anticipated material condition in the approvals or permits.

ENVIRONMENTAL DYNAMICS INC.

2195 – 2nd Avenue
Whitehorse, YT Y1A 3T8
P: (867) 393-4882

August 11, 2020

EDI Project No: 20Y0218

Yukon Energy Corporation
#2 Miles Canyon Road
Whitehorse, YT Y1A 6S7

Attention: Stephanie Whitehead, Resource Planning Engineer

RE: Environmental Evaluation of Proposed Battery Storage Facility Site

Yukon Energy Corporation (YEC) is considering three candidate sites for a potential battery storage facility in the Whitehorse area. The purpose of this assessment was to conduct an evaluation of environmental conditions at the three candidate sites to inform the site selection process. Two of these sites (the Robert Service Way [Lower] Site and the Takhini Substation Site) were assessed by EDI in 2019 for a thermal facility proposed by YEC (EDI Environmental Dynamics Inc. 2019). As the battery storage facility would have similar environmental effects as a thermal facility, results from the 2019 survey for these two sites were used for this assessment. The third site, the Robert Service Way (Upper) Site, was assessed in July 2020 and detailed information from the assessment is presented here. For detailed information about the other two sites, refer to the 2019 assessment letter (EDI Environmental Dynamics Inc. 2019). Summary information for all three sites is presented in this letter.

Methodology

The assessment of each site included a desktop review of available information and a reconnaissance-level field survey. The desktop assessment focused on environmental criteria and indicators adapted from a broader review of potential energy resource options evaluated in 2016 (Intergroup Consultants Ltd et al. 2016) (Table 1). In addition to the original indicators, a 'catch-all' indicator, "Other Environmental Values", was added to document any other environmental concerns that were encountered during this assessment. The information examined in the desktop assessment was mostly GIS data, including hydrological data (streams, waterbodies, wetlands), fish distribution information, protected and conservation areas, Wildlife Key Areas (Environment Yukon 2016), caribou ranges, forest cover data and high-resolution satellite imagery. In addition to the GIS data, known occurrences of species of concern within 1,000 m of the potential sites were queried from the Yukon Conservation Data Centre. Potential effects to each indicator at each site were ranked as No Linkage, Low, Moderate, or High according to the criteria described in the 2016 Resource Options Evaluation (Intergroup Consultants Ltd et al. 2016).

A reconnaissance-level field survey was conducted at the Robert Service Way (Upper) Site to identify potential stand and site-level environmental values that are not available from GIS data and background information. This survey followed the same methodology as 2019 surveys. Field surveys included evaluation of three components: (1) vegetation and wildlife habitat conditions, (2) wildlife occurrences and features, such as nests, trails, and dens, and (3) water features.

Prior to field surveys, vegetation communities within 500 m of the site were stratified into habitat types based on vegetation cover and structural stage. The survey route consisted of a meandering transect selected using high-resolution satellite imagery, to provide representative coverage of the habitat strata within and adjacent to the proposed site. Transect density was highest within 200 m diameter of the site centre (i.e. the potential project footprint area) and diminished with increasing distance from the site. Generally, surveys were limited to areas within a radius of 500 m of the site centre unless a potential wildlife feature or productive habitat area was identified from the satellite imagery. Habitat types were classified and described in the field following procedures outlined in *Field Manual for Describing Yukon Ecosystems* (Yukon Government Department of Environment 2017) and the ecosite guide *Southern Lakes Boreal Low Subzone (BOLsl): A Field Guide to Ecosites Identification* (Environment Yukon 2017). Vegetation surveys considered the potential for rare plants to occur, based on ecosystem types present. The rare plant survey methodology was based on the *Alberta Native Plant Council (ANPC) Guidelines for Rare Plant Surveys in Alberta* (Alberta Native Plant Council 2012). Results presented here should be considered as an assessment of the potential for rare plants to occur. A more focused rare plant survey may be warranted for the final site that is selected.

Wildlife surveys focused on locating wildlife features such as raptor nests, bank swallow colonies, dens, well-defined trails and mineral licks. Wildlife observations and general information about habitat values and wildlife sign (e.g. lichen cover for caribou, woodpecker forage sign) were recorded as encountered.

The field crew searched for small water features (i.e. features not visible in the satellite imagery) but none were noted within 200 m of the site.

Results – Robert Service Way (Upper) Site

The dominant ecosite on and surrounding the proposed battery storage facility footprint on the Robert Service Way (Upper) Site is 01: SwAP-Twinflower ecosite, consisting of a P22: Lodgepole Pine/Soapberry vegetation association (Map 1). Most of this ecosite is at a Young Forest structural stage, although a small area along the proposed access road is Mature Forest.

Most of the proposed transmission line footprint follows a pre-existing trail and cutline that consists of three distinct habitats on route to the YEC generating facility (Map 1):

- a narrow band of regenerating lodgepole pine, trembling aspen, and white spruce at a seral Pole-Sapling structural stage along the cutline;
- a narrow band of 01-SwAP-Twinflower ecosite in a ASw06: Trembling Aspen-White Spruce/Soapberry/Fireweed vegetation association at a seral Tall Shrub structural stage under the existing transmission line;

- a cleared area at the bottom of the hill off of the south access of Robert Service Way. Part of this cleared area is currently used for recreational dirt biking.

It is assumed that the proposed transmission line would be constructed on these existing seral areas. However, two adjacent forest areas could be affected. One is the 01-P22 ecosite near the proposed facility location described above. The second is a 01: SwAP-Twinflower ecosite in a Sw26: White Spruce/Soapberry/Step Moss vegetation association at a Mature Forest structural stage (Map 1). Three additional cleared areas occur near the proposed facility, including a gravel pit along the Alaska Highway. These cleared areas are characterized by a high occurrence of introduced and disturbance-induced plant species, including several species recognized as invasive in Yukon (Environment Yukon 2012).

Signs of deer (tracks, pellets, trails, antler rubs) and both ground and red squirrel (burrows, middens, auditory observations) were observed sporadically throughout the Robert Service Way (Upper) Site. One coyote den was found in the young lodgepole pine forest approximately 150 m west of the proposed battery storage facility footprint, and evidence of porcupine feeding was noted on numerous trees along the proposed transmission line footprint. With the exception of the coyote den, no wildlife features, including raptor nests, bank swallow colonies, well-defined trails, or mineral licks were detected during the survey. The coyote den would not be directly impacted by developing the site, and so is not considered a feature of management importance. Coyotes tolerate human activity (as evidenced by the location of this den near the Alaska Highway) and the animals using that den are likely to either continue using it, or relocate to a new den nearby, without any effects to raising young. Bird species observed incidentally included Savanna Sparrow, Dark-eyed Junco, American Robin, Yellow-rumped Warbler, and Swainson's Thrush.

No wildlife species of concern were observed in the Robert Service Way (Upper) Site during the field survey. Based on habitat and range, Olive-sided Flycatcher and Common Nighthawk may occur in the survey area. Two occurrences of species of concern were obtained from the Yukon Conservation Data Centre, but both were outside the potential zone of influence of the Project. One was of a Rusty Blackbird by the Ice Lake Road, approximately 1,000 m northwest of the Robert Service Way (Upper) Site. The other was of Dune Tachinid Fly approximately 1,300 m across the Yukon River/Schwatka Lake.

Summary of the Three Sites

A summary of the key results of this assessment for the three sites is provided in Tables Table 1 and Table 2. For detailed field information for the Robert Service Way (Lower) Site and Takhini Substation Site refer to EDI Environmental Dynamics Inc. (2019). The forested ecosystems observed across all three candidate sites are all common types for the Boreal Low bioclimate zone of Yukon and rare plants are not typically associated with them. Ecosystems that typically host rare plant species are generally uncommon on the landscape and include some types of wetlands, groundwater springs, grasslands, sand dunes, saline areas, and unglaciated areas (Environment Yukon 2017). No especially productive wildlife habitats or concentrations of wildlife sign were noted at any of the three candidate sites.

Management Implications

Based on the information compiled for this evaluation, nothing stands out as a potentially 'significant' environmental value in the context of an Environmental Assessment. Environmental values considered in this assessment are mostly ranked Low or No Linkage and do not preclude development at any of the sites evaluated. However, potential effects do vary somewhat across sites at the site level (Tables 1 and 2).

There were numerous invasive plant species observed in the clearings adjacent to the Robert Service Way (Lower) and Robert Service Way (Upper) Sites, particularly in the clearing currently used for dirt biking at the northeast end of the proposed transmission line associated with the Robert Service Way (Upper) Site. Surface disturbance and travel in these areas has high potential to spread invasive species throughout the footprint and into adjacent forested areas. If either of these sites are selected, appropriate mitigations should be incorporated into development to minimize the potential for invasive species spread.

Closure

If you have any questions about this assessment, please contact Todd Mahon or Elaine Kennedy at 867-393-4882.

Yours truly,

EDI Environmental Dynamics Inc.

Submitted by email

Todd Mahon, MSc. RPBio
Senior Wildlife Ecologist

Submitted by email

Elaine Kennedy, BSc. PBiol
Vegetation Ecologist

Attachments:

- Table 1. Summary of potential project effect rankings for a suite of environmental indicators across the three candidate battery storage facility sites.
- Table 2. Assessment of potential environmental effects associated with the candidate battery storage facility sites.
- Map 1 Ecosites surrounding the YEC proposed battery storage facility - Robert Service Way (Upper) Site
- Poster summary

Literature cited

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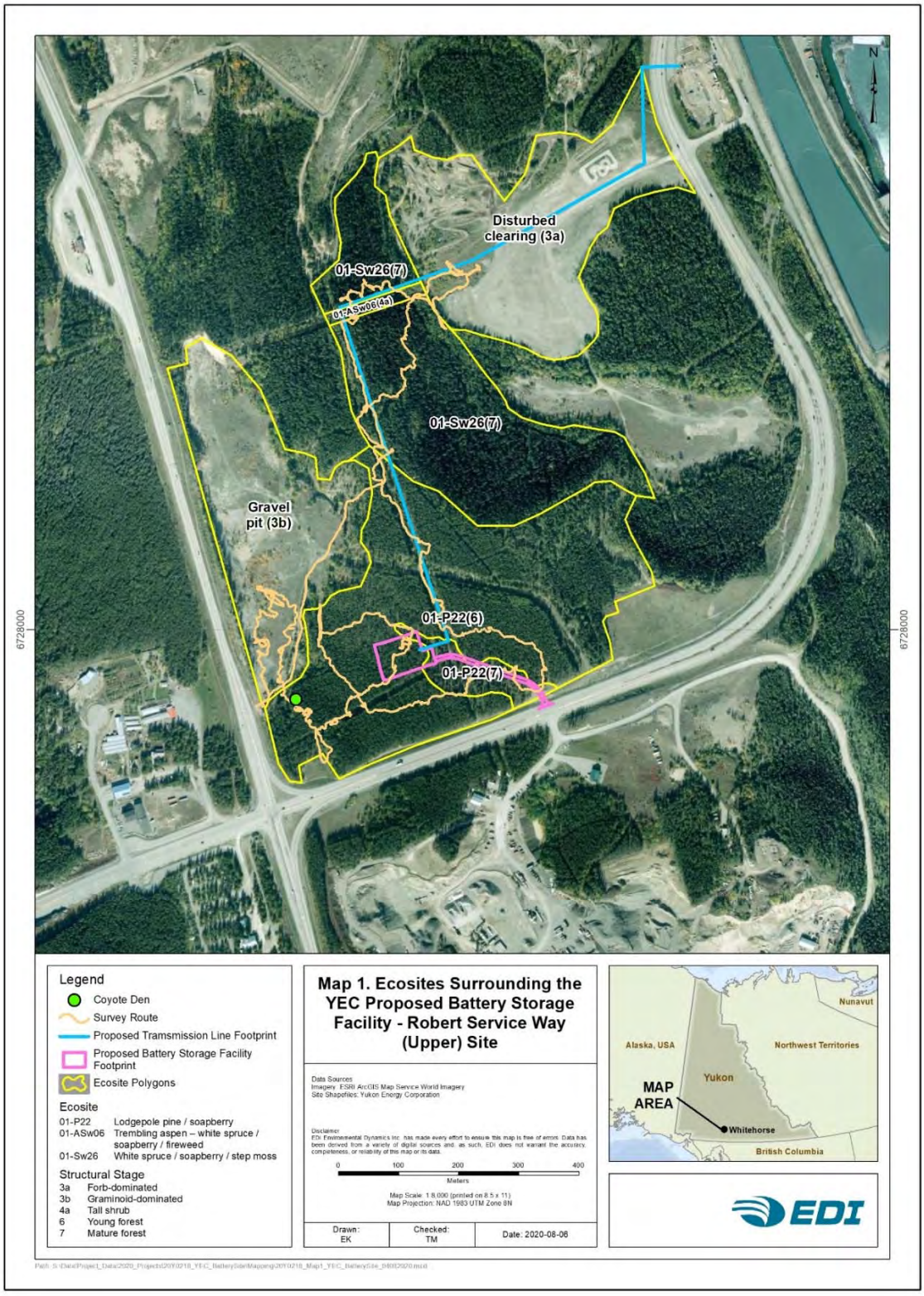
Table 1. Summary of potential project effect rankings for a suite of environmental indicators across the three candidate battery storage facility sites.

Indicator	Site		
	Robert Service Way (Upper) Site	Robert Service Way (Lower) Site	Takhini Substation Site
Species at Risk & Habitat	Low	Low	Low
Protected & Conservation Areas	No Linkage	No Linkage	No Linkage
Wildlife Key Areas	No Linkage	No Linkage	No Linkage
Caribou Ranges	No Linkage	No Linkage	No Linkage
Wetlands	No Linkage	No Linkage	Low-Moderate
Water Quality	Low	Low	Low
Fish & Fish Habitat	Low	Low	Low
Other Environmental Values	Low	No Linkage	No Linkage

Table 2. Assessment of potential environmental effects associated with the candidate battery storage facility sites.

Project Option	Indicator	Ranking	Assessment
Robert Service Way (Upper) Site (near the Alaska Hwy)	Species at Risk & Habitat	Low	No occurrences of SAR are known in the vicinity. Species that may occur based on habitat and range are: Olive-sided Flycatcher and Common Nighhawk. Dune Tachinid Fly occurs approximately 1,300 m east of footprint across the Yukon River/Schwatka Lake. Rusty Blackbird occurs approximately 1,000 m northwest of footprint by Ice Lake Road.
	Protected & Conservation Areas	No Linkage	
	Wildlife Key Areas	No Linkage	
	Caribou Ranges	No Linkage	
	Wetlands	No Linkage	
	Water Quality	Low	Effects to water are limited to site runoff and are predicted to be minimal after standard mitigation measures.
	Fish & Fish Habitat	Low	No direct effects to fish-bearing waterbodies.
	Other Environmental Values		One coyote den. Potential for invasive species spread from disturbed areas into surrounding forest habitats.
Robert Service Way (Lower) Site (across from YEC generating station)	Species at Risk & Habitat	Low	No occurrences of SAR are known in vicinity. Species that may occur based on habitat and range are: Olive-sided Flycatcher. Dune Tachinid Fly occurs approximately 700 m east across the Yukon River/Schwatka Lake. Rusty Blackbird occurs approximately 1,600 m northwest by Ice Lake Road.
	Protected & Conservation Areas	No Linkage	
	Wildlife Key Areas	No Linkage	
	Caribou Ranges	No Linkage	
	Wetlands	No Linkage	
	Water Quality	Low	Effects to water are limited to site runoff and are predicted to be minimal after standard mitigation measures.
	Fish & Fish Habitat	Low	No direct effects to fish-bearing waterbodies.

Project Option	Indicator	Ranking	Assessment
	Other Environmental Values	No Linkage	None noted.
Takhini Substation Site	Species at Risk & Habitat	Low	No occurrences of SAR are known in vicinity. Species that may occur based on habitat and range are: Olive-sided Flycatcher and Short-eared Owl.
	Protected & Conservation Areas	No Linkage	
	Wildlife Key Areas	No Linkage	
	Caribou Ranges	No Linkage	
	Wetlands	Low-Moderate	Potential footprint may partly overlap with a sedge wetland and shrub swamp.
	Water Quality	Low	Effects to water are limited to site runoff and are predicted to be minimal after standard mitigation measures.
	Fish & Fish Habitat	Low	No direct effects to fish-bearing waterbodies.
	Other Environmental Values	No Linkage	None noted.



Map 1 Ecosites surrounding the YEC proposed battery storage facility - Robert Service Way (Upper) Site

APPENDIX 1. SITE PHOTOGRAPHS



Appendix Photo 1. Lodgepole Pine / Soapberry vegetation association (BOLsl/01-P22) at a Young Forest structural stage is the dominant ecosite within and surrounding the proposed battery storage facility footprint.



Appendix Photo 2. Lodgepole Pine / Soapberry vegetation association (BOLsl/01-P22) at a Mature Forest structural stage located adjacent to the proposed battery storage facility footprint.



Appendix Photo 3. Old gravel pit at a graminoid-dominated Herbaceous structural stage to the northwest of the proposed battery storage facility footprint.



Appendix Photo 4. Regenerating forest at a Pole/sapling Forest structural stage along a pre-existing trail located within the proposed transmission line footprint.



Appendix Photo 5. Regenerating Trembling Aspen – White Spruce / Soapberry / Fireweed vegetation association (BOLsl/01-ASw06) at a Tall Shrub structural stage located within the proposed transmission line footprint.



Appendix Photo 6. White Spruce / Soapberry / Step Moss vegetation association (BOLsl/01-Sw26) at a Mature Forest structural stage located adjacent to the proposed transmission line footprint.



Appendix Photo 7. Disturbed cleared area at a forb-dominated Herbaceous structural stage located within and adjacent to the proposed transmission line footprint.



Appendix Photo 8. Inactive coyote den observed within the Young Lodgepole Pine / Soapberry forest approximately 150 m west of the proposed battery storage facility footprint.

REFERENCE: **Proposed Battery Energy Storage System Project Application, pages 29-31**

"Yukon Energy's 10-Year Renewable Electricity Plan examined a wide range of near-term resource supply options to address forecast energy and capacity shortfalls. Many of these options do not provide dependable capacity; and the new resources that will provide dependable capacity would generally not displace what the BESS option can provide, i.e., the identified permanent resource capacity options are generally all needed to remove reliance on rented diesels for addressing the forecast capacity shortfall reviewed in Table 4-1. Moon Lake pumped storage, when developed, is the only identified resource option aside from default new thermal fossil fuel generation that has the capability to remove the forecast N-1 dependable capacity shortfall."

"In summary, no feasible renewable resource alternatives to the Project have been identified within the relevant time period. Aside from the potential Moon Lake pumped storage project in the future, the temporary rental diesel option or permanent new diesel development remain the only feasible alternatives that would provide dependable capacity required to address the N-1 shortfall."

QUESTION:

a) Please confirm that YEC's current 10-Year Renewable Electricity Plan has not been formally reviewed within a YUB proceeding and has not received any type of approval from the YUB.

b) Please provide all internal and external analysis undertaken to determine that there are no feasible renewable resource alternatives to the proposed Battery Energy Storage System project.

c) Please confirm that all of the alternatives considered to the proposed Battery Energy Storage System project are listed on pages 30-31 in the application.

ANSWER:

(a)

Confirmed. The 10-Year Renewable Electricity Plan has not been formally reviewed within a YUB proceeding. However, a copy of the 10-Year Renewable Electricity Plan was filed in response to an interrogatory during the 2021 General Rate Application Proceeding (see CW-YEC-1-36(a) Attachment 1 of the 2021 General Rate Application Round 1 IRs).

The Yukon Utilities Board does not have jurisdiction to approve resource plans or electricity plans, but approves project costs when they are brought before the Board for a prudency review prior to being included in rates.

(b) and (c)

The 10-Year Renewable Electricity Plan (the Plan) reviewed a range of near-term and long-term resource supply options to address forecast energy and capacity shortfalls. A copy of the Plan is provided as Attachment 1 to UCG-YEC-1-10(a) (and was also filed in the Yukon Energy 2021 GRA in response to CW-YEC-1-36(a)).

As shown in the attached Table 3 from the 10-Year Renewable Electricity Plan [see excerpt provided Attachment 1 to this response], YEC has considered a broad range of renewable resources in its long-term planning exercises. The Project is required to address a dependable capacity shortfall. Many of the options reviewed in the Plan do not provide dependable capacity; and new resources that will provide dependable capacity would generally not displace what the BESS can provide, i.e., the identified permanent resource capacity options are generally needed to remove reliance on rented diesels for addressing the forecast capacity shortfall. Moon Lake pumped storage, when developed, is the only identified resource option aside from default new fossil fuel generation that has the capability to remove the full forecast N-1 capacity shortfall. The Moon Lake project is dependent on receipt of Federal funding and will not be in-service until 2029 at earliest.

In summary, and as noted at page 31 of the Application, no feasible renewable resource alternatives to the Project are identified within the relevant time period (the earliest renewable option is the Atlin Hydro Expansion potentially available for winter 2024/25). The 10-Year Renewable Plan portfolio relies on combination of a number of projects in order to address the requirements of the YIS. The BESS project, Atlin Hydro Expansion,

and Moon Lake are all required in combination to meet the forecast N-1 requirements over the long term. The temporary rental diesel option remains the only feasible near-term alternative that would provide dependable capacity required to address the N-1 shortfall.

7.2 Future Potential Resource Options

Table 3: Refined List of Future Potential Resource Options

IRP Resource	Options	Installed Capacity (MW)	Dependable Capacity (MW)	Lead Time (Years)	
Hydro Uprate	Aishihik Hydro 1 & Hydro 2 Uprate	1.3 MW	1.3 MW	3 Years	
Small hydro	Primrose (Storage)	13.0 MW	13.0 MW	6 Years	
	Drury (Storage)	10.0 MW	10.0 MW	6 Years	
	Tutshi Windy Arm (Storage)	10.0 MW	10.0 MW	6 Years	
	Wolf River (ROR)	11.0 MW	4.0 MW	6 Years	
	Atlin Hydro Expansion (Storage)	6.0 MW	6.0 MW	5 Years	
	Atlin Hydro Expansion (Storage) with Federal funding	6.0 MW	6.0 MW	5 Years	
Wind	Wind Resource 1	6.0 MW	0.0 MW	5 Years	
	Wind Resource 2	10.0 MW	0.0 MW	5 Years	
	Wind Resource 3	20.0 MW	0.0 MW	5 Years	
Solar	Whitehorse Solar 1	1.0 MW	0.0 MW	2 Years	
	Whitehorse Solar 2	5.0 MW	0.0 MW	2 Years	
	Whitehorse Solar 3	10.0 MW	0.0 MW	2 Years	
Diesel (Comparator)	Generic Greenfield Permanent @ Takhini	10.0 MW	10.0 MW	4 Years	
	Generic Rental @ Whitehorse Substation S150	2.0 MW	2.0 MW	0 Years	
Pumped Storage	Tutshi-Moon (15MW-25GWh)	15.0 MW	15.0 MW	6 Years	
	Tutshi-Moon (15MW-45GWh)	15.0 MW	15.0 MW	6 Years	
	Tutshi-Moon (25MW-50GWh)	25.0 MW	25.0 MW	6 Years	
	Tutshi-Moon (35MW-50GWh)	35.0 MW	35.0 MW	6 Years	
	Tutshi-Moon (15MW-25GWh with Federal Funding	15.0 MW	15.0 MW	6 Years	
	Tutshi-Moon (15MW-45GWh with Federal Funding	15.0 MW	15.0 MW	6 Years	
	Tutshi-Moon (25MW-50GWh with Federal Funding	25.0 MW	25.0 MW	6 Years	
	Tutshi-Moon (35MW-50GWh) with Federal Funding	35.0 MW	35.0 MW	6 Years	
Energy Storage	Lithium-ion	8.0 MW	8.0 MW	2 Years	

Table 3 is a summary of the 19 Future Potential Resources considered in the 10-Year Renewable Electricity Plan along with their associated technical and financial attributes.

	Annual Energy (MWh/Yr)	CAPEX ($2019)	O&M		LCOC ($/kW-Yr)	LCOE ($/kWh-Yr)
			Fixed ($2019/Yr)	Variable ($2019/MWh)		
	2,700 MWh	$5,300,000	$0	$5.31	$185	$0.09
	74,100 MWh	$177,500,000	$3,900,000	$5.00	$797	$0.14
	30,600 MWh	$110,500,000	$2,400,000	$5.00	$635	$0.21
	49,300 MWh	$135,600,000	$3,700,000	$5.00	$860	$0.17
	79,700 MWh	$165,100,000	$3,600,000	$5.00	$2,417	$0.12
	44,700 MWh	$131,000,000	$2,900,000	$5.00	$1,270	$0.17
	44,700 MWh	$32,750,000	$2,900,000	$5.00	$708	$0.10
	18,100 MWh	$39,500,000	$280,000	$27.26	Not supplied	$0.17
	29,500 MWh	$49,200,000	$290,000	$21.81	Not supplied	$0.13
	57,300 MWh	$73,500,000	$340,000	$21.40	Not supplied	$0.10
	1,100 MWh	$2,300,000	$30,000	$0.00	Not supplied	$0.13
	5,600 MWh	$8,100,000	$150,000	$0.00	Not supplied	$0.10
	11,500 MWh	$16,100,000	$340,000	$0.00	Not supplied	$0.10
	2,500 MWh	$25,600,000	$170,000	$22.00	$131	$0.53
	2,500 MWh	$0.00	$280,000	$0.00	$243	Not Supplied
	19,900 MWh	$182,500,000	$2,020,000	$0.00	$552	$0.42
	14,000 MWh	$194,200,000	$2,050,000	$0.00	$581	$0.62
	12,000 MWh	$245,000,000	$2,100,000	$0.00	$421	$0.88
	10,000 MWh	$280,000,000	$2,150,000	$0.00	$336	$1.18
	19,900 MWh	$45,625,000	$2,020,000	$0.00	$239	$0.18
	14,000 MWh	$48,550,000	$2,050,000	$0.00	$248	$0.27
	12,000 MWh	$61,250,000	$2,100,000	$0.00	$168	$0.35
	10,000 MWh	$70,000,000	$2,150,000	$0.00	$130	$0.46
	2,800 MWh	$29,500,000	$280,000	$0.00	$280	Not Supplied

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 32**

"There are various energy storage technologies available. Yukon Energy completed a comprehensive review of the available energy storage technologies for the 2016 Resource Plan. This study concluded that batteries, and lithium ion batteries specifically, were the best energy storage option for the YIS context. The use required by Yukon Energy involves low cycling, with a need for reliable and quick response in a northern climate location."

QUESTION:

a) Please confirm that YEC has not conducted a more recent evaluation of available energy storage technologies since the 2016 evaluation of energy storage technologies by TransGrid Solutions Inc.

b) Please confirm whether the Yukon's electricity generation capacity configuration has changed since the configuration that existed 5 years ago when TransGrid conducted their review.

c) Please confirm that the feasibility assessment completed by Hatch for the current application was limited to evaluating the proposed Battery Energy Storage System only and not on any other available energy storage technologies.

d) Does YEC have any internal expertise regarding energy storage technologies or is YEC relying entirely on the advice from outside consultants?

e) Has YEC conducted any independent reviews of the Hatch analysis and evaluation to ensure that the report under review is the best, industry standards based analysis upon which to make determination son [sic] the proposed Battery Energy Storage System?

ANSWER:

(a)

Please see YUB-YEC-1-38 for a summary of the evaluation energy storage technologies undertaken by YEC since 2016.

(b)

Confirmed. Section 4.1 of the Application updates the Yukon grid context for the Project, including Figure 4-1 and Table 4-1 updates on forecast non-industrial peak and dependable capacity under N-1 capacity planning through to 2030/31, and Section 4.2 updates alternatives to the Project based on the recent 10-Year Renewable Electricity Plan (the Plan).

A copy of the Plan is provided in response to UCG-YEC-1-10(a) Attachment 1 (and was also filed in the Yukon Energy 2021 GRA in response to CW-YEC-1-36(a)).

The inventory of the existing and retiring YEC and ATCO resources and their technical attributes are presented in Appendix A of the Plan (this includes a comparison to dependable capacity for these resources as indicated in the 2016 Resource Plan).

(c)

Not confirmed. Table 4-1 on page 17 of the Hatch report (Appendix B to the BESS Application) provides a summary overview of the differences between various storage technology capabilities.

The other energy storage technologies considered were not able to meet the Yukon grid needs as well as lithium ion batteries. The conclusion was based on the calculated power, energy, and discharge time characteristics required as well as the maturity, cost and environmental and socio-economic attributes of the technologies.

(d)

Yukon Energy has resource planning and engineering staff that reviewed the Utility Battery Feasibility Study report and provided professional assessments regarding its findings, and implications for the Yukon Integrated Grid.

(e)

Hatch was selected to undertake the Utility Battery Feasibility Study following a competitive procurement process where Hatch was determined to be suitably qualified to undertake the feasibility assessment. See YUB-YEC-1-54(b) Attachment 1 for a summary of Hatch's professional qualifications.

Yukon Energy resource planning and engineering department staff also reviewed and vetted the report findings.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 41**

"A public engagement process for the Project was undertaken in Q3 2020. The objectives of the engagement process were to:

1. Inform the public that YEC plans to install a battery in, or near, Whitehorse and explain why the project is happening, how the battery works, project benefits and how it relates to the 10-year Renewable Plan;
2. Gather public input on each of the three proposed site options for the battery project; and
3. Identify any potential questions or concerns about the project to ensure they can be addressed / incorporated into project design where feasible."

QUESTION:

a) Please explain why YEC decided on the plan to move forward with the proposed Battery Energy Storage System and then initiated consultation instead of initiating consultation on the issues that need to be addressed and gather input on alternative solutions from stakeholders.

b) Please describe the rationale behind YEC's approach to get stakeholder feedback on its preferred approach instead of presenting information and seeking feedback on multiple potential solutions under consideration and stakeholder input on additional solutions YEC may not have considered.

c) Please provide details of the stakeholder engagement undertaken with respect to the energy storage projects that YEC has referenced in Northern Quebec and the Northwest Territories.

ANSWER:

(a) and **(b)**

YEC conducted consultation on electricity issues and alternative solutions for its 2016 Resource Plan and the 10-Year Renewable Electricity Plan, which were used to inform

the selection of YEC's future portfolio, including the development of the BESS project. The consultation for the 10-Year Plan included the solicitation for feedback on potential additional solutions not under consideration by YEC.

(c)

The requested information is not relevant to the current proceeding. Stakeholder engagement processes undertaken for projects in Northwest Territories and Quebec do not have any bearing on the matters to be assessed by the YUB as part of the current review process.

Yukon Energy's "Grid Scale Battery – What We Heard" report is provided as YUB-YEC-1-46(a) Attachment 1 and provides relevant information regarding the engagement process undertaken by YEC for the BESS.

REFERENCE: **Proposed Battery Energy Storage System Project Application, page 41**

"Engagement activities were undertaken from late August to early September 2020 and included: two virtual community meetings; three in person community meetings; six stakeholder meetings; letters and information sheets to property owners and businesses located within 800 metres of each proposed site; and "door knocking" to each residence and business within this radius. Written comments were also accepted through an online form or by direct email. A final "What we Heard" report was developed summarizing the outcomes of the above engagement process. The majority of comments provided focused on the Takhihi site on the North Klondike Highway – and while there was general support for development of the Project, there was strong opposition to developing the Project at the Takhini location. General concerns identified regarding the Project related to potential noise and light pollution, impact of an industrial development in rural residential areas, fire and explosion safety, health impacts of radiation, electromagnetism, and gases, reduction in property values and impacts on insurance premiums, and contamination of agricultural land close to project in case of accidents and malfunctions. Many of these concerns are being addressed through a combination of site selection and selection of the battery technology and planned engineering."

QUESTION:

a) Please provide specifics are the number of individuals who attended and contributed to the community and stakeholder meetings. If individuals attended more than one meeting, please only count them once.

b) How many written comment submissions were made during the consultation specifically on the proposed Battery Energy Storage System project? Please provide copies of these submissions with personal information redacted.

ANSWER:

(a) and **(b)**

See the What We Heard Report provided as YUB-YEC-1-46 Attachment 1. This report outlines the number of individuals that attended each engagement event and the written comment submissions. For privacy reasons the names of individuals are not identified and therefore YEC cannot comment on whether a stakeholder attended multiple engagement sessions.

REFERENCE: **Hatch Utility Battery Feasibility Study Final Report, page B-2**

"This report has been prepared by Hatch Ltd. (Hatch) for Yukon Energy Corporation (the "Client") for the purpose of assisting the Client with the development of a Utility Battery Feasibility Study."

QUESTION:

a) Please provide details of the Utility Battery Feasibility Study being developed by YEC that has been informed by the January 2021 Hatch report.

ANSWER:

(a)

The Utility Battery Feasibility Study referenced was the Hatch report (filed as Appendix B of the Application), along with development of internal YEC estimates for planning and owner's costs.

REFERENCE: Hatch Utility Battery Feasibility Study Final Report, page B-17

"Preferred system sizing is 8.8 MW/35 MWh or 10 MW/40 MWh. Estimated capital cost for each of these options is $23.8 M and $26.8 M, respectively, if located on the TKC Land near Whitehorse Substation. Increasing power sizes from 10 MW/40 MWh to 20 MW/40 MWh leads to an increase in the CAPEX by approximately $1.7-1.8 M. This higher power BESS achieves the lowest LCOC."

QUESTION:

a) Please provide a comparison of the cost of the proposed Battery Energy Storage System and the costs identified in the Hatch report.

ANSWER:

(a)

The costs presented by Hatch cover the equipment and construction for the BESS (battery system, power conversion system, and grid connection). The costs provided in the Application include the costs for equipment and construction (estimated by Hatch) in addition to the Planning Costs and Owner's Costs. Please refer to Table 3-4 on page 16 of the Application.

REFERENCE: Hatch Utility Battery Feasibility Study Final Report, page B-18

"Recommended immediate next steps are as follow:

- Conduct the Community Consultation to support site selection
- Preliminary Interconnection for Preferred Site
- Develop a procurement strategy for EPC & EPCM alternatives
- Confirm tax implications if BESS located within Whitehorse
- Conduct geotechnical campaigns for selected sites"

QUESTION:

a) Please provide details of the actions that YEC has undertaken on each of the recommended next steps contained in the January 2021 Hatch report.

ANSWER:

(a)

The following is noted:

- YEC has conducted the community consultation and public engagement process as outlined in the Application on page 41.

- Please refer to YUB-YEC-1-3 for information on the work conducted to date regarding design of the interconnection for the project site.

- YEC completed procurement of an Owner's Engineer and designed a two-stage procurement process which is now under way, as described in YUB-YEC-1-13.

- YEC has confirmed the property tax costs and included them in the O&M cost estimates shown in the Application. Please also refer to YUB-YEC-1-26.

- Please refer to YUB-YEC-1-71 for the update on the geotechnical work.