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# 1 BASIS

## 1.1 OBJECTIVE

This **Site Selection Report** seeks to define the process by which one or more land assets have been selected by HDF Energy for development, and to make recommendations for the securement of a primary option for further study and development, and at minimum, one secondary option. Land assets may be secured via reservation agreement with option to lease or option to purchase, the decision for this being driven by corporate strategy as an outcome of the recommendations provided in the report. The report has been condensed in this **Site Selection Summary** to protect the confidentiality of HDF's selection process and methodology.

## 1.2 INTRODUCTION

The Renewstable® concept involves the pairing of utility-scale renewable power generation from intermittent sources such as solar PV and wind with two types of storage media: hydrogen, generated from the electrolysis of water, and battery storage. Currently the vast majority of electricity generation is from non-renewable brown or grey sources of energy such as diesel, heavy fuel oil and natural gas. In response to the global demand for climate change mitigation measures and the diversification of electricity generation options, the Renewstable® solution was thus conceived. The Renewstable power plant requires only inputs from renewable sources (water plus solar or wind energy), and delivers consistent supply of green baseload electricity to the power grid 24 / 7 / 365. Electrolyzer technology being relatively advanced today is sought from third party suppliers, however, to enable the generation of electricity from stored hydrogen at high power levels, HDF Energy has developed a containerized fuel cell module that can be paralleled with Li-ion batteries to facilitate utility-scale electricity generation of up to high levels of penetration on any grid. The combination of these three technologies comprises the Renewstable® hydrogen power scheme.

## 1.3 PROJECT DESCRIPTION

The island of Barbados is generating its electricity mainly from imported heavy fuel oil which generates locally a large amount of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and exposes the power consumers to great volatility in pricing. The Barbados National Energy Policy from 2019 seeks at decarbonizing the power sector by 2030 by generating locally produced renewable energy.

HDF held first conversations with the national utility Barbados Light and Power Company (BLPC) in 2018, presenting the Renewstable® solution that was at the time in development in French Guiana. The approach was that as the renewable energy integration was taking off with the existing successful Feed-In-Tariff program and a planned expansion of it, the grid would reach a point when it would need renewable baseload to further decarbonize.

The Government of Barbados, the BLPC and the Barbados Renewable Energy Association were intrigued by the solution and encouraged HDF to pursue the development of a Renewstable® project of a similar size to the one developed in French Guiana. The Renewstable® Barbados project was then in development through its SPV Renewstable (Barbados) Inc. Further conversation with the utility and analysis of the power dispatch led to a project designed optimized to deliver 13 MW during the day (matching the size of a gas turbine that needed to

be decommissioned) and 3MW during the night with the possibility to provide 2 hours during the night at 13MW as well.

To deliver such a service, HDF evaluated that the project would need 50 MW of solar power plant and a hydrogen storage area (Hydrogen Power Centre, a.k.a. “HyPCe”) with close to 120 MWh of storage composed of hydrogen and batteries, requiring at least 150 acres of flat land.

After engaging with the local planning authorities it was made clear that the flat parcels in the range of 150 acres were designated as agricultural and that the planning agencies and the Ministry of Agriculture would most likely be opposed to a change of use for that size parcel from agricultural to industrial. The only solution to facilitate a large-scale solar PV array in Barbados (approximately 100,000 panels) would be a robust agri-energy dual use solution.

HDF looked at different options for bankable, sustainable, and realistic agricultural components that could be added to the RSB project such as elevated panels with crop agriculture underneath, collocation with greenhouses, and farming. After research, discussions with our local planner Richard Gill Associates, who had been through this exercise previously in the very specific context of Barbados with the largest solar plant on island (BLPC’s 10MW Trents plant located in St. Lucy), HDF decided to collocate a Black Belly sheep farm with the RSB project, and the search for a suitable piece of agricultural land that could host the project began.

## 1.4 SITE DESCRIPTION

The ideal site for the RSB project would need to:

- Be a continuous flat parcel of more than 150 acres with a shape that allows to position the hydrogen power centre with a minimum setback of 250 meters from all the boundaries of the site.
- Not be “prime A” agricultural land in order not to compete with the most productive sugar cane land on island, but still comprise soil that is good enough for sheep rearing.
- Not be qualified as a ‘Zone 1’ water zone, which would prevent sheep farming from being developed due to sensitive aquifers underneath the site.
- Be close enough to the 24 kV line network in order to be connected to a feeder that allows for a maximum output of 25MW. 13kV line network is not an option as it cannot connect more than 5MW per feeder, as per the grid code. The 24 kV line network of BLPC is also more robust, and positioned where the largest demand is.
- Be close enough to a power substation that can host at least 20MW power (in case of a change in design of the project, or in the event that other small solar projects are connected to it prior to RSB).
- That can be rented at a reasonable price that would be attractive enough for an estate owner to switch from an agricultural lease to the RSB project, but not too high to harm the project economics or disturb the market for agricultural land. After assessing the market, the initial rental target was set between 500 to 1,000 USD/acre/year.
- Have decent road access from the port in order to accommodate a large number of 40 ft. containers and heavy equipment with minimal infrastructural damage or need for road modifications.

- Be owned by an entity that can commit to an option to lease agreement with a reservation period of at least 3 years, remunerated at no more than 30,000 USD/year (budget for reservation set by HDF).

## 1.5 PROCESS AND METHODOLOGY

### 1.5.1 Data Collection

In order to find a site matching the criteria, data collection was conducted in both a methodical way and an opportunistic way. The opportunistic way occurred in parallel when meeting with stakeholders, personal relationships that were landowners, or knew of potential lease candidates.

The methodical way was to first map out which general areas of Barbados could meet the criteria. The planning agent was engaged to analyse areas with concurrent agricultural zoning, current and future water zoning to avoid Zone 1 areas, and proximity to the 24 kV transmission network in order to identify a list of plantations that would prequalify for further consideration against the main criteria. That led to a first list of plantations that were then reviewed in more detail using Google Maps to check if there was any illegal housing, map out the access and the potential connection to the closest 24 kV line.

The planning agent was then able to provide history about those sites, and owner-related soft information. Sites with current reservations, complex or unidentified ownership, or owners with uncertain reputations were not considered.

### 1.5.2 Decision Criteria

For the purposes of this report, it has been assumed that the corporate decision has already been made to seek development opportunities in Barbados. The decision criteria for all Renewstable® type projects are the same and are based on the fundamental needs of an infrastructural power project. There are nine (9) basic **Criteria** that will impact the decision to select a specific piece of property for power plant development. These criteria have fundamental effects on the decision to develop a project site and have interrelated effects on each other. Each criterion is considered in the context of a number of **Categories** considered most impactful in the development of this type of project.

The decision criteria that were applied for the selection of the site are described in Table 1:

Table 1. Description of applied Decision Criteria

Criteria	Categories
<b>Land Conditions</b>	Topography, elevation, vegetation, weather exposure, drainage, dual-use potential.
<b>Accessibility</b>	Proximity to major highways and ports, quality of roads, bridges and / or rail networks, infrastructural improvement requirements, availability timeline (includes photographs and / or map extracts as required).
<b>Feedstock Access</b>	Types of and proximity to water source(s), water treatment requirements
<b>Environmental &amp; Social Factors</b>	Proximity to wetlands / protected areas, communities, and archaeological sites; endangered species, cultural concerns, squatters.
<b>Utility</b>	Proximity to the electricity grid, grid interconnection capacity, grid (infrastructural) improvement requirements, and utility ownership structure.

Criteria	Categories
<b>Permitting, Laws &amp; Regulations</b>	Local and national permitting processes and requirements, land and other resource zoning regulations / restrictions, building regulations, PPA / IPP regulations, resiliency policy, renewable development maturity.
<b>Risk Factors</b>	Financing, construction, ownership, political activity, and lease default.
<b>Financial Factors</b>	Qualitative impacts on project cost (CAPEX/OPEX).
<b>Contract Factors</b>	Site due diligence, governance, and reservation terms.

### 1.5.3 Scoring and Weighting

HDF's scoring methodology establishes a maximum score in each criterion and a target maximum assessment score. The two sites scoring closest to the maximum target, and not otherwise eliminated, form the basis of the report's final recommendations.

### 1.5.4 Identifying Sites of Interest

Multiple means were taken to find suitable land plots for the project. First, HDF engaged with several landowners directly in 2018 who owned land in St. Philip parish. A recommendation was made to work with a planning agent and Richard Gill Associates (RGA) was engaged. RGA provided assistance with screening the different land plots that would comply positively with the nine criteria described above. A list of land parcels was established and RGA was able to screen the Barbados Land Registry to identify the respective owners of each parcel.

Discussions were then initiated with all the identified landowners and site visits were organized to assess suitability for purpose, current use, and to get familiar with the owner's expectations and future plans, etc. Many parcels were disqualified after verbal discussions as landowners were not ready to engage in a reservation agreement (option to lease or sale), or were only contemplating a direct sale at exorbitant prices outside of RSB's budget. Real estate agents were also engaged to assist in the land research process, with collecting candidates' contact information and with making introductions, but this path was mostly unfruitful.

Sites located on Highway 2A were considered preferential for two important reasons: it is the main highway-quality ground transport artery connecting the northern and southern parts of the island; equally important is that the island's main 24 kV transmission line runs north-south parallel to the Highway (). Highway 2A comprises (from South to North):

- **Tom Adams Highway** – East / West from Tom Adams Roundabout in St. Philip to Errol Barrow Roundabout in Christ Church.
- **Errol Barrow Highway** – North / South from Errol Barrow Roundabout in Christ Church to D'Arcy Scott Roundabout in St. Michael.
- **Ronald Mapp Highway (Highway 2A)** – North / South from D'Arcy Scott Roundabout in St. Michael to Charles Duncan O'Neal Highway in St. Peter.

The Highway is most easily accessible from the Barbados Port located in Cheapside, St. Michael via the Spring Garden Highway and the Gordon Cummins Highway.

The Grantley Adams International Airport is also located on this main artery, immediately accessible to the Tom Adams Highway, which makes properties in the vicinity of Highway 2A more easily accessible and resistant to heavy vehicular traffic.

Figure 1. Highway accessibility: Barbados Port to Highway 2A

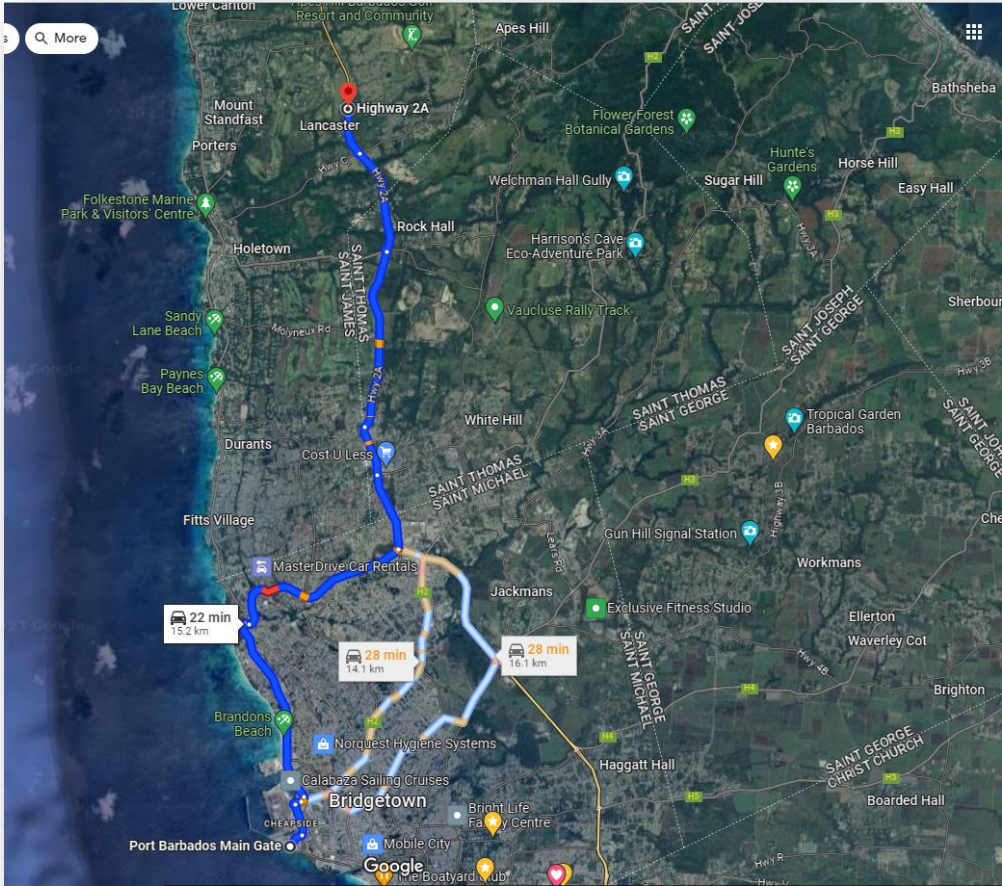
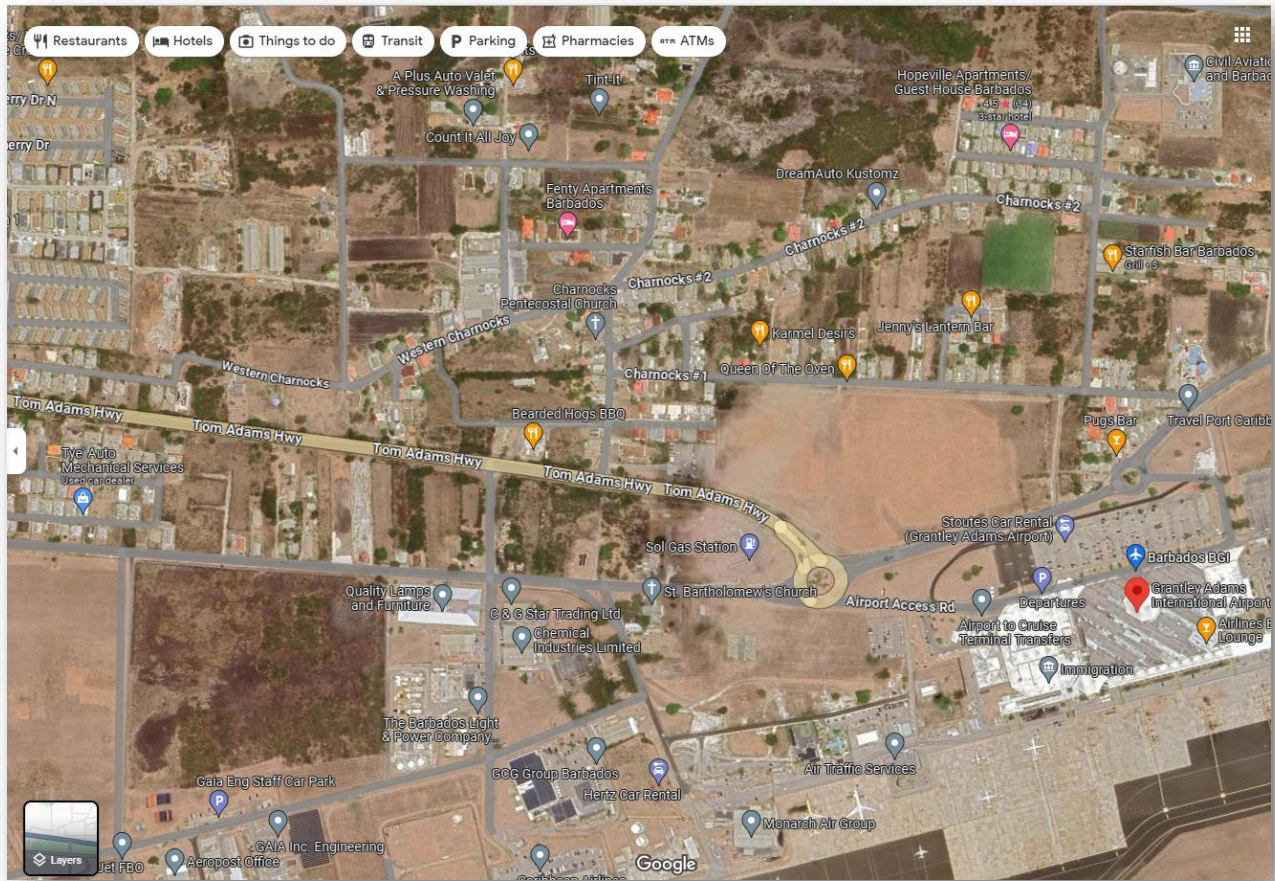




Figure 2. Highway accessibility: Grantley Adams International Airport at Tom Adams Highway



In early 2019, Orange Hill in St Peter was identified as the most promising option, and negotiation for an option to lease was initiated with Barbados Farms Ltd. contingent on successful award of planning permission for the RSB development and an Independent Power Producer license (ref. Section 2.1.1).

## 2 SITE SELECTION ANALYSIS

### 2.1 SITES OF INTEREST

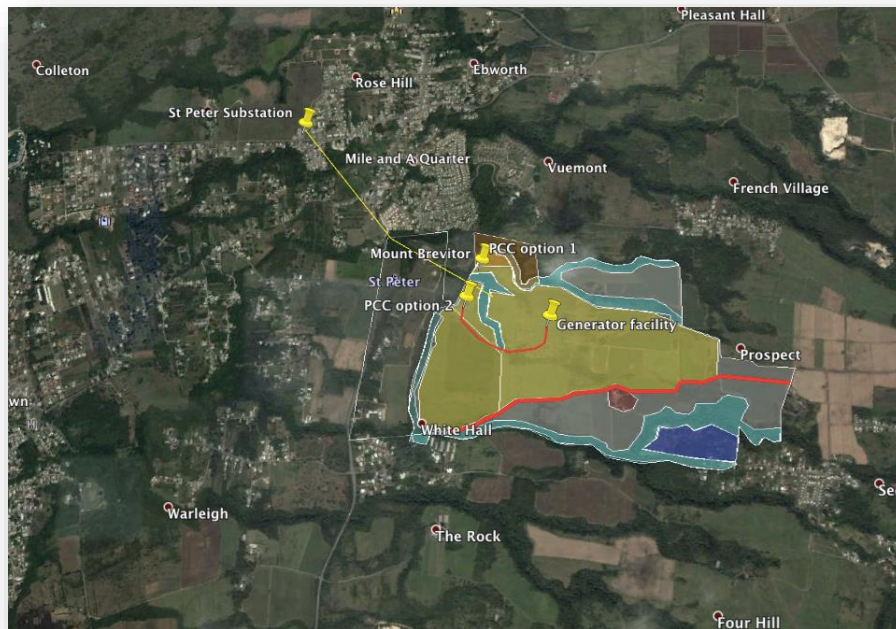
#### 2.1.1 SOI 1: Orange Hill, St. Peter

Comprising 333 contiguous acres, Orange Hill in the parish of St. Peter was identified immediately as an excellent preliminary option. Owned by Barbados Farms Inc. preliminary discussions revealed some interest in initiating negotiations. Barbados Farms is owned by the insurance company Sagicor, which also initially showed interest in an equity stake in the project.

Orange Hill Plantation is located near the centre of St. Peter on the east side of the Highway 2A, and bordered by White Hall to the southwest, Sedge Pond to the southeast, and Mile and A Quarter to the northwest. The property has excellent road access from the Barbados Port, a secondary roadway (Highway C) dissecting the property, and access to the 24 kV line is relatively convenient via the Rose Hill substation (Figure 3). There would also be no occupied properties in the vicinity of the selected site. The entire parcel is fairly flat and features a tertiary road network.

The plantation is the most remotely located of Barbados Farms' operation and has one of the lowest sugar production yields, making it unattractive from an agricultural crop point of view. It also has relatively low tourism / commercial realty value due to underdeveloped potable water accessibility and a bad odour coming from the nearby blood dump.

Figure 3. Analysis from BLPC identifying the Point of Common Coupling and Interconnection to the Grid for the Orange Hill site.





### 2.1.2 SOI 2: Pleasant Hall Plantation, St. Peter

Comprising 235 contiguous acres in northern St. Peter, a preliminary land analysis was performed by RGA (Figure 4), validating the suitability of the land for an agrivoltaic project. Located at the northern end of Highway 2A between Mile and A Quarter, Welchtown and Luke Hill, the property is fairly flat, and dissected by the Charles Duncan O'Neal Highway (a.k.a. Highway 2). It is also perfectly situated for road and grid connection access via the Rose Hill Substation located to the west. Relatively unencumbered, there would be no visual impact to neighbouring properties, with a tree line and gully screening as natural features. Neighbouring plantations also hosted operating animal farms (poultry in Portland and a black belly sheep farm in Welchtown).

Two site visits helped in establishing that the land was poorly exploited for sugar cane and very suitable for a project such as RSB. The northern side of the site was best situated for the implementation of the energy project, while the southern side of the plantation is suitable for sheep farming.

Figure 4. Pleasant Hall Plantation, St. Peter.



### 2.1.3 SOI 3: Harrow Plantation, St Philip

The owners of Harrow Plantation had already been approached by a Spanish solar developer for a site for a 7MW solar plant, therefore when RSB approached the landowners they had some experience with solar development contracting. They also understood the need for storage solutions on the Barbados grid and so were very receptive to the RSB solution. This was positive since it then improved the likelihood of a more informed, expeditious negotiating process.



Harrow is near the centre of St. Philip parish, which is the most southeasterly of the eleven parishes. The Harrow site lies between Six Roads to the south, Marchfield to the west, Padmore Village to the north and Highway M (Bushy Park Main Road) to the east.

Figure 5. Harrow Plantation, St. Philip.



The selected site would occupy the entire southern boundary of the property (Figure 6) which features a residential housing development along a significant section that could experience some visual impact from the panels. Bushy Park Racetrack is on the eastern side of Highway M and also has some direct visibility. It is a popular public entertainment centre, although the track is insulated behind a vegetative screen on the highway



side. There is also a small cemetery a few hundred meters to the southeast of the property between Highway M and Congo Road.

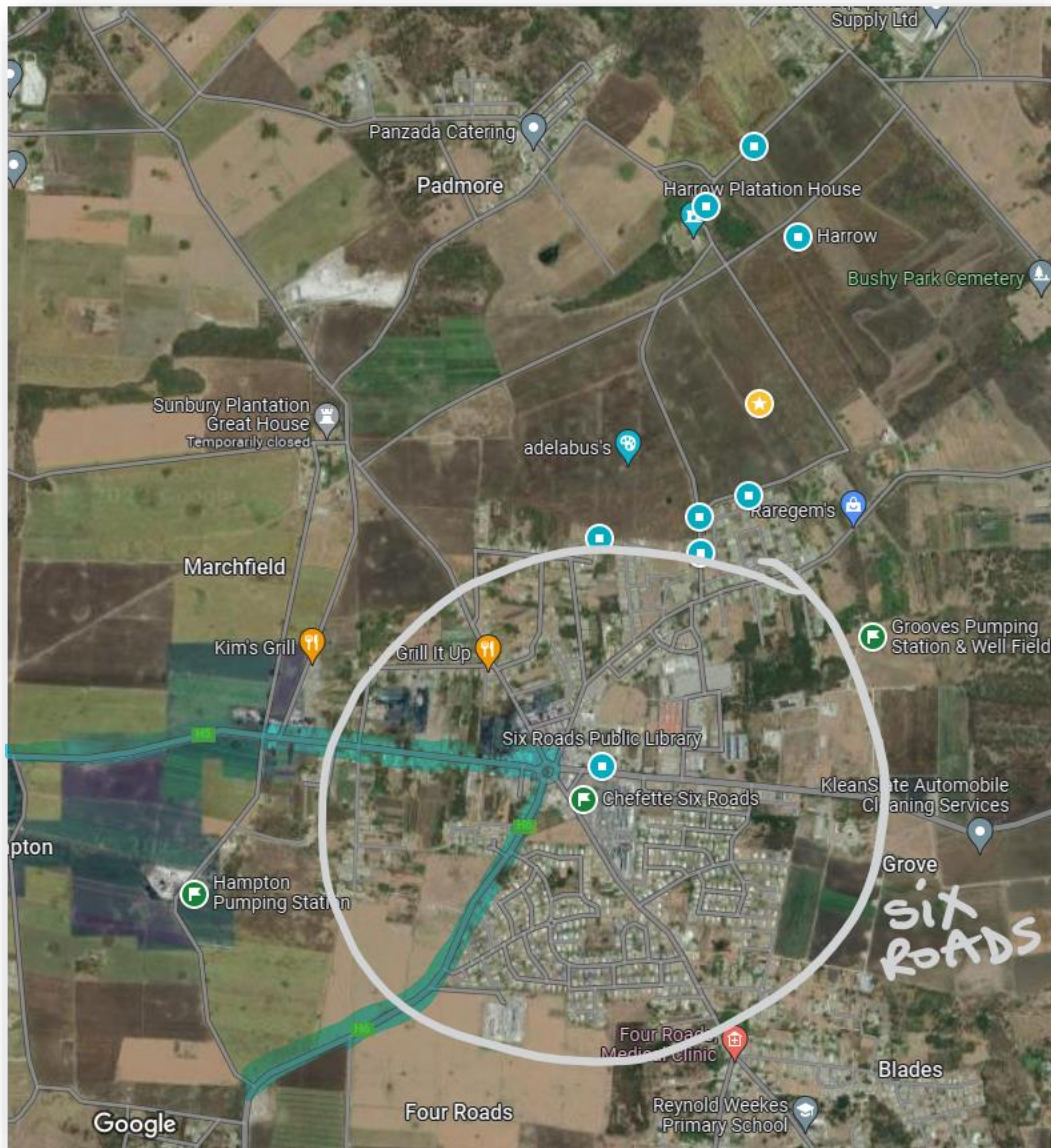
The old train line runs along a large segment of the northern boundary, which is currently earmarked for development by the [Future Centre Trust](#) for the [Barbados Trailway Project](#). This is a well-known recreational and heritage project which could be an interesting, relatively high-profile community project opportunity for RSB.

Figure 6. Harrow site.



As with the other two sites the property is basically flat, with fairly good ground access; heavy vehicles approaching from the main port arteries (Highway 6 via Tom Adams Highway, or Highway 5 via Errol Barrow Highway), need to navigate Wynter Crawford Circle in the middle of the population centre of Six Roads to access the site, which may present some logistical issues (Figure 7). The nearest substation is the Hampton substation, approximately 3 Km as the crow flies to the southwest, which is earmarked for upgrade in 2023/2024.

Figure 7. Wynter Crawford Circle at the middle of the Six Roads community.



## 2.2 ASSESSMENT

A summary of the assessment is provided in Table 2. Of the three sites that were assessed, Orange Hill Plantation ranked highest, then Pleasant Hall Plantation and finally Harrow Plantation. In the Discussion, detail on the conditions found at and around each site that may have impacted the outcome of the assessment is provided, any specific positive outcomes that may have improved the assessment, along with any major red flags discovered that may have warranted an elimination. These two sites will also be discussed in Section 3 as our primary and secondary recommendations respectively for siting this project.



Table 2. Assessment Results

Site of Interest	Best Score	Score	Rating	Rank	Comments
Orange Hill Plantation	Accessibility, Financials	449	Favourable	1	Good highway & port access, flat topography, proximal PCC, no special risks or encumbrances, minor water infrastructural improvement required.
Pleasant Hall Plantation	Environmental & Social, Risk	431	Eliminate	3	Buyout only; no reservation option
Harrow Plantation	Feedstock Access, Risk, Contract	434	Favourable	2	Grid capacity available, gentle topography, highway access, port access, multiple feedstock options in range, no special risks or encumbrances, some infrastructural improvement required, proximal residential community.
<b>Best</b>		<b>449</b>		<b>1</b>	

## 2.3 DISCUSSION

All three sites, as with the majority of Barbados, are relatively flat, with Harrow Plantation featuring a gentle undulating topography; all three sites also have quite good highway accessibility, although Pleasant Hall’s proximity to Highway 2A makes it ideally located; this improves the accessibility for heavy equipment and transport vehicles, which would have positive impacts on the cost of construction in the area. Not as good as Pleasant Hall’s position, Orange Hill’s location on the east side of Highway 2A makes its accessibility quite good as well. Where ground movements are concerned however, transportation of the hydrogen tanks may prove an issue at Harrow due to the need to navigate the Wynter Crawford Circle in downtown Six Roads. In all cases, secondary roads would need to be reinforced and the highway rating should be confirmed before detailed design.

Orange Hill’s relatively isolated and unencumbered location also makes it well positioned to absorb the hazards of a hydrogen project. The site’s limited agricultural value and proximity to the local blood dump gives it limited development appeal in habitation industries like tourism and housing, especially areas to the east and downwind of the dump. This should improve RSB’s negotiating position in the reservation process.

Harrow has excellent feedstock access, as the potable water network is within 100 metres of the eastern boundary of the site. Its location in St. Philip also opens up the option for a groundwater well, however it can be anticipated that permitting for this would be difficult due to the proximity to the local aquifer. There are no other known water sources for the other two sites however, and the potable water infrastructure in the Orange Hill area specifically is underdeveloped and would require some investment. This is a relatively low-cost issue to overcome however as network distances are relatively short in a general sense. There is a history of desalination projects on the east coast, specifically for the Sandy Lane Resort & Golf Course in St. James parish, however for the Pleasant Hall site this is an extremely cost intensive option that would entail installation of over 5 Km of pipeline to the east coast, as the crow flies.

The Orange Hill site is less than 5 Km from the Rose Hill Substation which services St. Peter; feedback from BLPC however indicates that there are two potential points of common coupling (PCC) within the Orange Hill Plantation that would be possible, both less than 1.5 Km from the proposed site, which makes this location quite favourable for tie-in to the 24 kV transmission network. The Pleasant Hall site is also less than 5 Km from the Rose Hill Station in the opposite direction, however the PCC for this site would most likely be the Rose Hill

Substation itself, which would require some underground transmission investment through populated areas. St. Philip's Hampton Substation is within 3 Km of the site as the crow flies which is acceptable if not favourable, and fortunately for RSB an upgrade is on BLPC's current plan, although an underground transmission project to the PCC could prove costly and logistically difficult through the community of Six Roads. This site could also require investment in a new substation on Harrow property.

Initial interactions with the owners of Orange Hill were positive. The owner of Pleasant Hall from very early indicated his preference for a buyout over the reservation option. RSB was not able to negotiate a favourable reservation position for this site which is extremely important for ensuring the project's financial viability, and this prompted the elimination of Pleasant Hall from consideration. Discussions with Harrow Ltd., however, were very positive; this was given much weight after the negative interactions with other owners. Preliminary investigation identified the principals of Harrow Ltd., Philip William and Janice Payne, as reasonable landowners with a preference for keeping their family estate in the family. They also openly shared their need to transform their source of income away from sugarcane agriculture, which is typically unprofitable and commercially unreliable, while producing some meaningful benefit for Barbados. They also showed willingness to negotiate an option to lease, which improves the attractiveness of this site over the others. None of the landowners disclosed any political exposure.

Concerns for the Orange Hill site revolve around proximity to residential housing in the French Village, Sedge Pond and White Hall communities, with a relatively short underground transmission project being required from the proposed PCC. The Pleasant Hall site being undeveloped and located to the north of the nearest residential community would not create visual concerns for residents, however would carry a significant transmission infrastructure investment from the Rose Hill Substation, and would require some investment in potable water infrastructure. Concerns for Harrow include direct proximity to residential housing on its southern boundary, and drainage questions. Its location at the bottom of a catchment area increases the potential for flooding due to heavy rainfall activity, therefore its proximity to residential areas in the south is not ideal. This is balanced by the fact that Barbados has relatively low rainfall in general and the volume that would cause serious flooding, not considering the effects of climate change, could be generated within the next 25 years – a drainage study would provide clarity on this issue. The property is currently in agricultural use, however the Barbados Agricultural Management Company (BAMC) has indicated their intent not to continue cultivation on this plantation, which is favourable for the landowner's decision to invest.



## 3 RECOMMENDATIONS

### 3.1 PRIMARY SITE RECOMMENDATION

#### Orange Hill Plantation

Based on the above analysis the primary site recommendation is Orange Hill Plantation, however as the landowner was not in favour of a lease option, negotiations for this property were unsuccessful.

### 3.2 SECONDARY SITE RECOMMENDATION

#### Harrow Plantation

With the Orange Hill negotiations failed, the project needed to relocate. Multiple landowners that were consulted in the previous search were recontacted to ascertain renewed interest, and based on preliminary investigations the Pleasant Hall site was considered the next best option. Unfortunately, even though the initial engagement was promising, after multiple discussions around an option agreement the landowner was more in favour of a buyout than a reservation arrangement, therefore prompting this SOI to be eliminated in the FINANCIALS and CONTRACT criteria. At this point, Harrow Plantation had not been identified as a potential option.

During this period of reengagement however, one of the real estate agents identified the owner of Harrow Plantation (Harrow Ltd.) as a new candidate. With a Favourable scoring outcome and Pleasant Hall eliminated, the planning application for development on Orange Hill was rescinded, and terms of reference for an ESIA on the Harrow property was developed. The planning application was then revised and resubmitted in October of 2021.