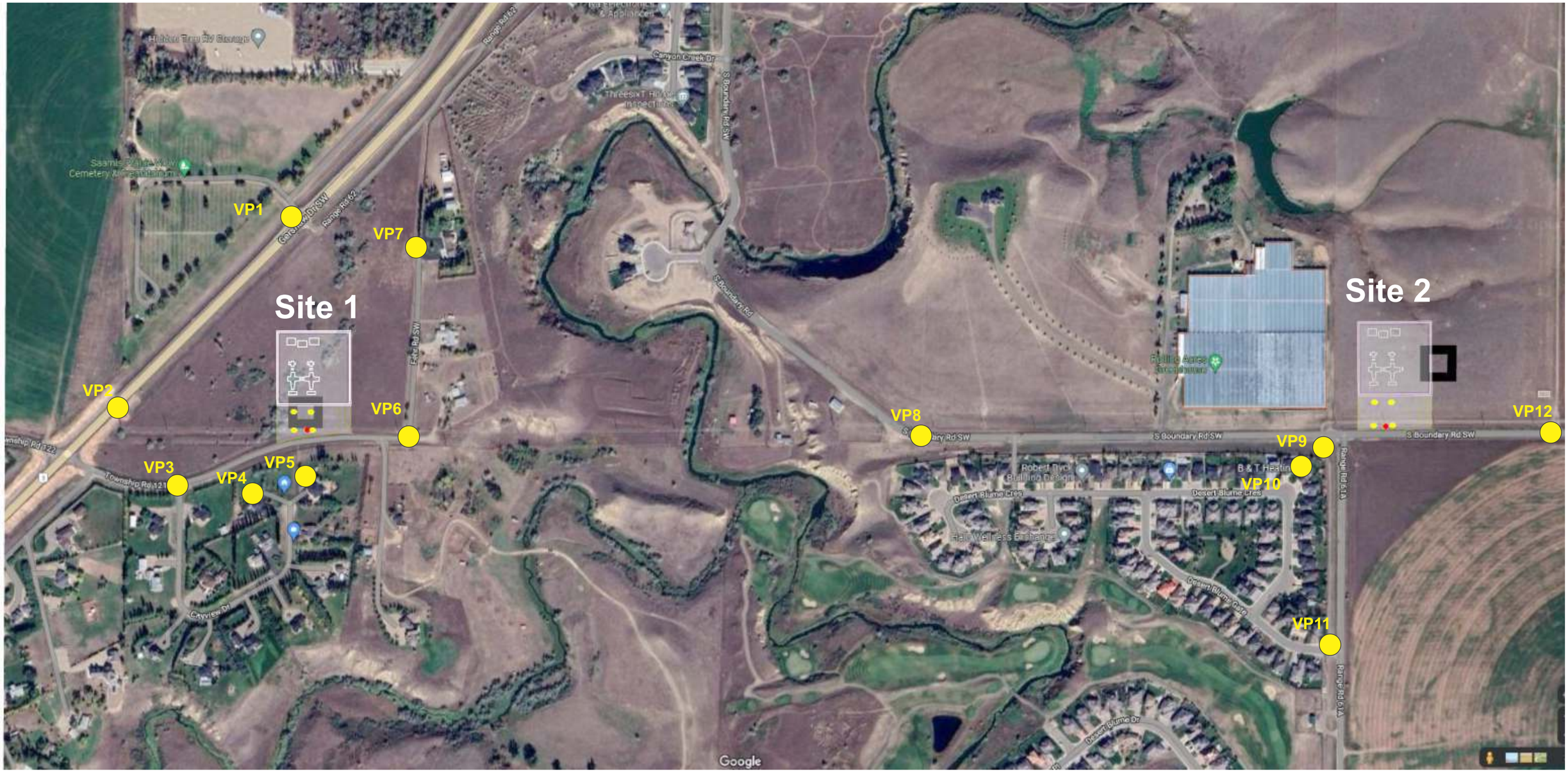
Visual Landscape Aesthetics Assessment of Site Alternatives for MHS-11



Visual Nature Studio Rendering Viewpoints

Expert Written Evidence Report of Dr. Kenneth B. Fairhurst, PhD, RPF - RDI Resource Design Inc
Post-Presentation Version, July 4, 2023

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Credentials and Attestation

I, Kenneth B. Fairhurst, PhD, RPF, am wholly responsible for carrying out the Visual Impact Assessment of the two site alternatives proposed for MHS-11 and for the related report.

My credentials for conducting a visual impact assessment of the proposed substation are 40 years of central and progressive involvement in Visual Resource Management by way of practice, academic teaching and studies, and international symposia. My work has covered many applications, from forest landscapes, oil sands, oil, gas, and electrical transmission, industrial site facilities, a windfarm, and now a substation. My work has extended from B.C. to Alberta and the USA.

I commenced my discipline in 1980 as the Visual Landscape Specialist for the BC Ministry of Forests for the Vancouver Forest Region for 3 years. I first became associated with visual landscape issues in Alberta when I conducted the Hidden Creek Visual Impact Assessment consulting project for Alberta Forestry, Lands and Wildlife in 1984 (unpubl. rep., 1984). I later took the full-time position as the Timber Operations Forester in Edmonton with Energy and Natural Resources. During that period, I was tasked with the initial development of a Visual Landscape Program in the Province, leading to the eventual completion by my successor, Terry Turner, and the publishing of the “Forest Landscape Management Strategies for Alberta” (1988).

I returned to BC in 1985 and resumed my earlier position with the Ministry of Forests, Vancouver (Coast) Forest Region for another 11 years.

I established my consulting practice, RDI Resource Design Inc, in 1996. The company is now in its 27th year of business.

I produced the “Visual Landscape System for Planning and Managing Aesthetic Resources” in 2003 for the Sustainable Ecosystems Working Group, Cultural and Historical Resources Subgroup of the Cumulative Environmental Management Association (CEMA). The document is available on the RDI website rdi3d.ca on the “Consulting Services” page. CEMA operated in the Regional Municipality of Wood Buffalo, Alberta, and made recommendations to manage the cumulative environmental effects of regional development of all resources, both natural and built.

I completed a doctoral dissertation developing a prediction technique for cumulative visual risk in the landscape along travel corridors in 2010. While at UBC, I taught students visual resource management and visual simulation techniques.

RDI’s client base has primarily been from industry or government. Projects have included visual impact assessments of several Alberta oil-sands projects (CNRL, Suncor), many dozens of forestry-related projects in BC, as well as visual aesthetics of LNG infrastructure and electricity transmission. RDI was recently involved in the visual assessment of the EDP Sharp Hills Windfarm proposal in a windfarm in eastern Alberta, providing expert evidence to the AUC in April of 2018 (AUC 22665). The findings are presented on the “Alberta Windfarm” page of the RDI website https://rdi3d.ca. Many of RDIs other projects are also linked on the rdi3d.ca site. A detailed CV was provided separately, and is also available for downloading on-line on the RDI website rdi3d.ca on the “Consulting Services” page.

I have made no corrections nor additions to my original report though this “post-hearings" document contains slight amendments.

The written text is brief. Instead, each picture (and each of the 12 visual simulations herein) “is worth a thousand words”.... as they say.

Ken B. Fairhurst, PhD, RPF
RDI Resource Design Inc
July 4, 2023

Conclusions and Expert Opinion

- At the outset, the two sites are comparable, in general, in that each sites would potentially have the proposed substation present and would be similarly distanced in views from several residences and roads and both sites are presently pastoral/natural-appearing. While the proponent favours Site 1 over Site 2, it cannot be supported from a visual aesthetic perspective. Using the commonly accepted visual impact assessment metrics of form, line, colour, texture, and scale, as well as night time lighting influence, the industrial visual character of the substation would be a major visual intrusion in close viewing distance from residential settings (i.e., low to nil Visual Absorption Capability) without significant mitigation.

- Site 1 has greater intrinsic aesthetics than Site 2, offering greater variety in vegetation and naturalness as compared to the flatness of Site 2 except where it reaches the coulees to the north.

- Site 1 is within close viewing distance from Highway 3. Visual landscape inventory methodologies typically assign high visual sensitivity ratings along major highways, leading to higher degrees of visual protection (restrictive Visual Quality Objectives).

- Site 2 has strong visual influence of the industrial greenhouse directly adjacent. It is considered a transition land-use. The greenhouse would provide partial mitigation of visibility of the substation as seen from houses to the west of the greenhouse. Additionally, the wall around Desert Bloom affords the partial screening from the ground level gardens of adjacent houses. Residents of Desert Bloom have argued that the greenhouse is enough visual impact and should not have to tolerate more from the substation if it were to be built on Site 2.

- Existing recreational amenity is greater in Site 1. Development of the substation on Site 1 would severely disrupt or eliminate such amenity.

- The more modest recreational amenities in Site 2 would suffer the least. The recreational trail along the road by Site 2 opposite Desert Bloom would not be impacted by site development, except during construction.

- Both sites have either native grassland (Site 2) or restored grassland (Site 1) and each could likely serve to offset any losses to the other. The 1 hectare area on Site 2 requiring avoidance or minimization of foot-print for no-net-loss of native grassland could be transferred to the Site 1 property of similar characteristics.

- Mitigation opportunities regardless of which site is selected, require serious consideration and implementation. These should include:

  - lighting - reductions in height, intensity, duration),
  - options for screening - tall vegetation, berming, solid wall fencing, full building enclosure, and,
  - structural height reduction by excavation (appropriate mainly in Site 2 where it backs onto the coulee). Presently the proposed location would require fill at the north end of the site.

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Measurement of the Visual Landscape

Aesthetics is a set of principles concerned with the nature and appreciation of beauty, especially in art. Formal aesthetic qualities of many physical attributes can be easily measured and evaluated using quantitative or classification methods. Such attributes include vertical elements, horizontal elements, form, colour contrast, repetition, texture and pattern, scale, proportion, dominance, cumulative effect, direction, distance and movement, to name some. The metrics lead to a measure called Visual Absorption Capability - the ability for a proposed change to fit with the landscape. Metrics relating to “viewing duration” and “number of viewers” also contribute into formula deriving visual sensitivity and ultimately provide input into the determination of visual aesthetic ratings to differentiate landforms and landscapes from one another. This formal, or expert, approach is commonplace in procedures for measuring visual impacts in Canada, the USA, and in Great Britain and remain relatively unchanged and validated since the early 1960’s. I am fully cognizant of these principles and practices.

Symbolic aesthetic qualities, such as those contributing to meaning and function, cannot be measured by quantitative methods, and generally rely on soliciting public opinion. However, formal aesthetic models generally include some generalized estimates, such as “level of concern”. I reviewed the submissions to the AUC from locals citizens. I did not seek public opinion except those views expressed by Mr. Jim Jackson, resident of the residential subdivision immediately adjacent to Site 1 on Cityview Drive in clear and close view of the proposed substation, and present owner of the land on which Site 1 would be built. Mr. Jackson also expressed the views of his community which he knows well. Mr. Jackson also provided the photography for both sites at my encouragement.

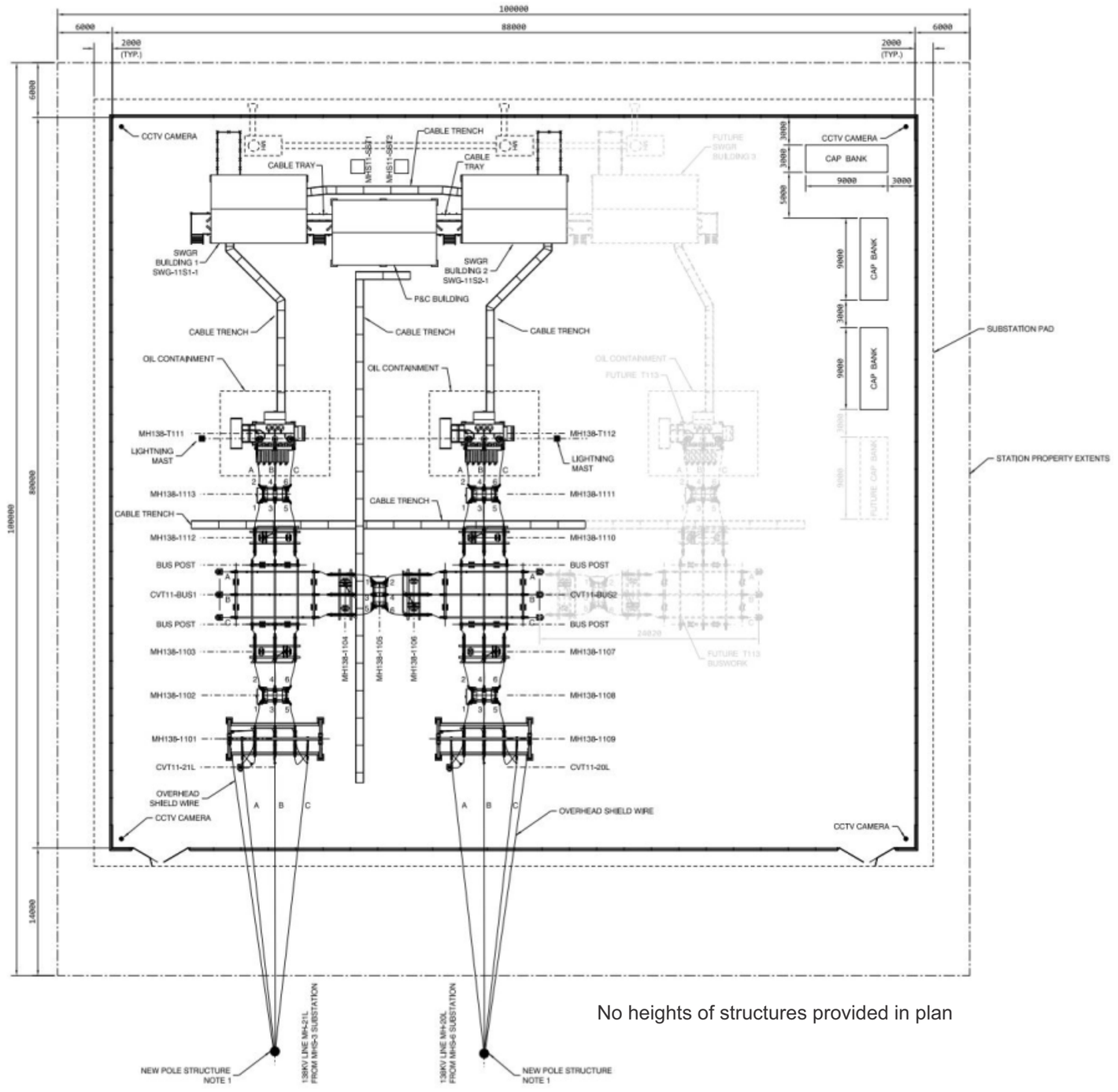
Visual Simulation Techniques

The proponent provided four measures of scale: 1] ground area to be gravelled (1ha), 2) ground area to be fenced, 3) height of A-frames (18m), and 4) height of light masts (20m). No data was provided on the heights of the 138kV transmission poles or the 64kV distribution poles. A site plan without internal measurements was provided. No details were provided as to actual ground area to be occupied by the substation components, nor of structural dimensions or scale (heights) of the components.

RDI constructed a planimetric geo-referenced plan to scale based on the proponent's measureless equipment plan by importing the graphic into ESRI GIS Pro, and referencing it to the boundaries of the gravel surface and fencing which were imported from the KMZ. This gave RDI the locations and footprints of the major components of the substation. Still, height measures were absent except for the A-frames and light masts. RDI sought out a representative stock substation model from the internet. RDI found a 66kv substation in the associated link called 3D Warehouse and downloaded it into Sketchup. A scaling procedure was applied to approximate the dimension of the two sets of the substation. Accuracy was hampered by the absence of height elevations in the proponents drawings.A third set was not simulated as it was declared to be only included in the design for assurance of potential accommodation, and would likely never be built according to the proponent.

Two approaches were examined: 1) importing a 3-d model into Visual Nature Studio (VNS), and 2) importing the model into Cinema 4-D (C4D). The VNS modelling provided for accurate positioning and scale based on terrain imported from Maps Canada, and allowed for a variety of viewpoints (12 in total). The Google Earth image was also imported and draped onto the model for reference. While the detail is satisfactory as seen from elevated viewpoints, the image drastically loses clarity when viewed from ground-based viewpoints. As such, RDI added surface features such as grasslands, trees, houses, trails, and roads to emulate reality.

C4D is able to have a 3-D model added to 2-D photography to obtain a more clearer sense of how a 3-D model of the substation will look in its actual setting. The technique requires additional positioning and scaling to ensure a proper fit is achieved. The C4D results had limited utility and accuracy and so were not included in this presentation, with RDI opting to concentrate on the VNS modelling. Both approaches, it must be remembered, are only models of reality, each with their limitations. Simulations do not represent 100% of reality. RDI was unable to portray key elements in either simulation method such as the A-frames and light masts, and was also unable to import a more realistic 3-d model for the transmission poles. RDI used a simple t-pole with a 21m height and without lines to portray the transmission poles, and referenced the photography which exhibited the correct form of the poles.

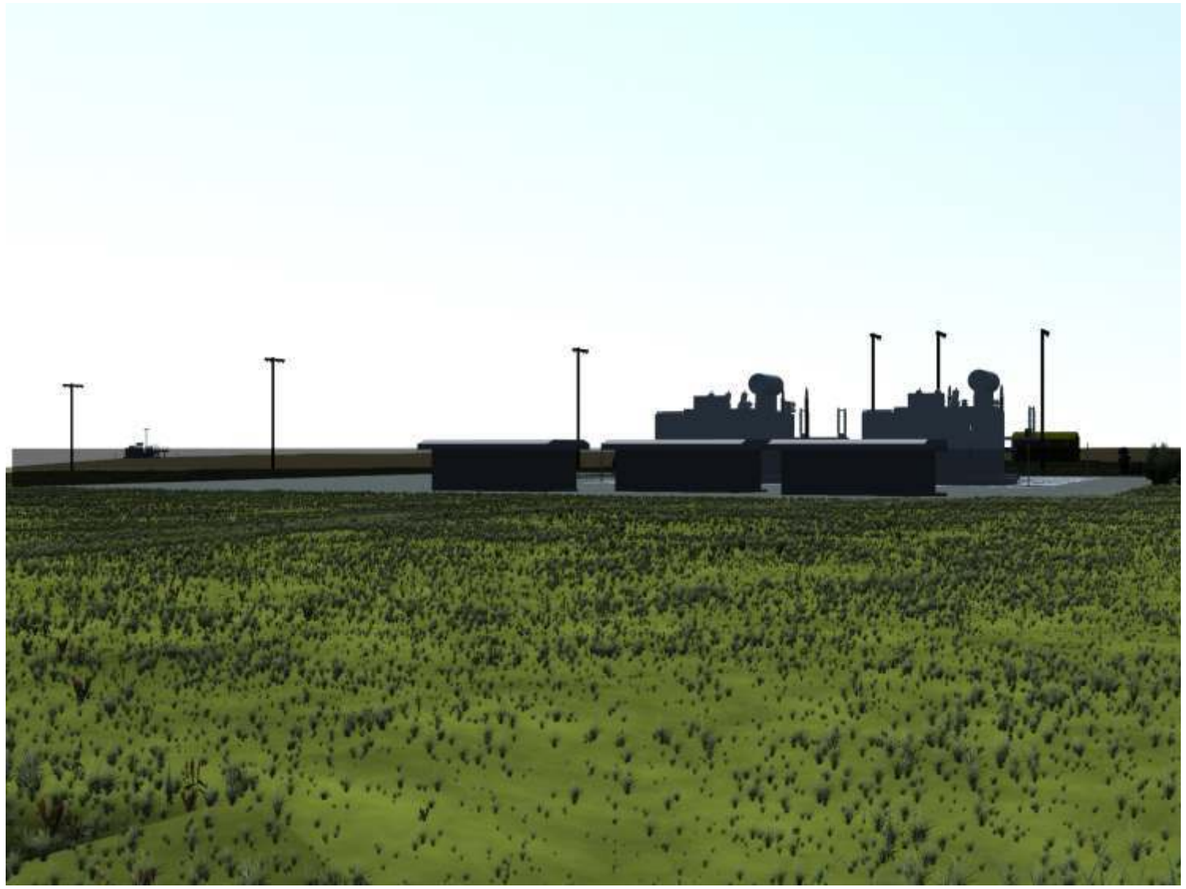


No heights of structures provided in plan

Site Plan provided by Proponent - includes Third Future Set - not likely to be built

Photos by James Jackson - Panoramas produced by RDI

Site 1 Photography from South Boundary Road

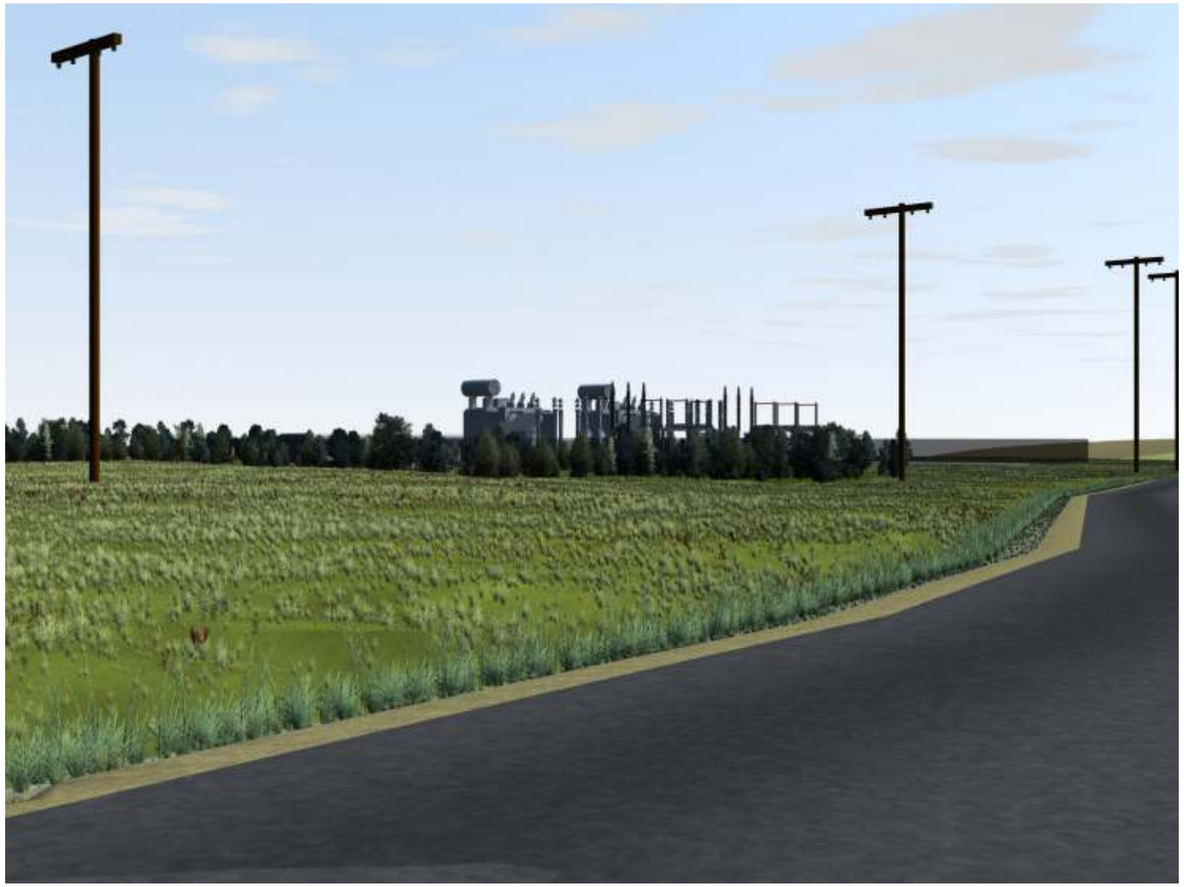


VP 1 - Highway 3 North - VNS Simulation

VP 2 - Highway 3 South - VNS Simulation

Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m

Site 1 VNS Simulations from Highway 3



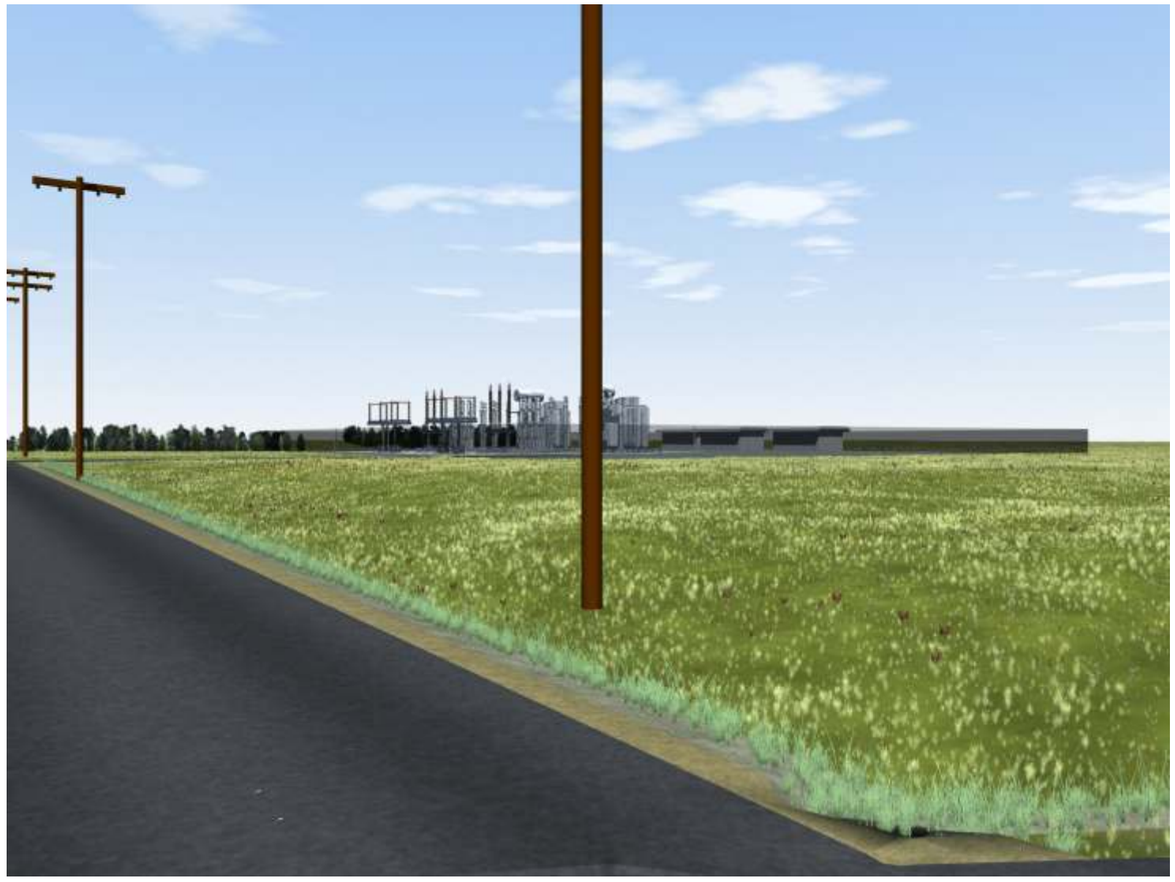
VP3 - TWP Rd 121 @ Cityview Drive - VNS Simulation

VP4 - in Cityview West - VNS Simulation

Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m

Site 1 VNS Simulations VP 3 Twp Rd 121 and VP 4 Cityview West

VP5 - In Cityview East - VNS Simulation



VP6 - TWP Rd 121 @ Fehr Corner - VNS Simulation

VP7 - Upper Fehr Rd - VNS Simulation

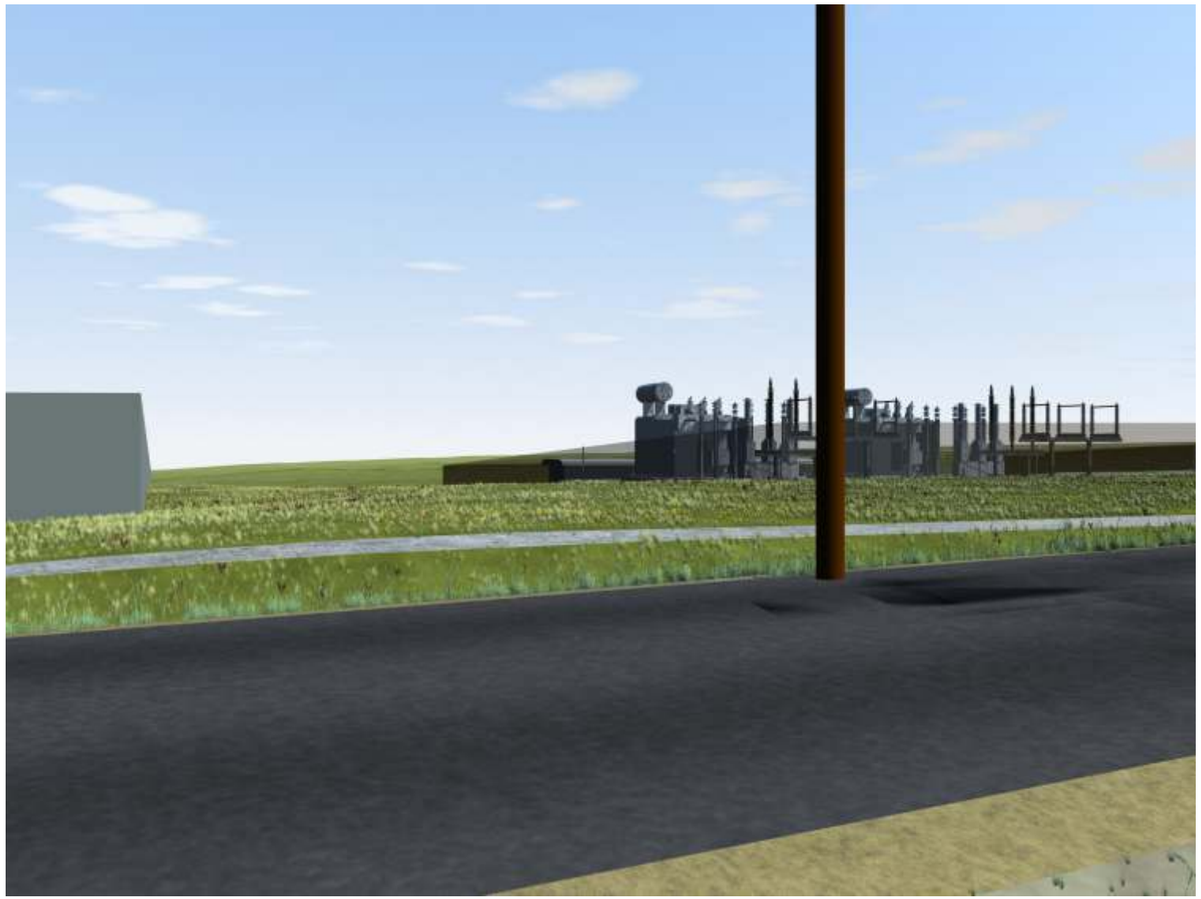
Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m

Site 1 VNS Simulations - VPs 5, 6, 7

Photos by James Jackson - Panoramas produced by RDI

Site 2 Photography S. Boundary Rd. SW

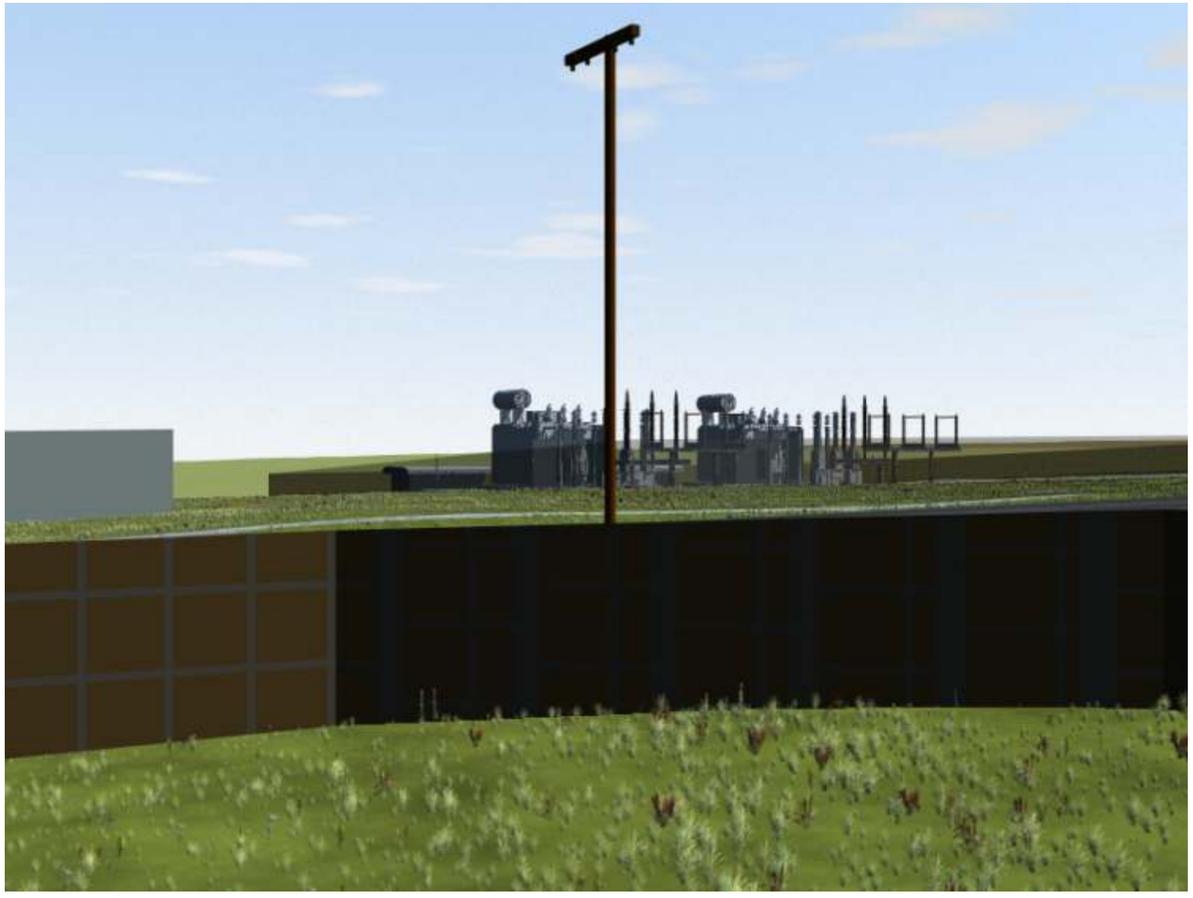
VP 8 - S. Boundary Rd West View, Desert Bloom on Right - VNS Simulation



VP 9 - S. Boundary Rd Mid View, Greenhouse on Left - VNS Simulation

Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m

Site 2 VNS Simulations - VPs 8, 9

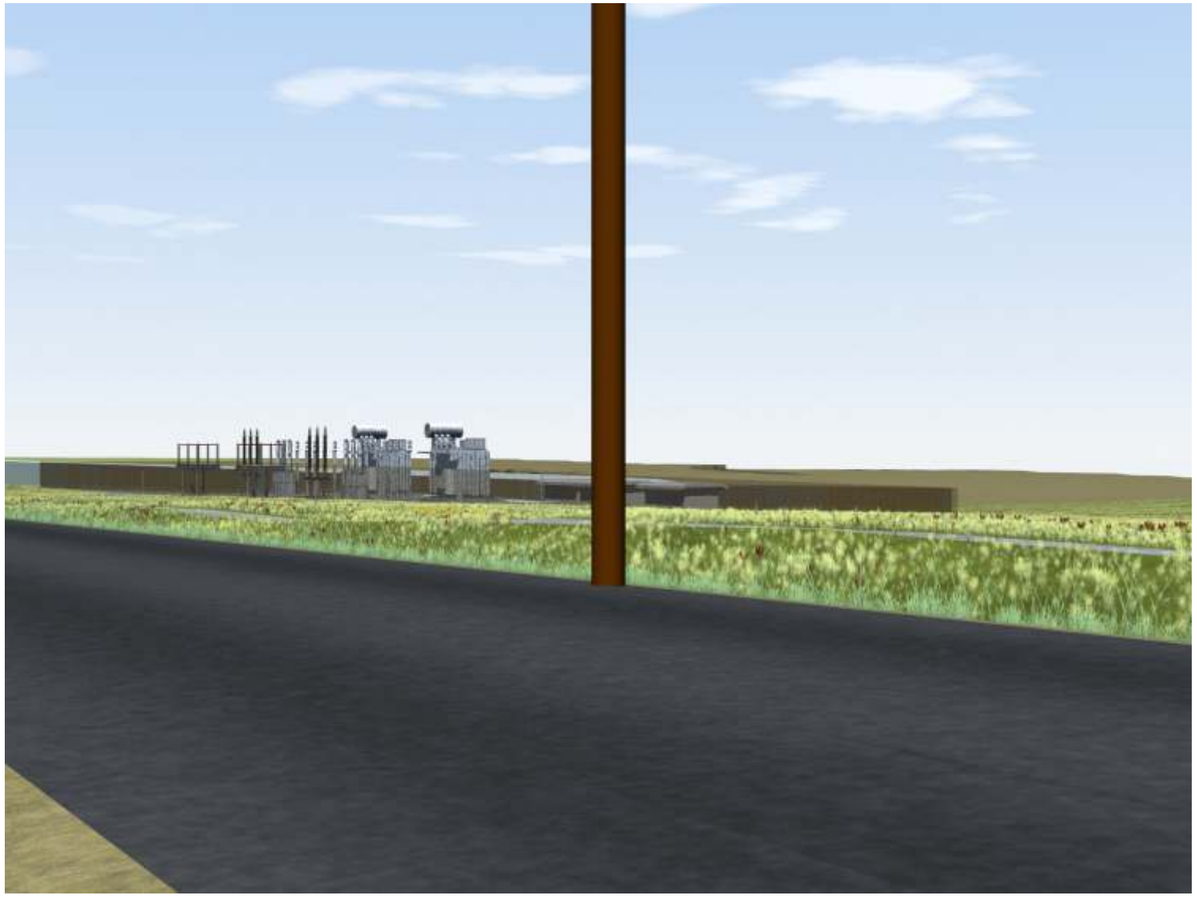


VP 10 - Inside Desert Bloom at Corner - house-level view above 1.3m wall,
Greenhouse on Left - VNS Simulation

Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m.

Site 2 VNS Simulations - VP10 Ground and Second Story Dwelling View Rge Rd 61A @ Desert Bloom Gate

VP 11 - Rge Rd 61A @ Desert Bloom Gate



VP 12 - S. Boundary Road - view from east - VNS Simulation

Model missing A-frame, light masts.
Overall height of substation rendered 11m.
Fence is rendered at 3.6m.
See p.16 for actual transmission pole photos.
Transmission pole height portrayed is 21m.

Site 2 VNS Simulations - VPs 11, 12

View toward Desert Bloom from close to Site 2

Photos by James Jackson

Visual Influence of the Greenhouse - considered to be a transitory land-use

Photos by James Jackson

Photo of Existing Comparable Substation as Proposed

Photos by James Jackson

Night View - Existing Comparable Substation as Proposed

Photos by James Jackson

Existing Comparable Substation as Proposed - Day and Night Scenes