

SMITH BAY WHARF

DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX R

PREPARED FOR KANGAROO ISLAND PLANTATION TIMBERS BY ENVIRONMENTAL PROJECTS
JANUARY 2019

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APPENDIX R – VISUAL AMENITY

R1	Smith Bay Visual Amenity Assessment Report.....
R2	3D Visual Assessment of KI Seaport.....





Appendix R1 –
Smith Bay Visual Amenity
Assessment Report –
Andrew Lothian

**VISUAL AMENITY ASSESSMENT
PROPOSED SMITH BAY WHARF
KANGAROO ISLAND**

**DR ANDREW LOTHIAN
DIRECTOR, SCENIC SOLUTIONS**



2016

Visual amenity assessment, Proposed Smith Bay wharf, Kangaroo Island
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VISUAL AMENITY ASSESSMENT

PROPOSED SMITH BAY WHARF, KANGAROO ISLAND

FINDINGS

The proposed development of a causeway, floating barge and associated infrastructure at Smith Bay will extend the existing industrial-like character of the abalone farm into the foreshore landscape. This is likely to reduce the landscape quality of the Bay from its present 6.5 to 5, a 15% reduction in landscape quality.

However compared with the length of the highly scenic northern coast of Kangaroo Island, Smith Bay represents 1.6% and it lies east of the more highly scenic coast. It is also a largely inaccessible Bay and will be viewed by relatively few people. On this basis the visual impact is judged acceptable.

The visual impact of the timber storage area will be largely neutral as this area already rates only 5 given its existing industrial character.



Smith Bay foreshore – location of the causeway

CONTENTS

Chapter	Section	Page
	Findings	3
1.	Proposal	5
2.	Location	6
3.	Proposed Structures	9
4.	Site Landscape	11
5.	Landscape Quality	13
6.	Visual Impact Assessment	17
7.	Visual Impact Assessment of the Proposed Development	20
8.	Conclusions	23
9.	About the Consultant	24

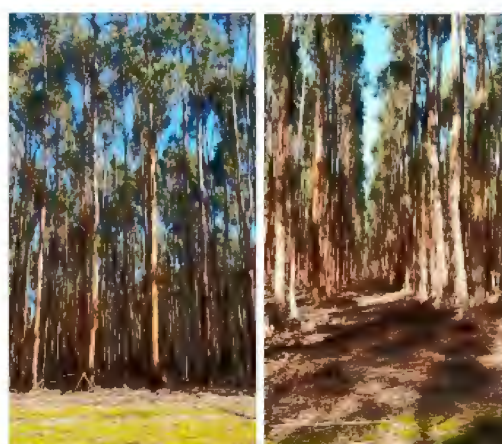
1. PROPOSAL

Kangaroo Island Plantation Timbers has acquired 95% of the hardwood and softwood forestry plantations on Kangaroo Island which are grown on former agricultural land. According to its website (www.kipt.com.au), the Company owns around 19,000 hectares of productive Kangaroo Island land, approximately half of which is planted with trees and half of which is either cleared or contains native vegetation.

The company has standing timber assets of 1.3 million cubic metres, about 60% softwood (*Pinus radiata*) and 40% hardwood (*Eucalyptus globulus* and *Eucalyptus nitens*) on 7,200 ha. The Company also owns Kangaroo Island's only sawmill at Parndana and land at Smith Bay that is considered suitable as a site for a deep water wharf that can be used as a bulk log or chip export facility. The Managing Director of KIPT, John Sergeant, stated that the timber on the Island is worth, conservatively, a half a billion dollars (*The Islander*, 10/11/16, p 8).



Pine plantation



Hardwood plantation



Stacked timber



Trailer load of timber as transported to the wharf

Source: KIPT

Figure 1 Scenes of KIPT operations - the wharf will enable the export of the timber

On 21 October, 2016 the Company announced that it had lodged an application for Major Development Status with the South Australian Government, for KIPT's proposed \$25 million multi-user deep water wharf project at Smith Bay on Kangaroo Island.

2. LOCATION

Smith Bay is located on the north coast of Kangaroo Island, west of Kingscote (Figure 2).



Source: RAA map

Figure 2 Map of part of Kangaroo Island and location of Smith Bay

Figures 3 and 4 show Google Earth images of the locality.



Source: Google Earth

Figure 3 Vertical view of Smith Bay and the existing abalone farming facilities



Source: Google Earth

Figure 4 Oblique view of Smith Bay at end of road leading to the proposed wharf



Source: EBS Ecology

Figure 5 Location of the Company's Project Site

Figure 5 shows the location of the Company's project site. Figure 6 shows the location of the causeway and floating barge. The abalone farm is the large black covered square to the right of the project site. The small round white forms are the sand bases of former abalone tanks.

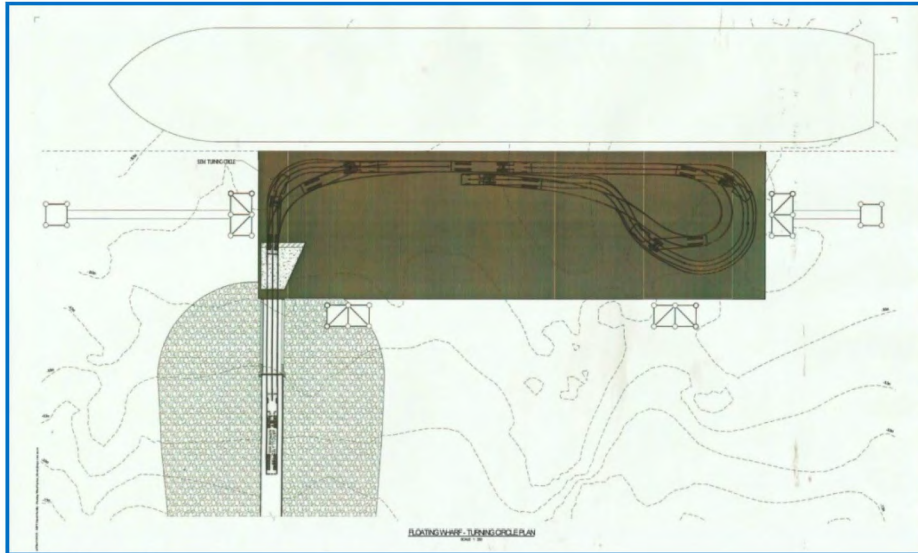


Source: AZTEC Analysis

Figure 6 Location of the causeway, floating barge and timber storage area

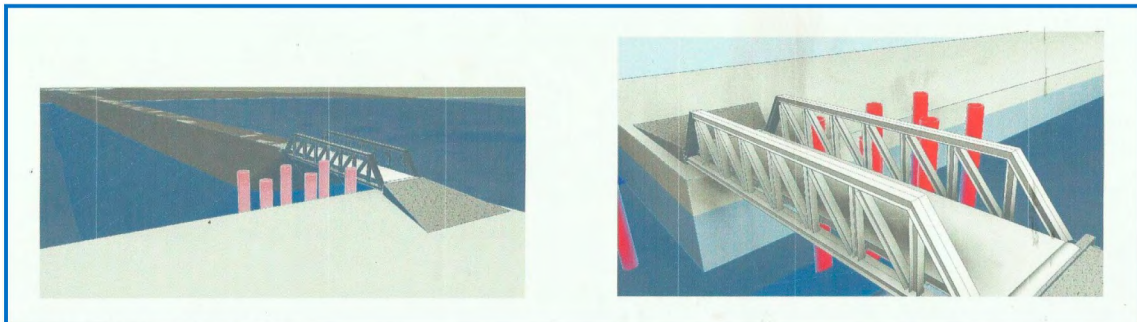
3. PROPOSED STRUCTURES

The proposed wharf design uses a sealed roadway on a rock fill causeway, extending towards a large floating pontoon barge moored permanently in deep water and accessed by a link span bridge and concrete ramp (Figure 7 and 8). Two mooring dolphins and four piled restraint frames will hold the barge in position. The floating barge will be approximately 120 m long and 35 m wide. A team is in Asia inspecting floating barges which could be acquired for the project.



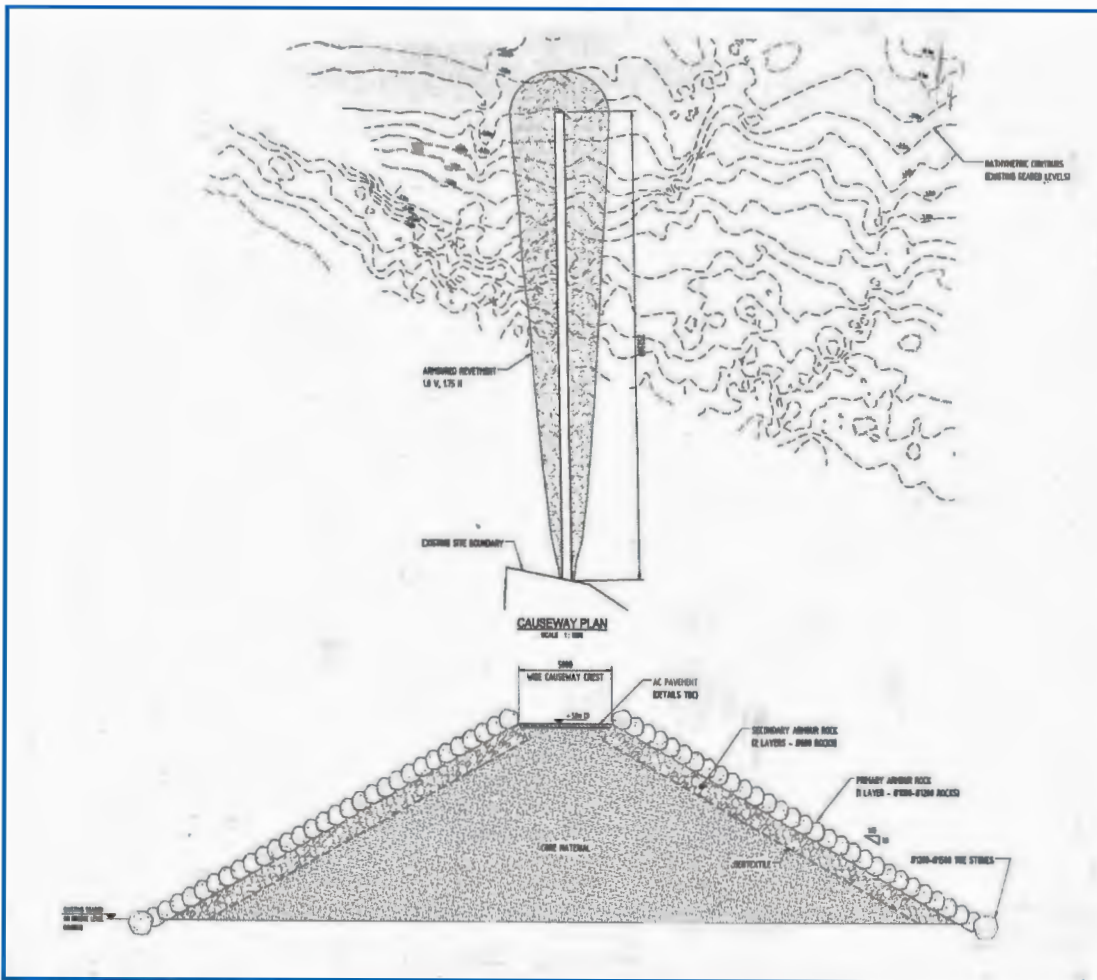
Source: AZTEC Analysis

Figure 7 Details of the floating barge and movement routes for loading timber



Source: AZTEC Analysis

Figure 8 Details of the 20 m linkspan bridge to the floating barge



Source: AZTEC Analysis

Figure 9 Causeway plan and section

Figure 9 details the causeway which will extend approximately 250 m from the land to the 9 m depth of the seabed. The causeway is expected to be approximately 5.0 - 5.5 m above the Lowest Astronomical Tide. The deck level of barge is expected to be 3.0 - 3.5 m above the waterline. The causeway will be topped by a 5 m wide roadway. On shore, the timber will be stored in three bays accessed by the road from the North Coast Road.

4. SITE LANDSCAPE

The following panoramas show the landscape of the site and its surrounds.



Figure 10 Rocky beach at Smith Bay. The posts are along the route of the causeway



Figure 12 Foreshore west of site



Figure 13 Foreshore east of site



Figure 14 View from the access road towards the foreshore



Figure 15 Part of the timber storage area in the former abalone farm site



Figure 16 Another view of the timber storage area



Figure 17 Towards Cape D'Estaing with the abalone farm on the right



Figure 18 Abalone farm and foreshore from the eastern end of Smith Bay



Figure 19 Lichen covered rocks on foreshore at site



Figure 20 The posts mark the location of the causeway



Figure 21 Route of the access road from the North Coast Road to the right of the trees



Figure 22 The KIPT beach house within the location of timber storage area above the foreshore

5. LANDSCAPE QUALITY

The consultant has carried out several studies relevant to defining the landscape quality of the area and the likely visual impact of the proposed development. These are described below and in section 6.

Coastal Viewscapes of South Australia Project, 2005

The consultant completed the Coastal Viewscapes Project for the Coast Protection Branch of the SA Department for Environment and Heritage. The project entailed photographing the entire South Australia coast (1,700 photographs), compiling an Internet-based survey with 138 representative photos and having over 3,000 people participate in rating the scenes on a 1 (low) – 10 (high) scale of aesthetic quality. Based on the 2,200 respondents who completed the entire survey, ratings were derived for each of the images. In addition, smaller groups of respondents scored a range of features in the scenes, including water area, diversity, naturalness, beach quality and height of land forms. Of the nine coastal regions, the Kangaroo Island region rated the highest, 7.15 compared with 7.02 for western Eyre Peninsula, the second highest rated region. Mapping of coastal landscape quality completed this section of the project.

The report's overview for the Kangaroo Island region was as follows:

South Australia's largest island has a spectacular and highly rated coastline, possibly a higher proportion of high ratings than any other region. Much of Dudley Peninsula on the Island's east comprises headlands and cliffs interspersed with bays and dunes. Pelican Lagoon, a large wetland separates the Peninsula from the rest of the Island. West of Pelican Lagoon comprises a plateau which rises towards the west, producing high cliffs and headlands particularly in the north-west and south-west.

The coastlines with high ratings were:

- North coast: Cape D'Estaing (near Emu Bay) to Cape Borda 7.25 – 7.75
- West coast: Cape Borda to Cape du Couedic 7.25 – 7.75
- Cape du Couedic to Kirkpatrick Point (Remarkable Rocks) 8.00
- South coast: Kirkpatrick Point to Point Tinline 7.25 – 7.75
- Cape Willoughby – Penneshaw 7.25 – 7.75

While Pelican Lagoon and some other wetland areas rated low, most of the remaining coast was in the 6.75 – 7.0 range, just below the high rating.

Source: Coastal Viewscapes Project, 2005

Table 1 provides the ratings for the coast between Cape D'Estaing and Cape Cassini. Zone 1 is the immediate foreshore and where it comprises cliffs, rates 7.0 – 7.5 depending on their height and steepness. Zone 2 is the land inland from the coast which has a view to the sea, it being assumed that such land has a rating higher than land without such a view. Zone 3 is such land without the sea view.

Table 1 Ratings: Cape D'Estaing and Cape Cassini

Zone 1	Cliffs 7.0 – 7.5, Cape Cassini 6.5 – 7.0	
	< 1 km	> 1 km
Zone 2		
Non-Veg	5.5	5.0
Vegetated	6.0	5.5
Zone 3		
Non-Veg	< 1 km 5.0	> 1 km 4.5
Vegetated	5.5	5.0

Figure 23 shows the images that were used in the survey from northern Kangaroo Island. The Cape Cassini scene (Figure 24) which rated 6.46 is similar to the Smith Bay foreshore with lichen covered rocks and headlands in the distance.



Cape Torrens 7.56



Snelling Beach 7.59



King George Bay 7.48



Near Penneshaw 6.94

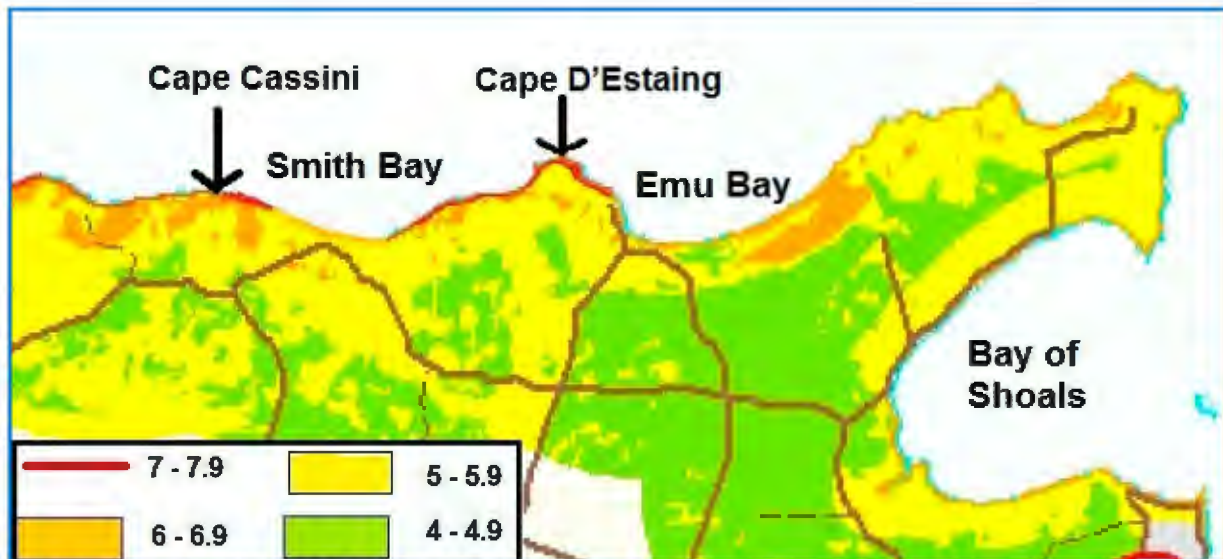
Figure 23 Survey photos from northern Kangaroo Island



Figure 24 Cape Cassini 6.46

Smith Bay is a rocky bay with a small sandy beach and with low headlands at each end. The Coastal Viewscapes Project found that for Kangaroo Island, the headlands and bays formation averaged 7.31 while the dunes and beaches formation averaged 6.41.

Figure 25 summarises the ratings for the Smith Bay region. The length of the bay rates 6 rising to 7 towards Cape Cassini in the west and Cape D'Estaing in the east. Based on the scene of Cape Cassini (Figure 23), a rating of 6.50 is considered appropriate for Smith Bay. Inland, the barren land with a view of the sea has a rating of 5.5, reducing to 5.0 where it has no sea view.



Source: Coastal Viewscapes Project, 2005

Figure 25 Landscape quality rating for the Smith Bay region

Based on the analysis undertaken in the Coastal Viewscapes Project, and the evidence of the Cassini Bay image, a rating of 6.5 is adopted for Smith Bay. Smith Bay is not part of the high quality coast which characterises much of the western half of Kangaroo Island although it is nevertheless an attractive area.

Immediately inland the presence of the abalone facilities with sheds, vehicles, high fences and buildings create an industrial-like landscape of much lower scenic quality, around 5. This is also the rating for the area to be used for timber storage.

Further inland across the agricultural area and the barren paddocks of rising land with blocks of vegetation, the scenic quality rises slightly to 5.5.

Summary of landscape quality ratings for Smith Bay area

Smith Bay foreshore	6.5
Proposed timber storage area and abalone farm	5.0
Inland agricultural land with sea view	5.5

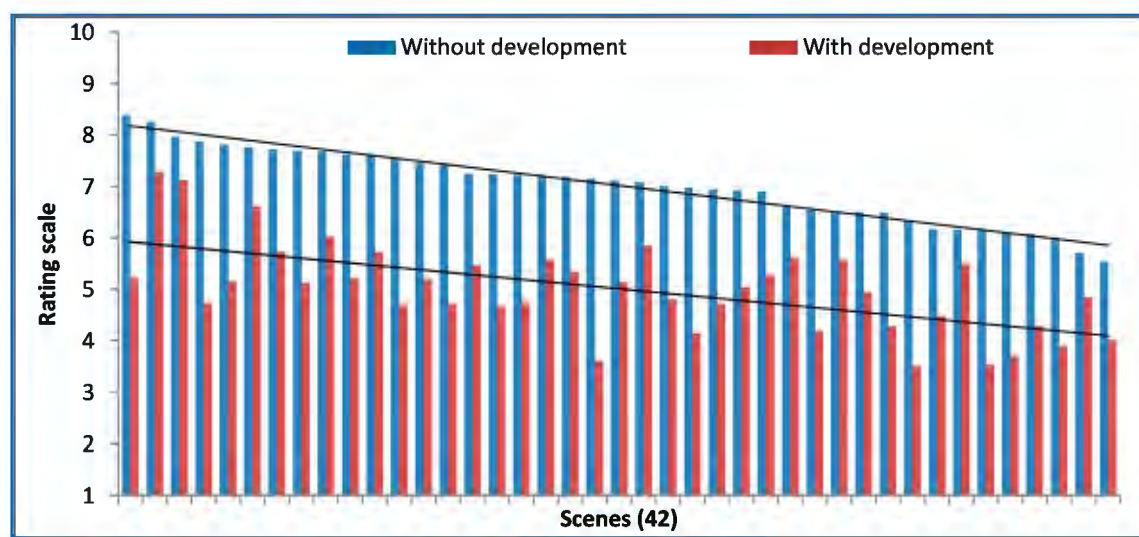
6. VISUAL IMPACT ASSESSMENT

As part of the Coastal Viewscapes Project, a separate survey of the visual impacts of coastal developments was undertaken comprising 82 scenes with and without a development. Figure 26 illustrates scenes with and without development, in this instance, coastal shacks.



Figure 26 Example of a scene without and with development (James Well, Yorke Peninsula)

Developments in the survey covered mainly housing-type developments (including high rise) plus scenes of marinas and aquaculture. The scenes were shown in random order. A total of 1659 respondents completed the survey. The average rating of scenes without development was 7.09 and with development was 5.00, a significant difference of two units. The visual impact did not correlate with the level of scenic quality but rather was similar across the range of scenic quality. Figure 27 illustrates this; the trend lines for the scenes without development and with development are nearly parallel, indicating a similar amount of visual impact for high and low scenic quality.



Trend lines: Without development $y = -0.06x + 8.23$, $R^2 = 0.97$
 With development: $y = -0.046x + 5.96$, $R^2 = 0.39$

Figure 27 Ratings of scenes with and without development

Table 2 summarises the means for the three types of development. While the visual impact of housing and marinas were similar, around 30%, that for aquaculture was half of this, 16.6%.

Table 2 Means of different developments

Development	Without	With	Diff.	%
Housing (36)	7.13	4.98	2.15	30.2
Marina (3)	6.70	4.74	1.97	29.3
Aquaculture (2)	6.92	5.77	1.15	16.6

Although there were only three scenes of marinas, these are the closest in appearance to the proposed wharf development at Smith Bay and are shown in Figures 28-30, without and with the development.



Rating 7.48



Rating 5.51

Figure 28 O'Sullivan's Beach marina

Rating 7.05



Rating 4.72

Figure 29 Christies Beach marina

Rating 5.58



Rating 3.98

Figure 30 Port Vincent marina

Table 3 shows that the visual impact as measured by the reduction in ratings of the marinas ranged from 1.60 to 2.33, an average of nearly 2 units.

Table 3 Means of marina developments

Development	Without	With	Difference	%
O'Sullivan's Beach	7.48	5.51	1.97	26.34
Christies Beach	7.05	4.72	2.33	33.05
Port Vincent	5.58	3.98	1.60	28.67
Mean	6.70	4.74	1.97	29.35

A second study of visual impacts was carried out for developments on the River Murray (Figure 31). This was part of the consultant's SA River Murray Landscape Assessment Project (2007), undertaken for the Department of Water, Land and Biodiversity Conservation and the SA Murray Darling Basin Natural Resources Management Board.

The survey used 40 scenes of houseboats, holiday houses, waterfront treatments, caravan and recreation areas and pumps shown in random order. Responses from 1259 respondents were used for analysis. Table 4 summarises the ratings of river developments.

The survey used a 1 – 9 Likert-type scale for rating:

1	2	3	4	5	6	7	8	9
Disliked				Neutral				Liked



Irrigation pump & pipes Rating 2.81



Jetty Rating 5.39

Figure 31 Examples of River Murray developments

Table 4 Rating of river developments

Waterfront treatments	Mean rating	Assessment
Natural bank (6 scenes)	5.06	Neutral
Jetties (8)	4.74	Slightly disliked
Retaining walls and wharves (9)	4.09	Slightly disliked
Irrigation pumps and pipes (up cliffs) (4)	3.08	Fairly disliked

These results indicate that the visual impact of developments can be quite substantial.

7. VISUAL IMPACT ASSESSMENT OF THE PROPOSED DEVELOPMENT

The proposal comprises the following elements:

- A stone-lined causeway extending 250 metres into the sea from inland, with an elevation of up to 5.5 m above the sea;
- A large floating barge with approximate dimensions 120 m long by 35 m wide with its deck up to 3.5 m above the sea;
- A 20 m linkspan bridge sloping down 2 m from the causeway to the barge;
- Two mooring dolphins, 5 m square, and four piled restraints (10 m by 5 m) for mooring the barge;
- An extensive timber storage area on higher land inland from the shore;
- From time to time, bulk carriers of up to 30,000 DWT will be moored against the barge.

Large trucks will deliver the logs to the site and to the barge, and forklifts and other equipment will be used to shift the logs onto ships, assisted by ship cranes. The plans do not include a crane on the barge or causeway.

Although the inland area which is intensively used for abalone farming and the foreshore may be considered as a single area, the visual impact is considered separately for the two areas.

Foreshore area

The proposed causeway, barge, dolphins and piled restraints together with other equipment and the activities associated with moving the timber will extend the existing industrial-like character of the abalone farm into the foreshore landscape.

The visual impact of this will be a reduction of the landscape quality of this section of the Kangaroo Island coast from 6.5 to 5.0.

This assessment is based on the results of the consultant's two previous studies which indicated various developments lowered scenic quality by up to 2 units.

How much of the Smith Bay landscape will be affected by the proposed development? With the causeway standing 5.5 m above the sea and extending 250 m out to sea, it will be visible across the entire width of Smith Bay. Therefore it will impact the visual quality of this coast, with the impact being greatest near the development and lesser in the western and eastern extremities of Smith Bay.

What is the significance of this visual impact? In a hand book on visual impacts, Buchan¹ (2002) noted:

Ultimately, significant is whatever individuals, people, organisations, institutions, society and/or policy say is significant – it is a human evaluative and subjective judgement on which there may or may not be consensus. It is therefore important that two separate but critical characteristics of all effects – magnitude and significance – are clearly distinguished.

There are several ways of assessing its significance.

Firstly, a reduction of 1.5 on a scale of 1 – 10 amounts to a 15% decrease in landscape quality.

1. Buchan, N., 2002. *Visual Assessment of Windfarms Best Practice*. Scottish Natural Heritage Commissioned Report F01AA303A, University of Newcastle.

Secondly, the visual impact may be considered on an all-of-Island basis. Table 5 summarises the length of coast for each rating.

Table 5 Length of Kangaroo Island coast by landscape quality rating

Rating	Coast length (km)	%
4	14.9	2.72
5	32.5	5.93
6	157.6	28.75
7	335.8	61.26
8	7.4	1.35
Total	548.2	100.00

With nearly 160 km of the Island coast rating 6, the loss of the small section at Smith Bay may be considered as not very significant. Smith Bay is approximately 2.5 km wide which is only 1.6% of the 6-rated coast.

Thirdly, the higher value coast lies mainly west of Smith Bay as the land rises to a plateau and high steep cliffs such as those at Cape Torrens line the coast (Figure 23).

A fourth means of assessing the significance of the visual impact is the number of people likely to view the developments. Compared with the popular Emu Bay to the east, Smith Bay is largely an unknown destination for tourists. Apart from the access track to a house overlooking the eastern end of Smith Bay, there is essentially no public access to the Bay. A locked gate prevents access to the abalone farm which adjoins the central part of the Bay. The remaining access road is that which will be used by KI Plantation Timbers in trucking the logs to the wharf facility and to which access is also likely to be restricted. There will therefore be few people other than the employees of KIPT and the adjacent abalone farm who will view the site.

KIPT has indicated the establishment of the wharf will provide an alternative freight facility for other primary producers on the Island (J. Sergeant, *The Islander*, 10/11/16) so the site may be viewed by others from the community who will also benefit from the wharf facility located there.

Access to the site can also be gained from the sea, by air or by walking along the coast. However the numbers of people doing this is likely to be small compared with those who would normally travel by vehicle. So overall, the number of people likely to view the developments is likely to be small.

In summary, the causeway, floating barge and associated infrastructure is likely to reduce the scenic quality of the foreshore of Smith Bay from its current 6.5 to 5.0, a 15% reduction in landscape quality. The significance of this change may be determined by considering the following: Smith Bay comprises 1.6% of the northern coast of Kangaroo Island and lies to the east of the most of the higher quality northern coast. Furthermore it is a largely inaccessible bay and will be viewed by relatively few people. On this basis the visual impact is judged acceptable.

Timber storage area

Prior to being loaded on ships, the logs will be stockpiled in the timber storage area above the foreshore. They are likely to occupy an extensive area and be quite high to store a sufficient number of logs for each shipment.

The additional visual impact of these logs is likely to be low. The area already has the remains of a former abalone farm – see Figures 6, 15 and 16, and adjoins the existing large abalone farm which presents an industrial-like appearance. The current landscape quality of 5 for this area is not likely to be affected.

8. CONCLUSIONS

The proposed development of a causeway, floating barge and associated infrastructure at Smith Bay will extend the existing industrial-like character of the abalone farm into the foreshore landscape. It is likely to reduce the landscape quality of the Bay from its present 6.5 to 5, a 15% reduction in landscape quality. However compared with the length of the highly scenic northern coast of Kangaroo Island, Smith Bay represents 1.6% and lies to the east of the more highly scenic coast. It is also a largely inaccessible Bay and will be viewed by relatively few people. On this basis the visual impact is judged acceptable.

The visual impact of the timber storage area will be largely neutral as this area already rates only 5 given its existing industrial character.

9. ABOUT THE CONSULTANT

Andrew Lothian

Dip Tech (Town Planning), MSc (Environmental Resources), PhD,
Certified Environmental Practitioner, FEIANZ

Andrew Lothian trained originally in town planning and environmental science and spent much of his career working on environmental policy in the South Australian Department of Environment and Natural Resources. He contributed significantly at State and National levels in the areas of ecological sustainability, greenhouse gas emissions and climate change, state of environment reporting, environmental valuation and environmental industries. He was also involved in legislation covering many environmental issues including site contamination, zero waste, housing energy rating, and climate change. He has also conducted carbon accounting of enterprises. He has presented many papers at conferences and seminars.

He lectured at Adelaide and Flinders Universities and at TAFE, is a past President and Secretary of the Environment Institute of Australia (South Australian Division), and has served as a councillor on local government. From 2003 to 2014, Dr Lothian was appointed by the Governor to serve as a Sessional Commissioner of the Environment, Resources and Development Court.

He completed a PhD on landscape quality assessment of South Australia in 2000 and has undertaken consultancies and studies on scenic quality and visual impact across South Australia including the coast, Barossa Valley, River Murray, Flinders Ranges and Mt Lofty Ranges as well as the Lake District in England. Reports of the studies are available at his website: www.scenicsolutions.com.au

Appendix R2 – 3D Visual Assessment of KI Seaport

Table of Contents

1.	Introduction	3
2.	Background	3
2.1	Location	3
2.2	The Proposed Facility	6
2.3	The Model	6
2.4	Constraints and limitations of the model	7
3.	Methodology	7
3.1	Buiding the model	8
3.2	Determining sensitive receptors	8
3.3	Extracting 3D renders	8
4.	Assumptions	8
5.	Results	9
6.	Discussion	9

List of Figures

Figure 1 – Smith Bay, Kangaroo Island, SA

Figure 2 – Aerial showing allotment 51 and 52

List of Appendices

Appendix A

Key Locations Map

Appendix B

Line of Sight Map

Appendix C

Location 06-Line of Sight

Appendix D

Location 07-Line of Sight

Appendix E

Location 08-Line of Sight

Appendix F

Location 9 (A and B)-Line of Sight

Appendix G

Location 10-Line of Sight

Appendix H

Location 11 (A, B and C)-Line of Sight

Appendix I

Location 12-Line of Sight

Appendix J

Location 13-Line of Sight

Appendix K

Location 14-Line of Sight

Appendix L

Location 5 (A AND B)-Line of Sight

Appendix M

Location 15

Appendix N

Vegetation Assessment

1. INTRODUCTION

This report provides an overview and results of an assessment of a three dimensional (3D) visual model developed by P.I. Service Solutions to create imagery to inform visual assessments from identified sensitive receptors, and other viewpoints, of the proposed KI Seaport facility, should it be approved and built, at Kangaroo Island Plantation Timber's site at Smith Bay, Kangaroo Island.

This report outlines the methodology, assumptions and limitations of the models built and the assessment methods adopted.

2. BACKGROUND

In October 2016, KIPT applied to the South Australian government to develop a deep-water port at Smith Bay to transport harvested timber from Kangaroo Island to markets overseas.

In February 2017 the proposal was awarded major development status under section 46 of the *Development Act 1993* (SA). As a result, KIPT is required to provide detailed information in compliance with the state-based Development Assessment Commission (DAC) guidelines. KIPT must answer questions raised, assess aspects defined and develop plans specified in the guidelines and submit its responses as part of an Environmental Impact Statement (EIS).

The objectives of creating a 3D representative model of the proposed KI Seaport, was to provide:

- a visual representation of the proposed facility infrastructure, both on and off shore
- representative images from a set viewpoint location in the local area, in particular those identified as sensitive receptors, to inform visual impact assessments
- a conceptual model that could facilitate discussion on potential impacts
- suitable communication tools for public and stakeholder consultation.

2.1 Location

Smith Bay is located on the north coast of Kangaroo Island, approximately 20 km west of Kingscote and approximately 10 km west of Emu Bay (Figure 1).



Figure 1 Smith Bay, Kangaroo Island, SA

The proposed site for the deep-water port facility is within the freehold area of land, owned by KIPT, at the western end of Smith Bay. It borders approximately 400 metres of the 5670 metres of Smith bay coastline. The area of on-shore land is identified as allotments 51 and 52, Certificate of Title Volume 5870 Folio 746, Hundred of Menzies in the Area of Wisanger (Figure 2).



Figure 2 Aerial view showing allotment 51 and 52

2.2 The Proposed Facility

The facility would consist of:

- a woodchip storage area
- a log storage and laydown area
- materials handling infrastructure-woodchip stockpile management system
- road transport access
- ancillary facilities including administration buildings, quality control equipment, car parks and associated infrastructure including security fencing.

The wharf structure would consist of:

- a causeway
- a suspended deck
- a link span bridge
- a floating pontoon
- tug mooring facilities
- a berthing pocket
- retaining structures and mooring dolphins.

Ancillary services would include power, water, wastewater and stormwater management facilities, telecommunication facilities and security.

2.3 The Model

A 3D conceptual model was developed to show the major components of the proposed on-shore and off-shore infrastructure for KI Seaport (which are being assessed as part of an Environmental Impact Assessment), including:

- the on-site log and wood chip storage areas
- the woodchip handling system (incorporating site receival point, storage and transport to the ship)
- site access point
- the causeway
- the suspended deck
- the link span bridge

-
- the floating pontoon
 - a panamax sized cargo ship.

The 3D model will also incorporate existing infrastructure at Smith Bay.

2.4 Constraints and limitations of the model

The model developed for this assessment is a visual conceptual model, which represents the basic infrastructure that could be required at a facility like that proposed by KIPT. It overlays early design drawings onto the site owned by KIPT and incorporates the expected offshore components of the facility.

Specific design details such as exact conveyor configurations, vehicle roadways and other site infrastructure such as fencing were not incorporated into the design. This was done deliberately, as the scope of this work required only a basic model that incorporated the key information such as woodchip stockpile heights, radial stacker height, rock causeway length and width, floating jetty, pontoon and panamax bulk carrier.

The built model replicates major features considered relevant and adequate for the intended purpose and use of images, that is for a visual assessment from sensitive receptors.

The model imagery of the current commercial aquaculture operation at Smith Bay is an extrusion of the building footprint, to an estimated height based on a visual assessment from remote piloted aircraft (RPA) imagery.

Natural features, such as trees were not included in the model or the surrounding areas, so as to provide a worst-case scenario for the visual assessment using unobstructed views.

3. METHODOLOGY

3.1 Building the model

A variety of methods and software packages were used to develop the 3D model and subsequent image dataset for assessment.

Draft engineering drawings supplied by Wallbridge, Gilbert and Aztec (WGA) were used to provide the layout of facility components and key measurements for the model.

A site inspection was conducted to capture visual imagery, used to supply additional commercial infrastructure heights and confirm sensitive receptor locations, view paths and any visual obstructions currently in place, such as vegetation screen plantings.

The 3D model, an interactive model, was then constructed in Autodesk modelling software, then placed via Sketchup Pro into Google Earth Pro, using WGA and Mitsui plan views and elevations as guidelines.

On-shore building footprints were elevated to a standard height and specific 3D models were sourced through SketchUp Pro warehouse, for the site access security building and the panamax bulk cargo carrier.

Other infrastructure currently located at Smith Bay was incorporated into the model to provide an accurate representation of the local area. This includes elevating the footprint of aquaculture infrastructure, office buildings and maintenance sheds, using height data sourced from aerial RPA imagery.

Texturing, colour and line of sight marker points were then added to the model.

3.2 Determining sensitive receptors

Potential sensitive receptors were identified as part of the EIS investigations and location, elevation and screening details were confirmed through the use aerial drone imagery.

Twelve onshore locations were identified for visual assessment, of which six are considered sensitive receptors as private residences, and one commercial operation, due to its close proximity to the site.

Two viewpoints on Smith Bay's coastline to the west (location L05a) and east (location L05b), and one from the ocean (location L15) were also assessed.

3.3 Extracting 3D renders

To conduct a visual assessment, sight lines from each location were established, looking towards the KI Seaport facility. The sight lines were formatted for consistency with estimated heights ie window height from a first floor or second floor or the height of an average person. An image was then captured for each location showing what the line of sight would show with and without the model in place, at a worst-case scenario ie. no visual obstruction from surrounding vegetation, the ship empty and at high tide and the woodchip stockpile at its maximum height.

4. ASSUMPTIONS

A number of assumptions were made during the development of the 3D model and the associated imagery, including:

- each sensitive receptor has an unobstructed view of the site ie. no trees are visible, as this will provide a worst-case scenario for each location
- the drawings that the model is based on, are only a conceptual representation of the KI Seaport facilities as final detailed design is pending the completion of environmental impact assessment, public and agency consultation and government approval
- location accuracy is approximate only, as the baseline drawings are not geo-referenced
- actual design layout of the site, elevations, cut and fill estimates and material handling infrastructure are inferred only (based on draft engineering drawings), with actual locations to be determined in final detailed design stages
- in cases of multiple buildings at a location, a number of images were collected to ensure an accurate level of representation was achieved
- lines of sight have been set at general elevations, such as:
 - window height, from a single-story house

- windows installed in a two-story house
- at approximately the height of an average person
- the model was developed with the panamax ship in place, at the highest tidal point, so as to provide the worst-case scenario for visual assessment.

5. RESULTS

The interactive 3D model can be viewed within Google Earth Pro, facilitating access and the identification of sight lines to provide a representation of what could be seen at specific viewpoints within the Smith Bay area.

A single map image was developed with each of the 15 viewpoint locations marked for reference (see **Appendix A**). A map that shows the line of sights for each of the assessed locations was also developed (see **Appendix B**).

Line-of-sight images were captured from each of the 12 locations showing both 'before' and 'after' the KI Seaport facility 3D model being in place (see **Appendix B-K**), with the aim to present current vs future visuals.

The images captured before the KI Seaport facility 3D model is inserted show that locations L06, L07 and L08 (refer to **Appendices C, D and E**) have an unobstructed view of the ocean and that those with a view of Smith Bay itself (locations L09, L10, L11 and L12) have a view that currently includes infrastructure of Yumbah Aquaculture (a land-based abalone farm) established at Smith Bay (refer **Appendices F, G, H and I**). Imagery also shows that views from location L14, are significantly impacted by Yumbah Aquaculture's own operation (see **Appendix K**).

Imagery captured after insertion of KI Seaport facility shows that all 14 viewpoint locations will have a view of the facility, with varying degree and lines of sight (see **Appendix B**).

At location L07 (**Appendix D**), only the top of woodchip stockpile (at its highest build point) and the top of the woodchip handling and management system is visible.

At locations L06 (**Appendix C**) and L09 (**Appendix F**) the ship, in addition to part of the KI Seaport operation would be seen.

The entire operation, including the wharf and ship, would be visible from locations L10, L11, L12 and L13 (**Appendix G to J, respectively**).

View from the ocean towards land (location L15) is shown in **Appendix M**.

Visual assessment of each location using an RPA, shows that locations L9a/b, L10, L11a/b/c and L12 have standing vegetation surrounding each structure (see **Appendix N**).

6. DISCUSSION

In summary, the development of a conceptual 3D model of the KI Seaport facility at Smith Bay has facilitated a 'line-of-site' visual assessment from a range of viewpoint locations for identified sensitive

receptors, a northern viewpoint location and southern viewpoint location on Smith Bay's coastline, and an in-ocean viewpoint location.

The images show aspects of the proposed development that would be visible as unobstructed views from the various viewpoint locations, both before and after the proposed development is built.

During aerial RPA work at Smith Bay, some locations assessed (including L9, L10, L11 and 12) were observed to have established shrubbery and trees which would obstruct views to the proposed development site. Imagery developed shows no obstruction from any vegetation screenings and provides a worst-case visual scenario. Stands of trees and high shrubbery would reduce the visual impacts as a result of part or full obstruction of the proposed development. The images were also captured to simulate the ship in port, during loading operations, which is expected to occur for 2-3 days at a time, approximately 12 - 18 times a year.

The imagery shows that all viewpoint locations assessed would have a view of the proposed KI Seaport facility, if unobstructed, with varying degree, refer to **Appendix B**.

Addition of KI Seaport would add further visual impacts to that currently experienced with Yumbah Aquaculture operations which occupy the landscape.

Measures to soften visual impacts for KI Seaport should be adopted to blend in with existing infrastructure of Yumbah Aquaculture and the surrounding environment.

The developed interactive 3D conceptual model of the proposed KI Seaport facility and surrounding landscape, and imagery generated from it, should be used for further assessment and planning, and for consultation with stakeholders and the community.

Appendix A

Key Locations Map



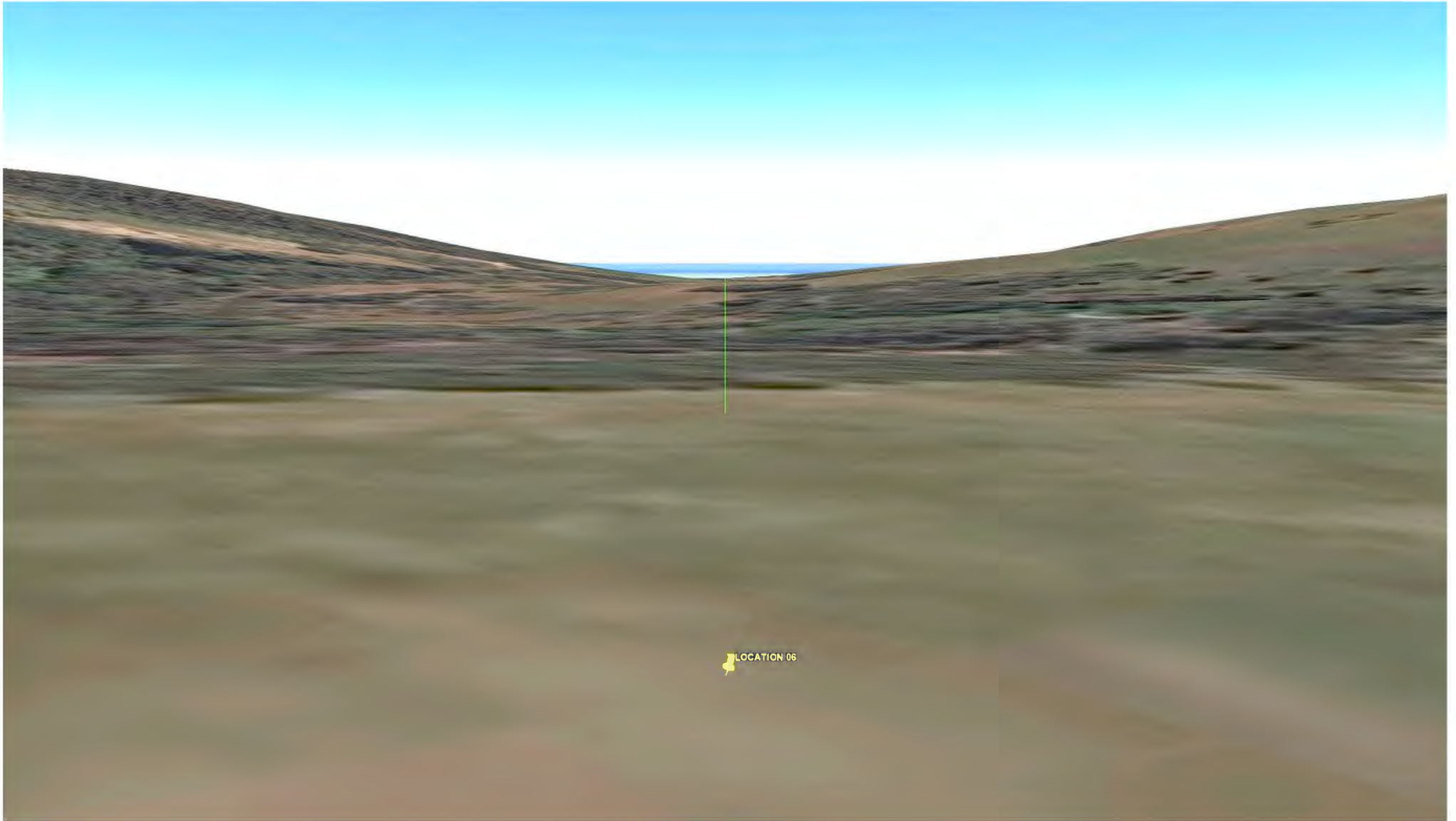
Appendix B

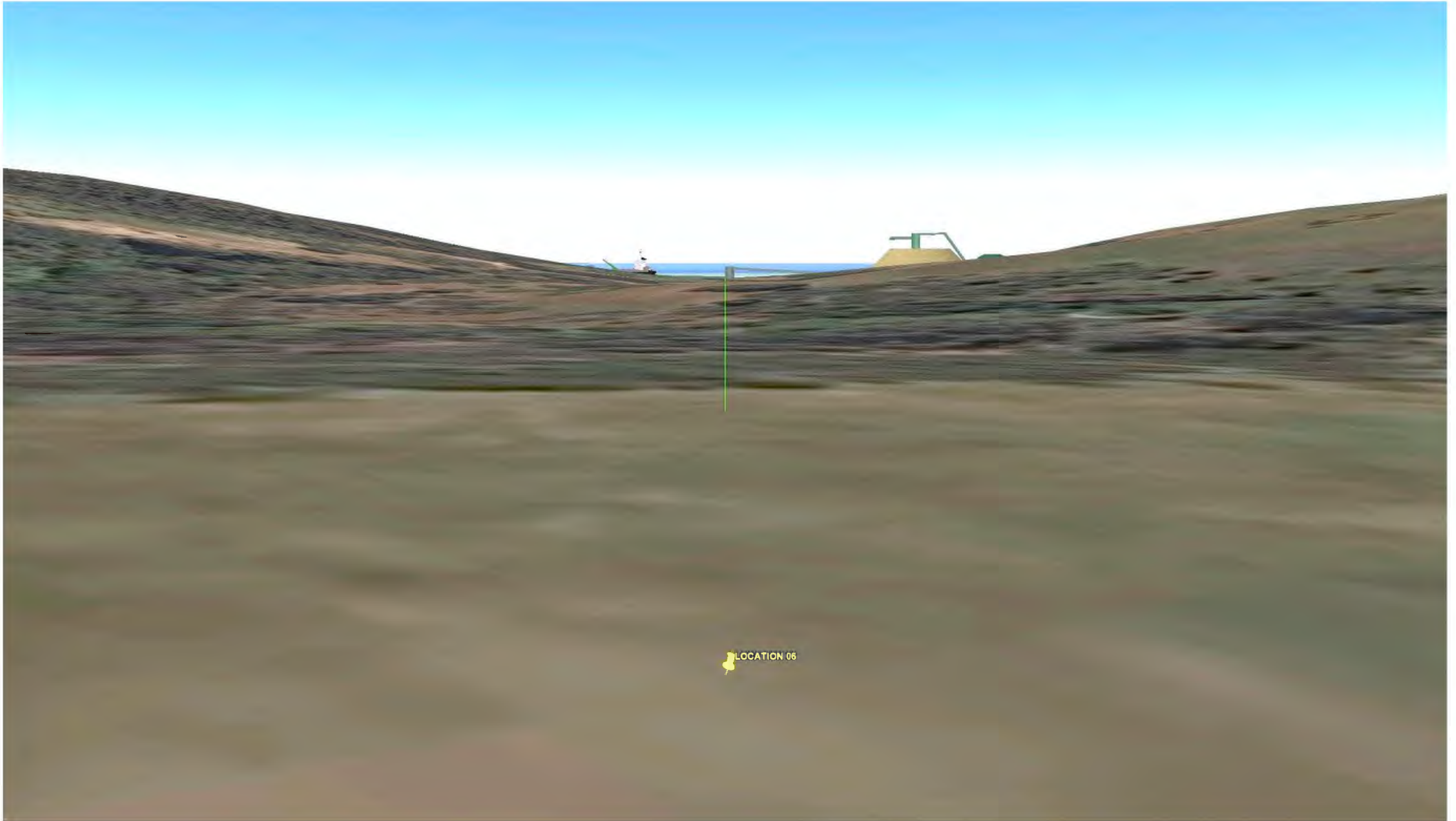
Line of Sight Map



Appendix C

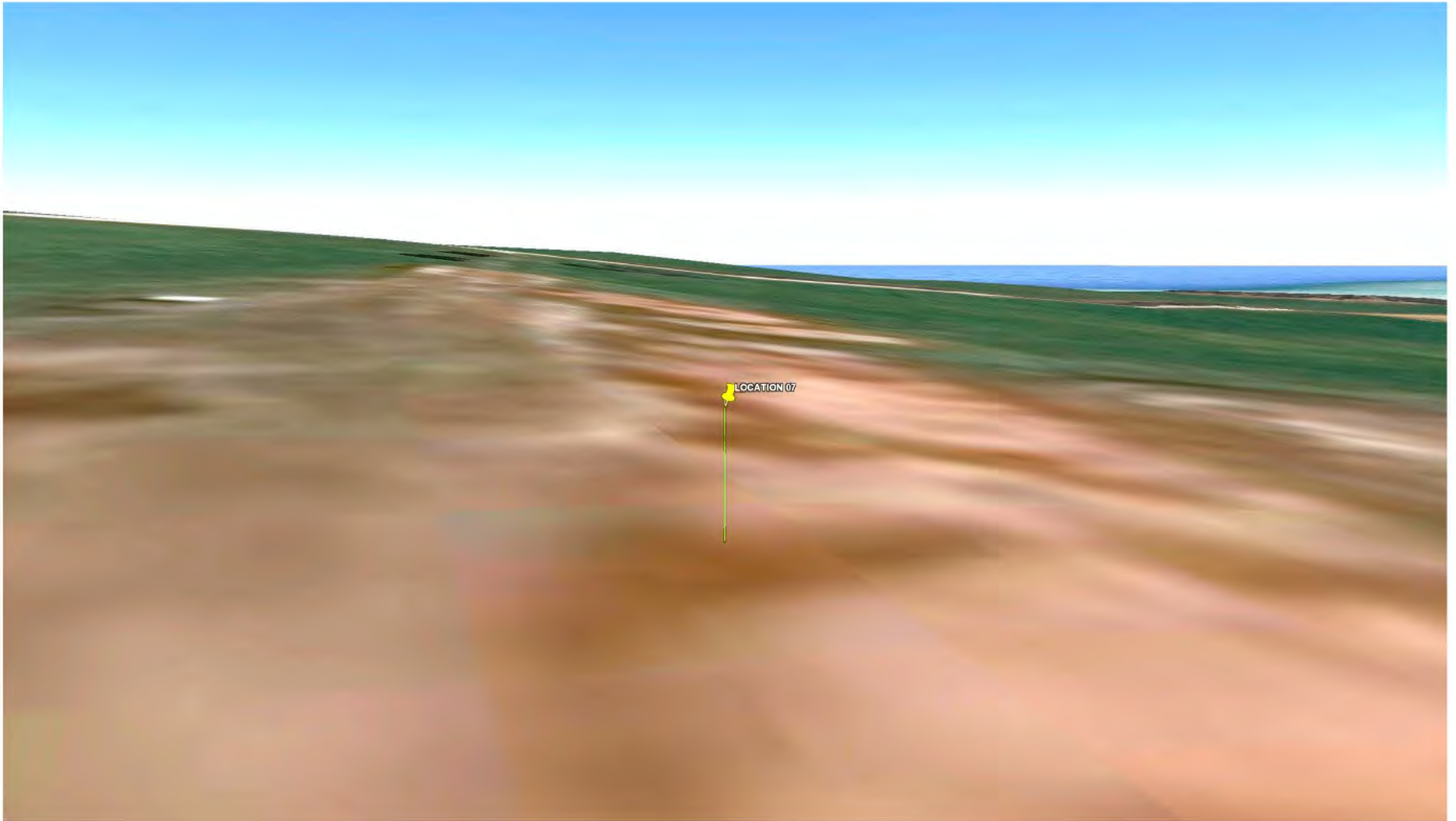
Location 06-Line of Sight

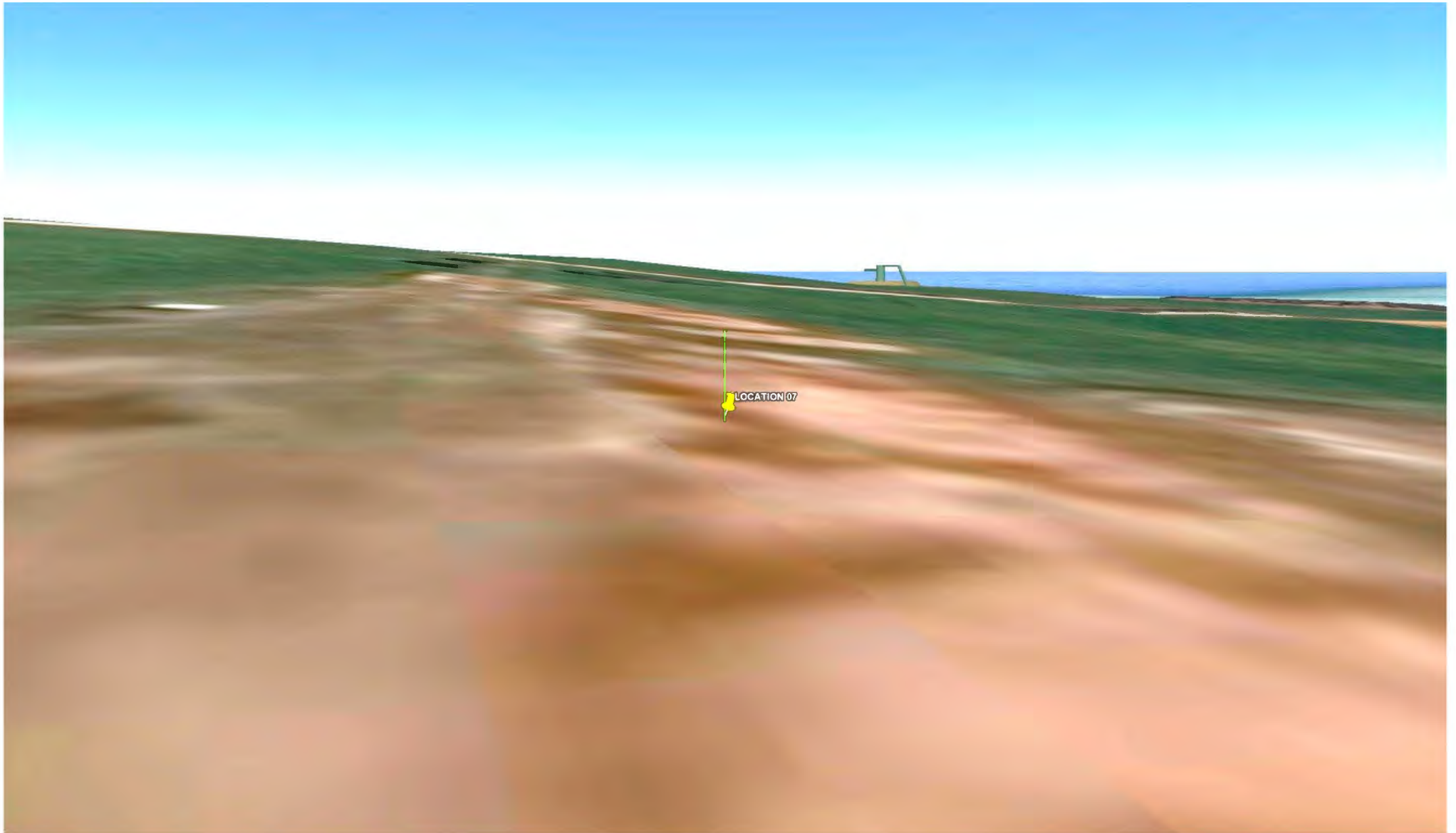




Appendix D

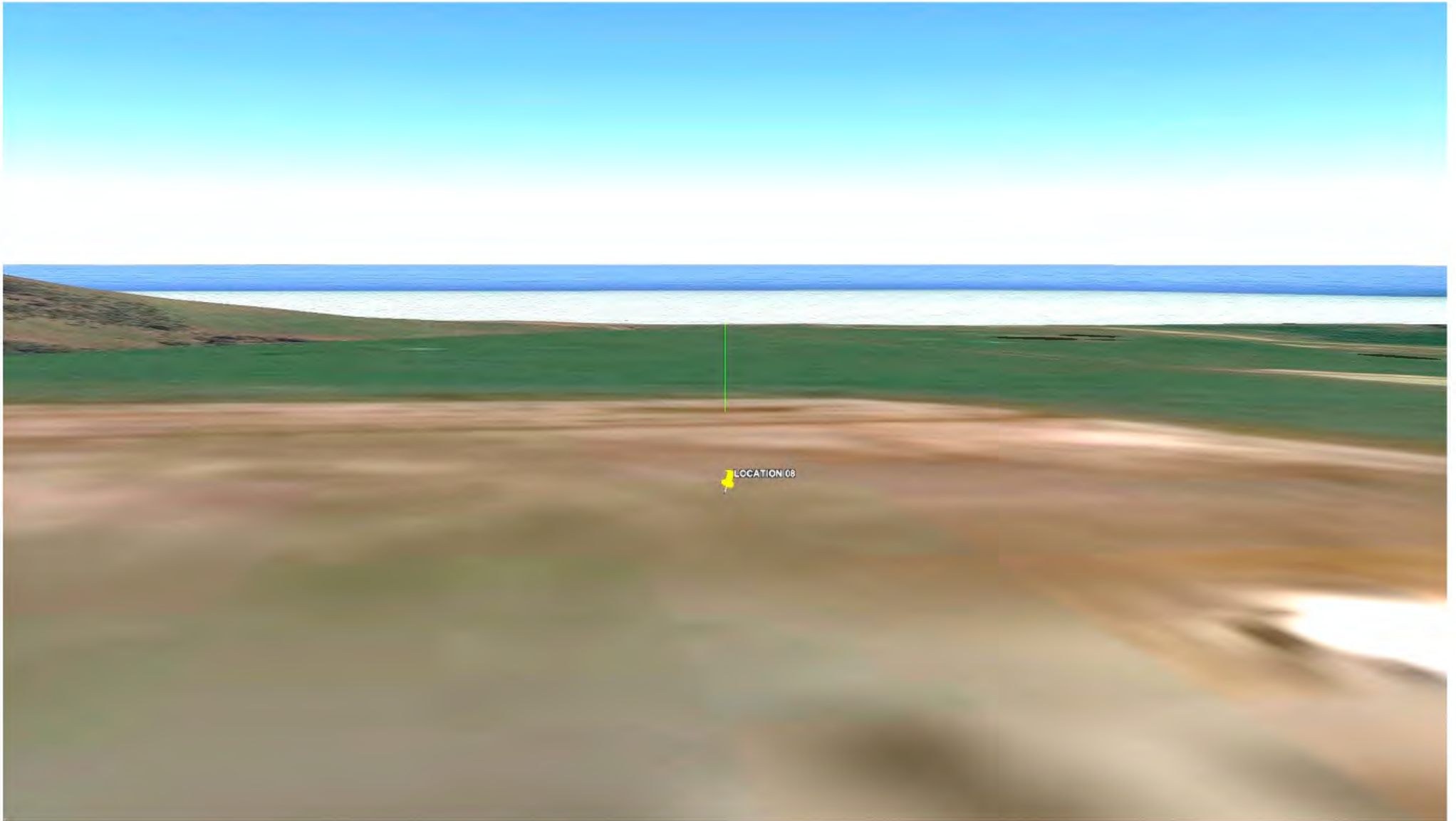
Location 07-Line of Sight

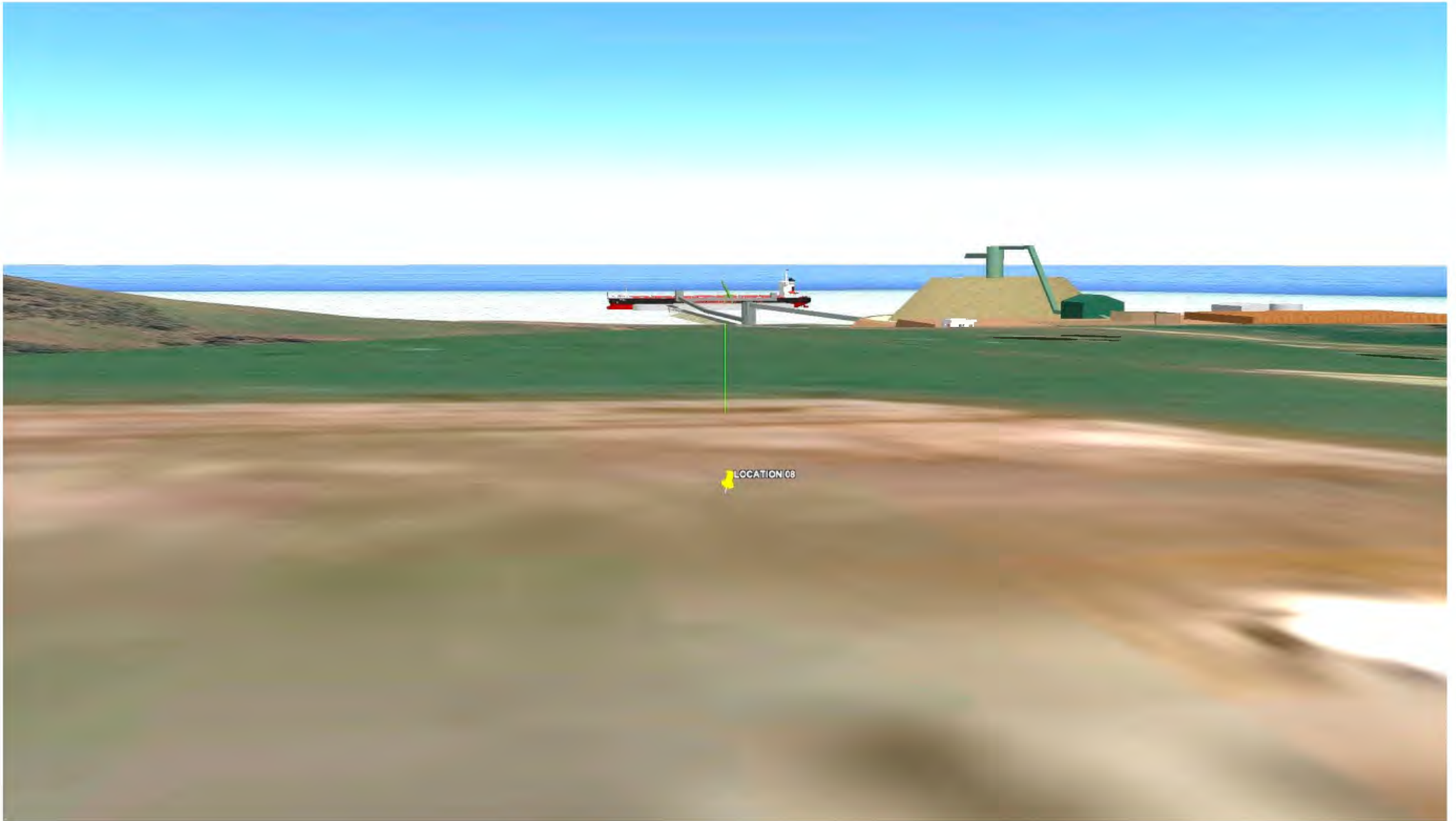




Appendix E

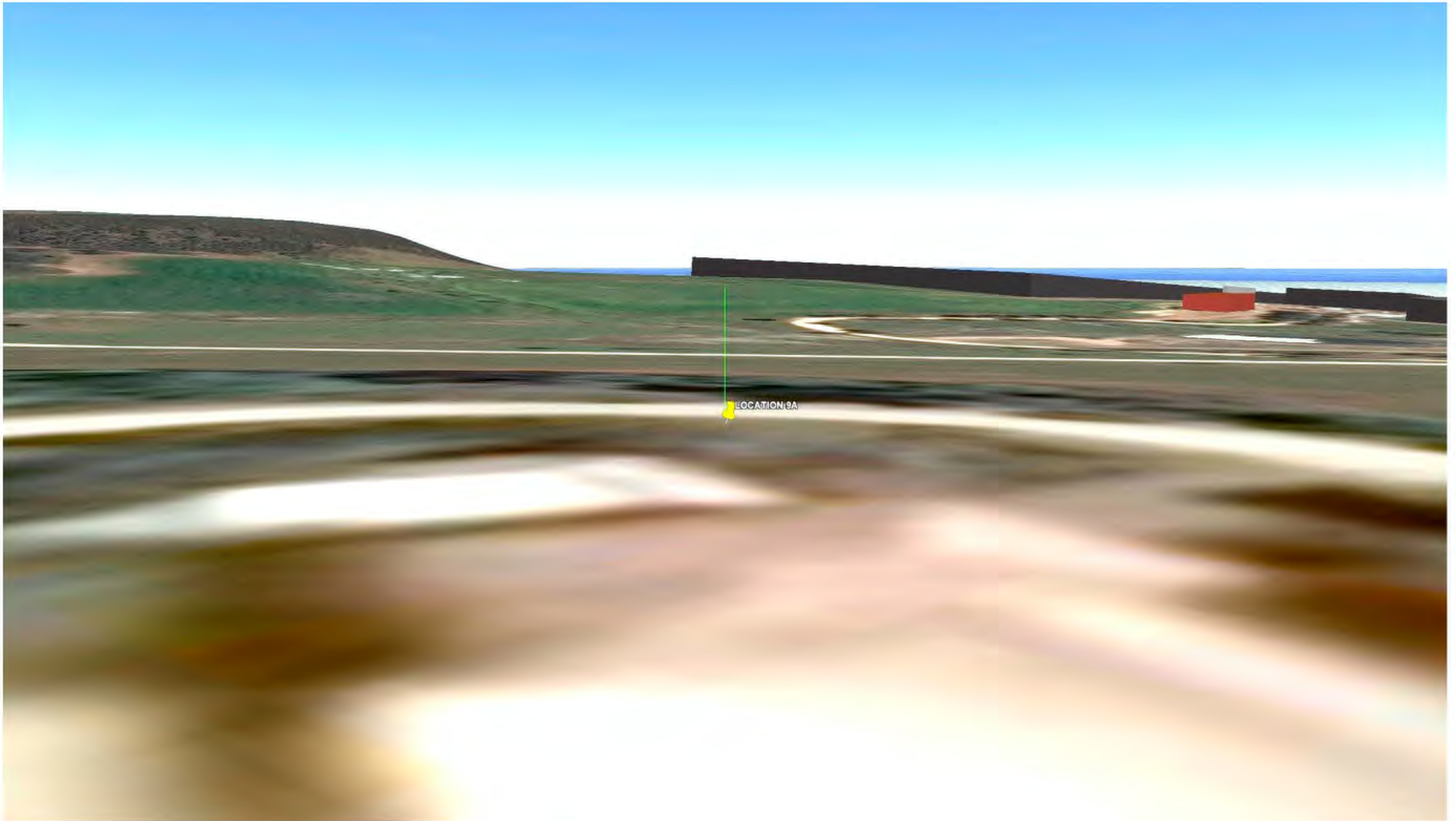
Location 08-Line of Sight

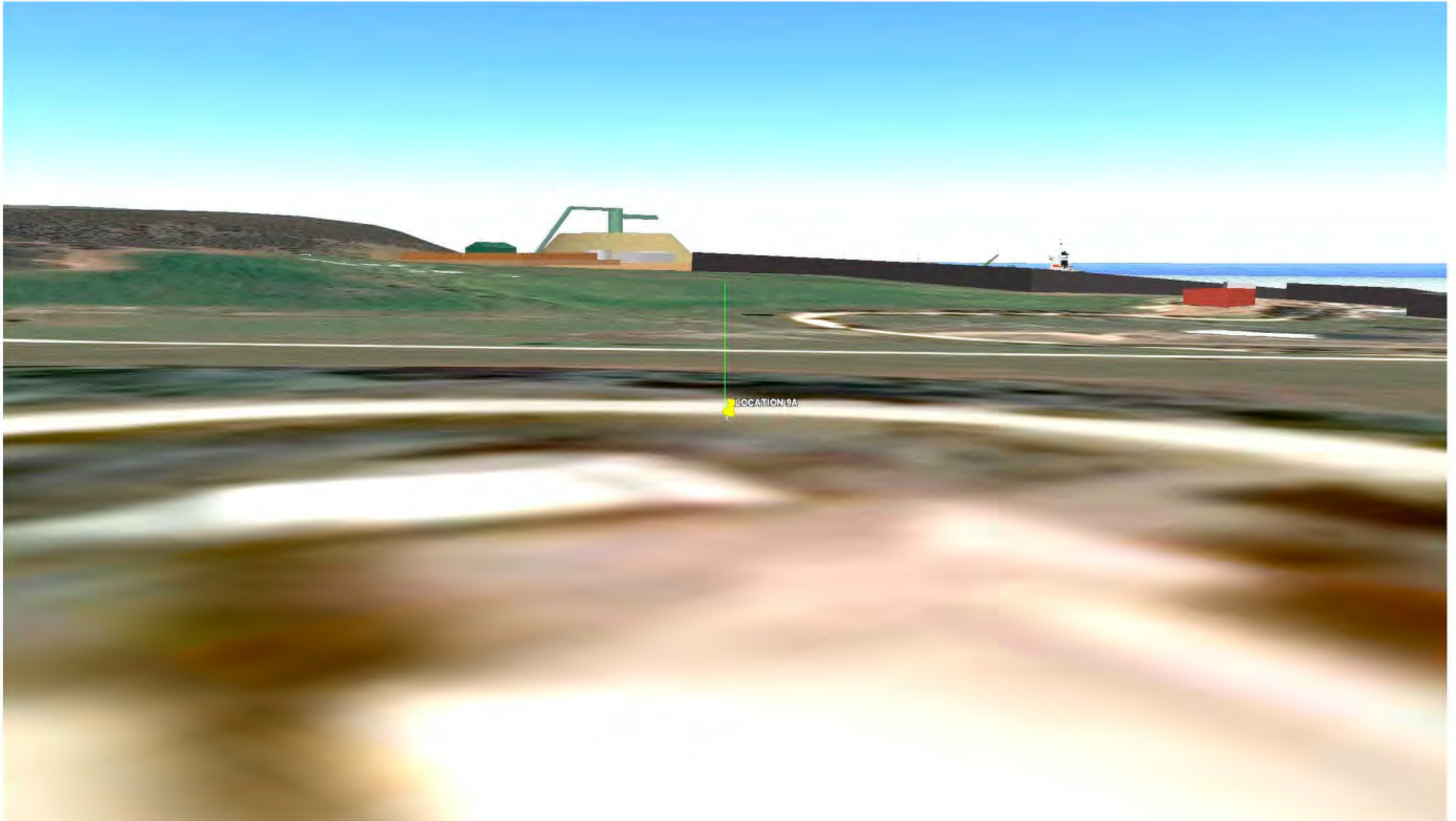


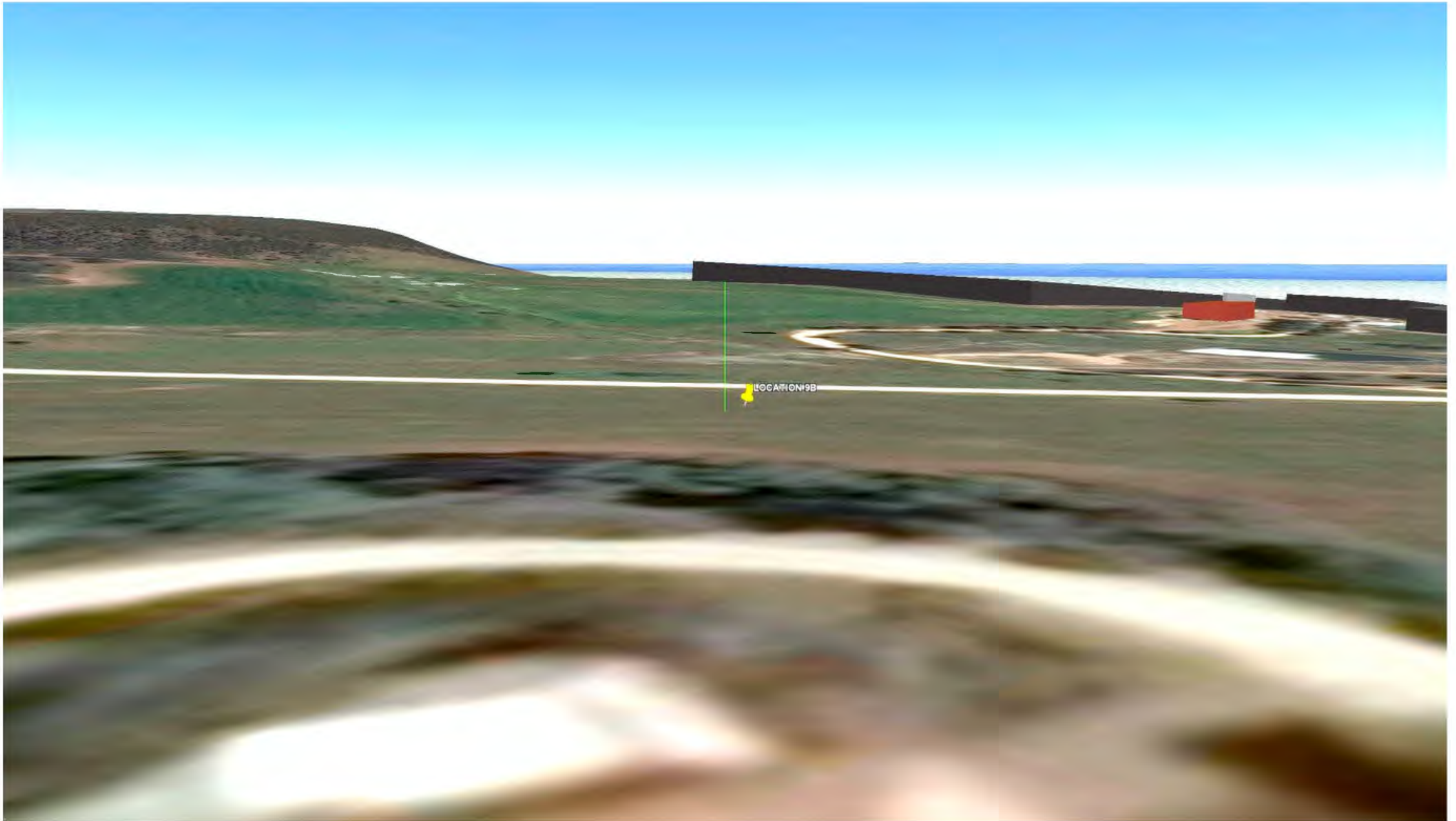


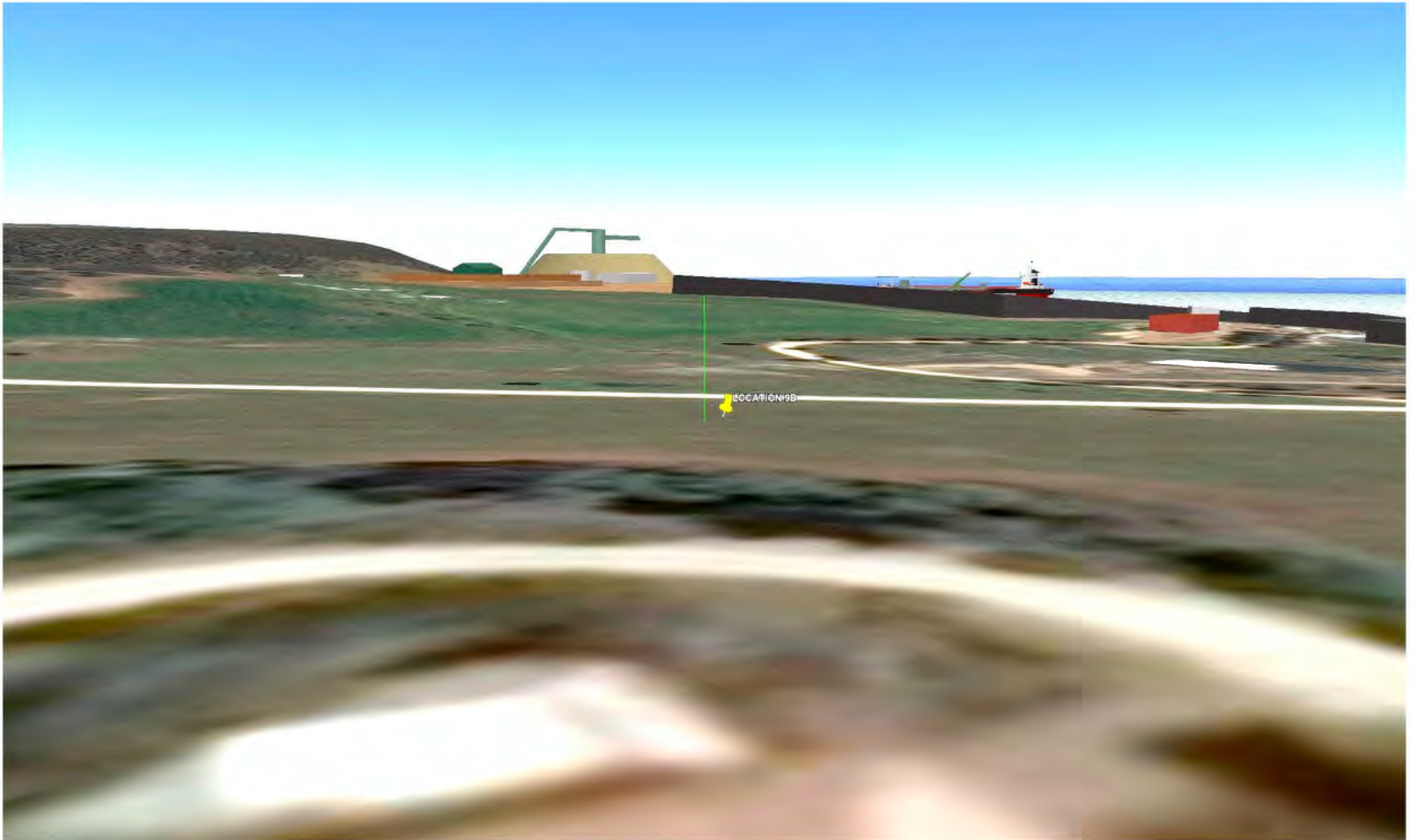
Appendix F

Location 9 (A and B)-Line of Sight



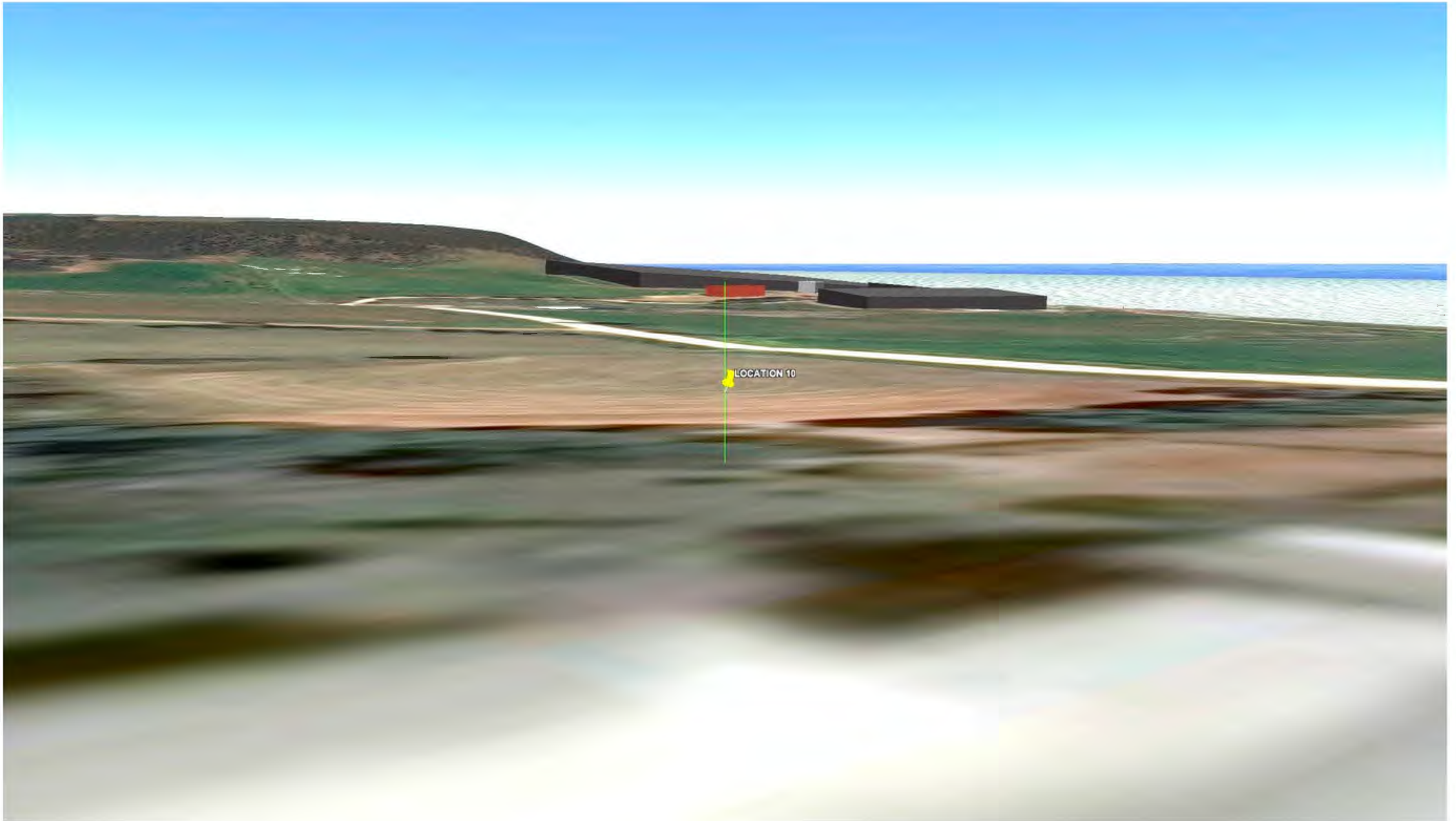


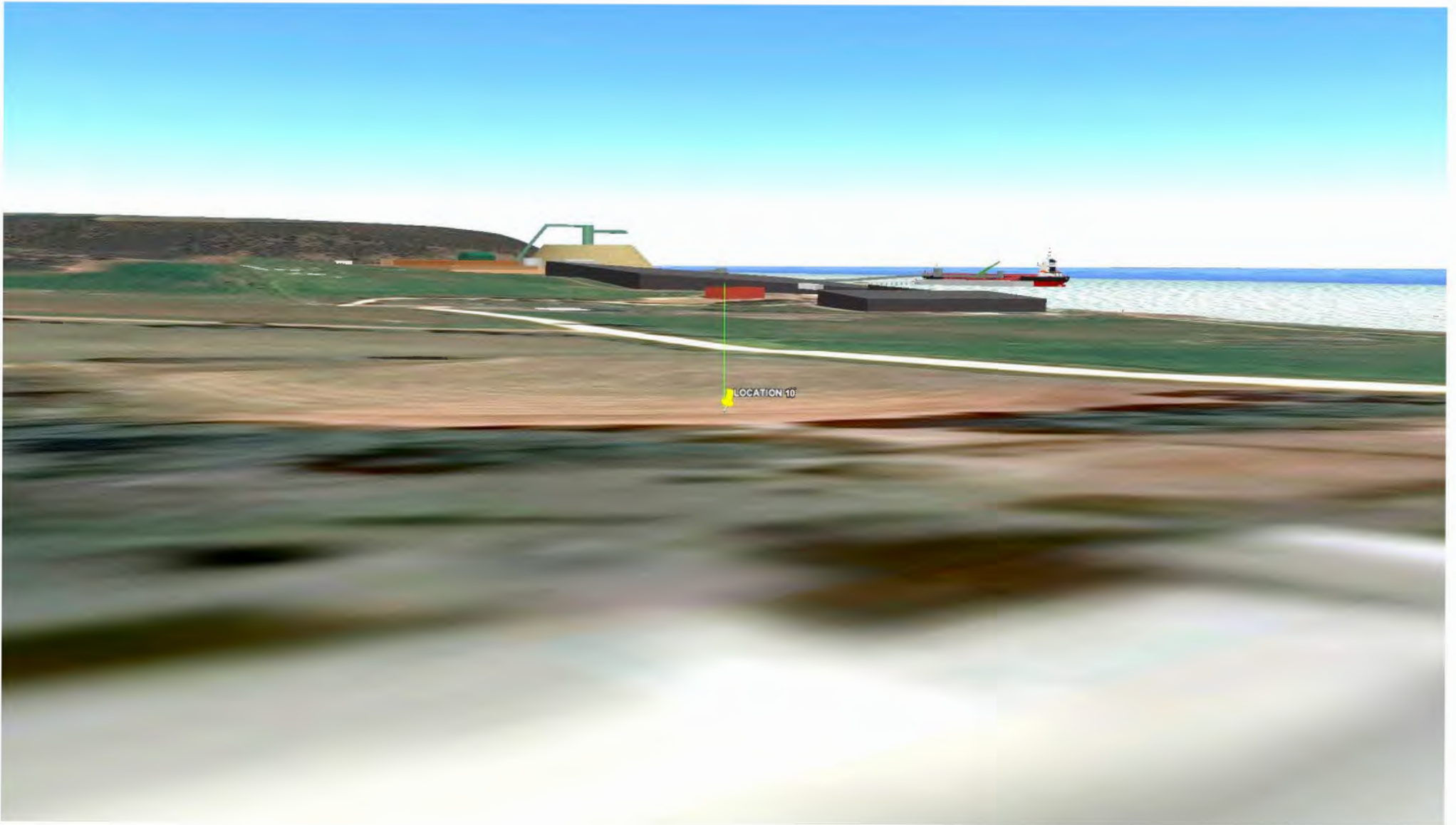




Appendix G

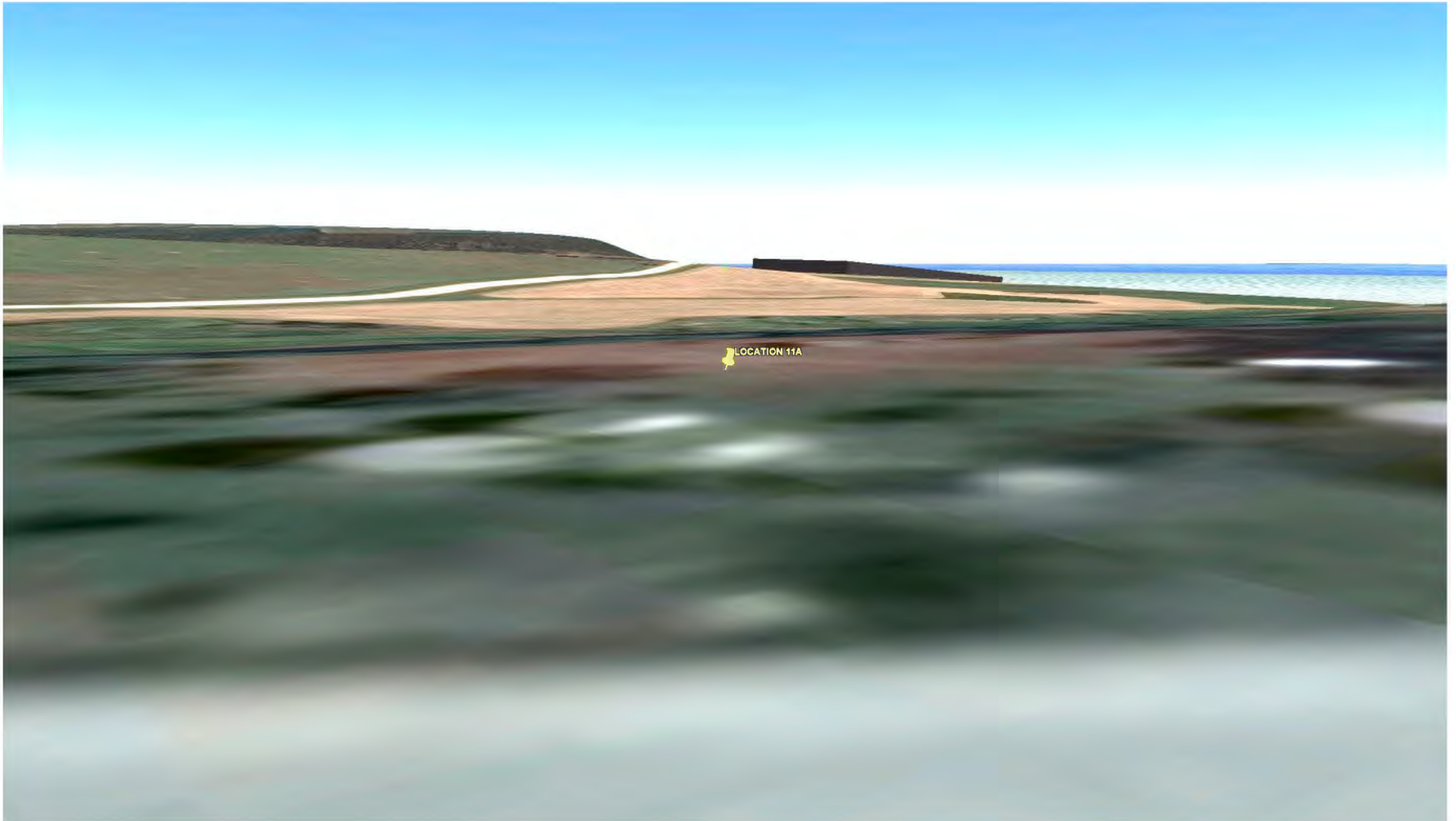
Location 10-Line of Sight

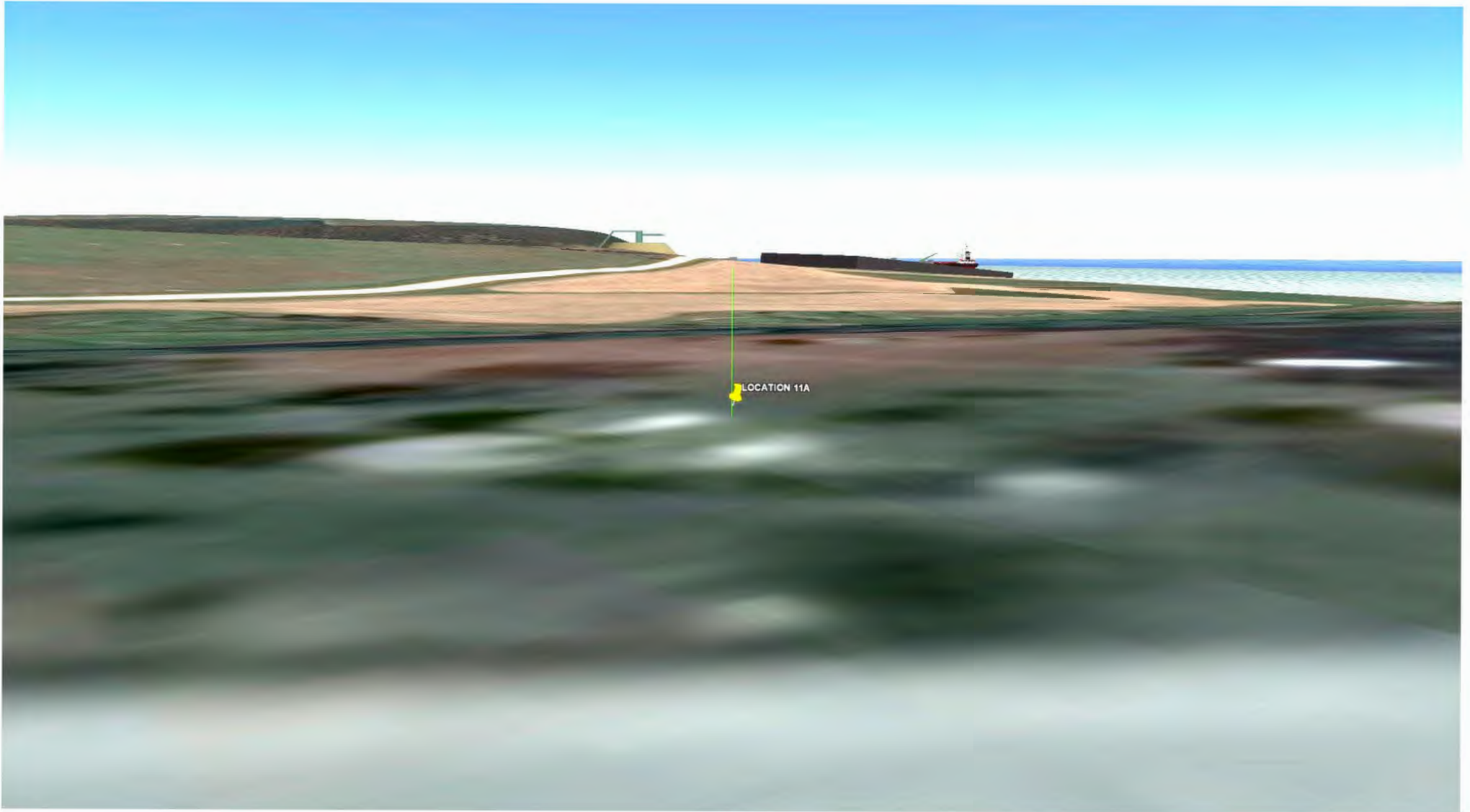


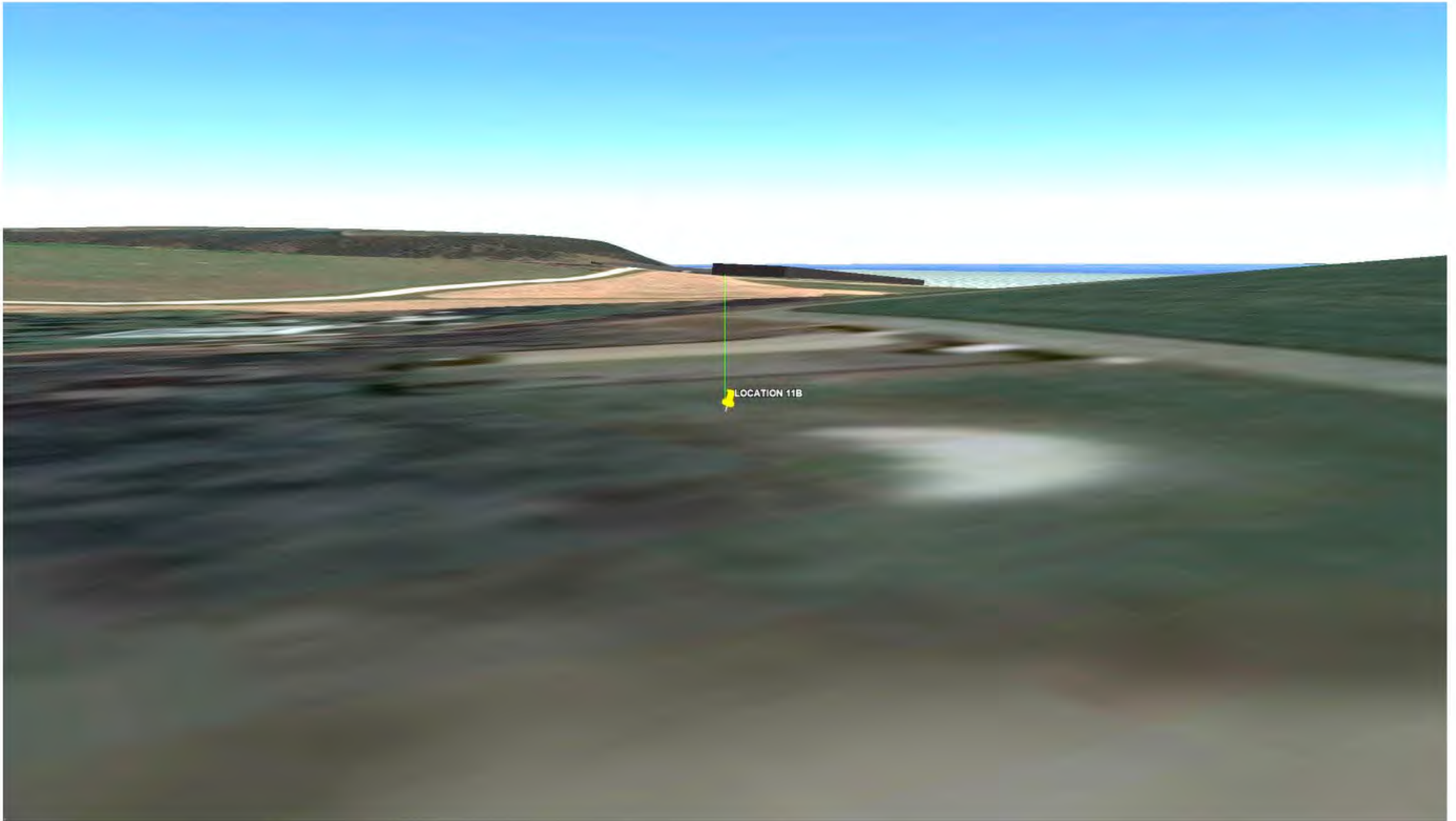


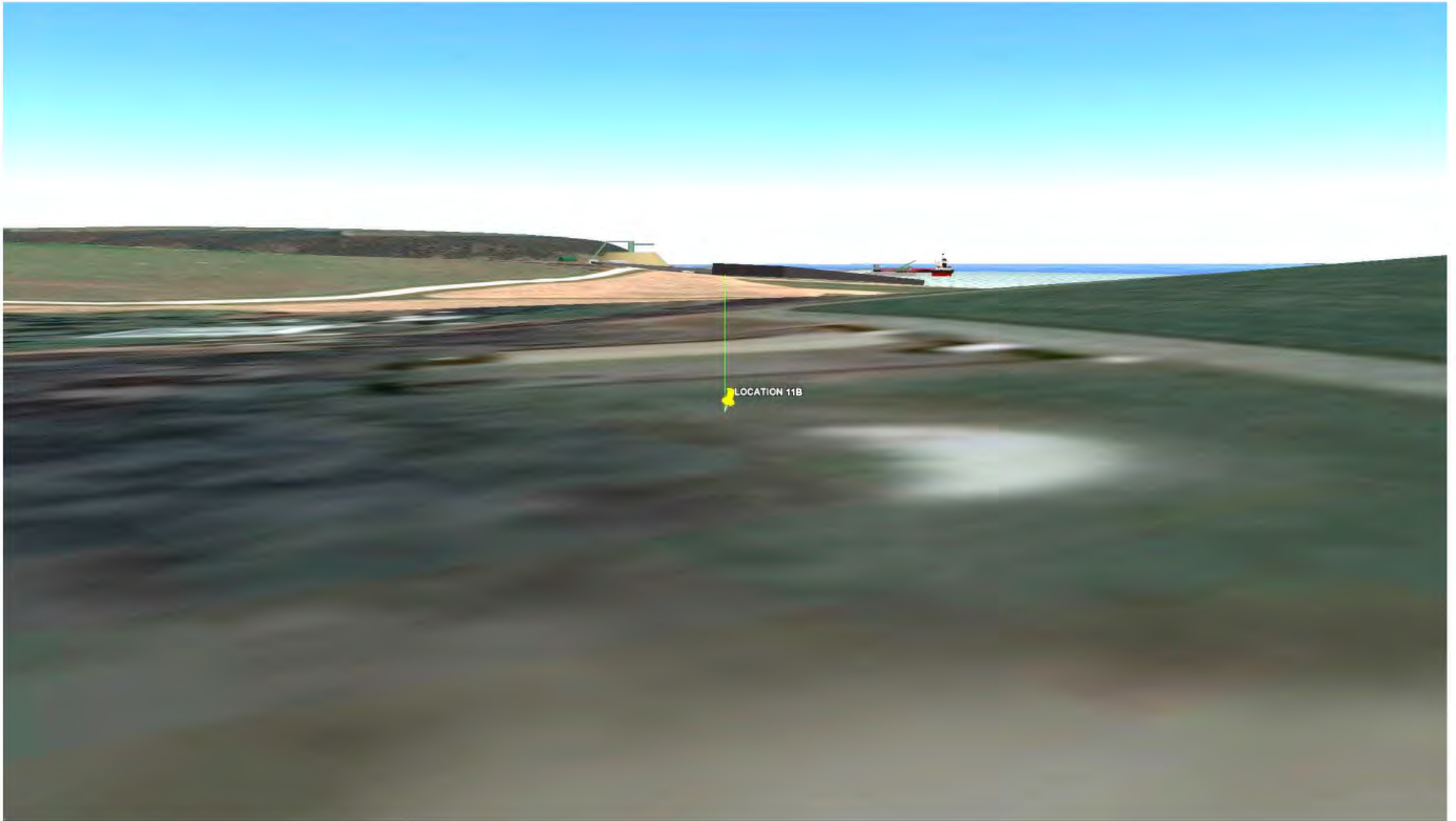
Appendix H

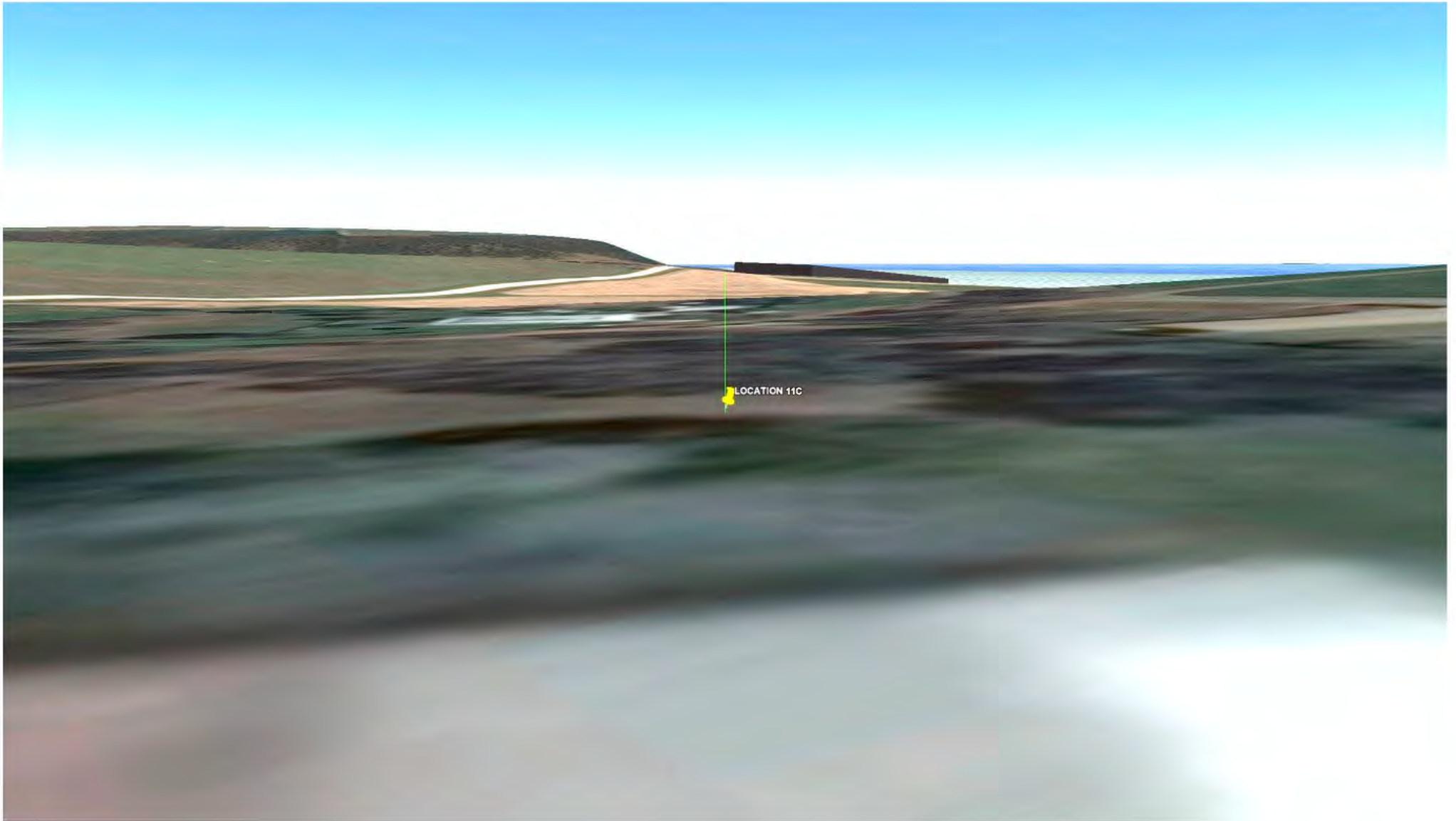
Location 11 (A, B and C)-Line of Sight







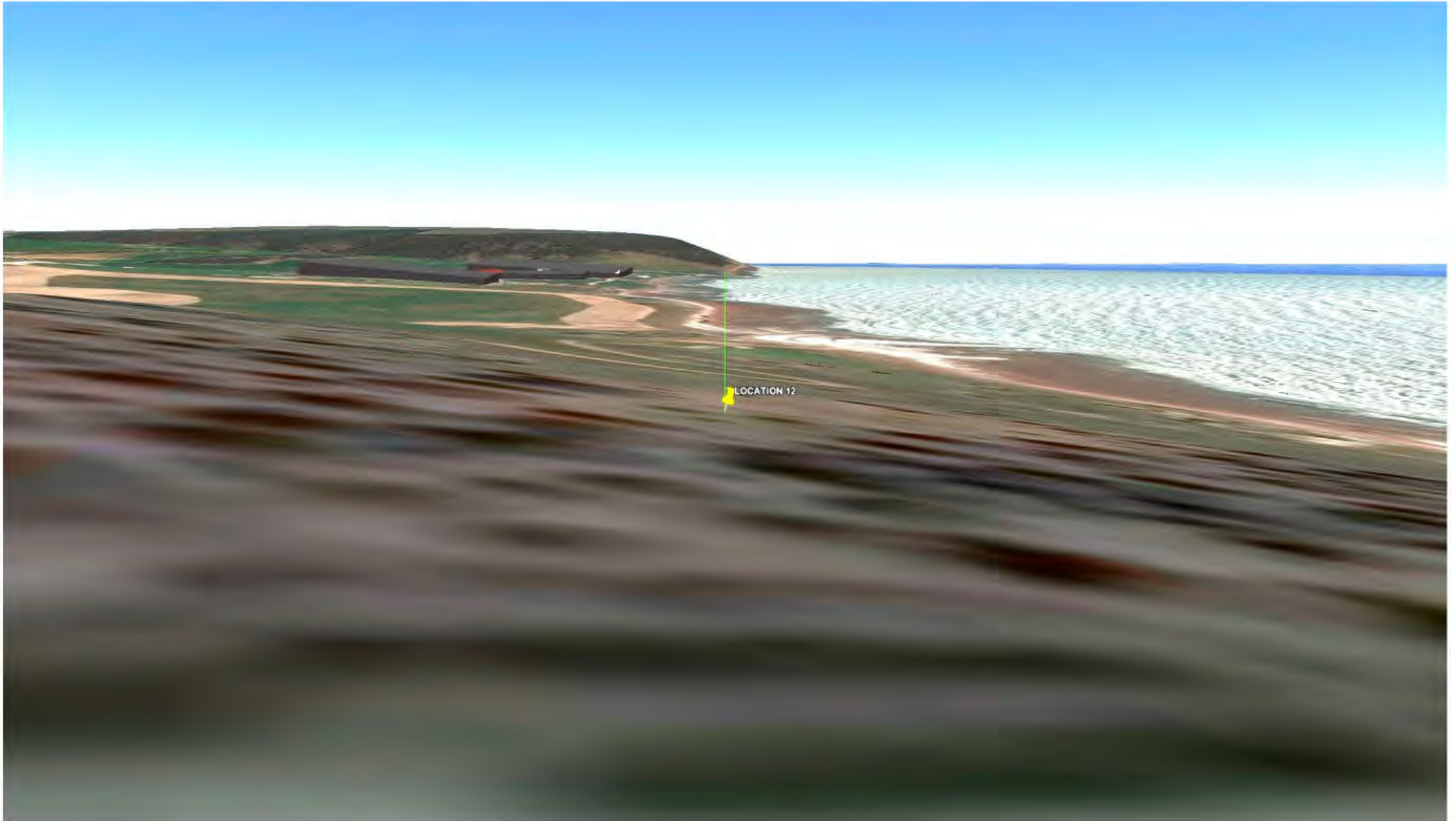


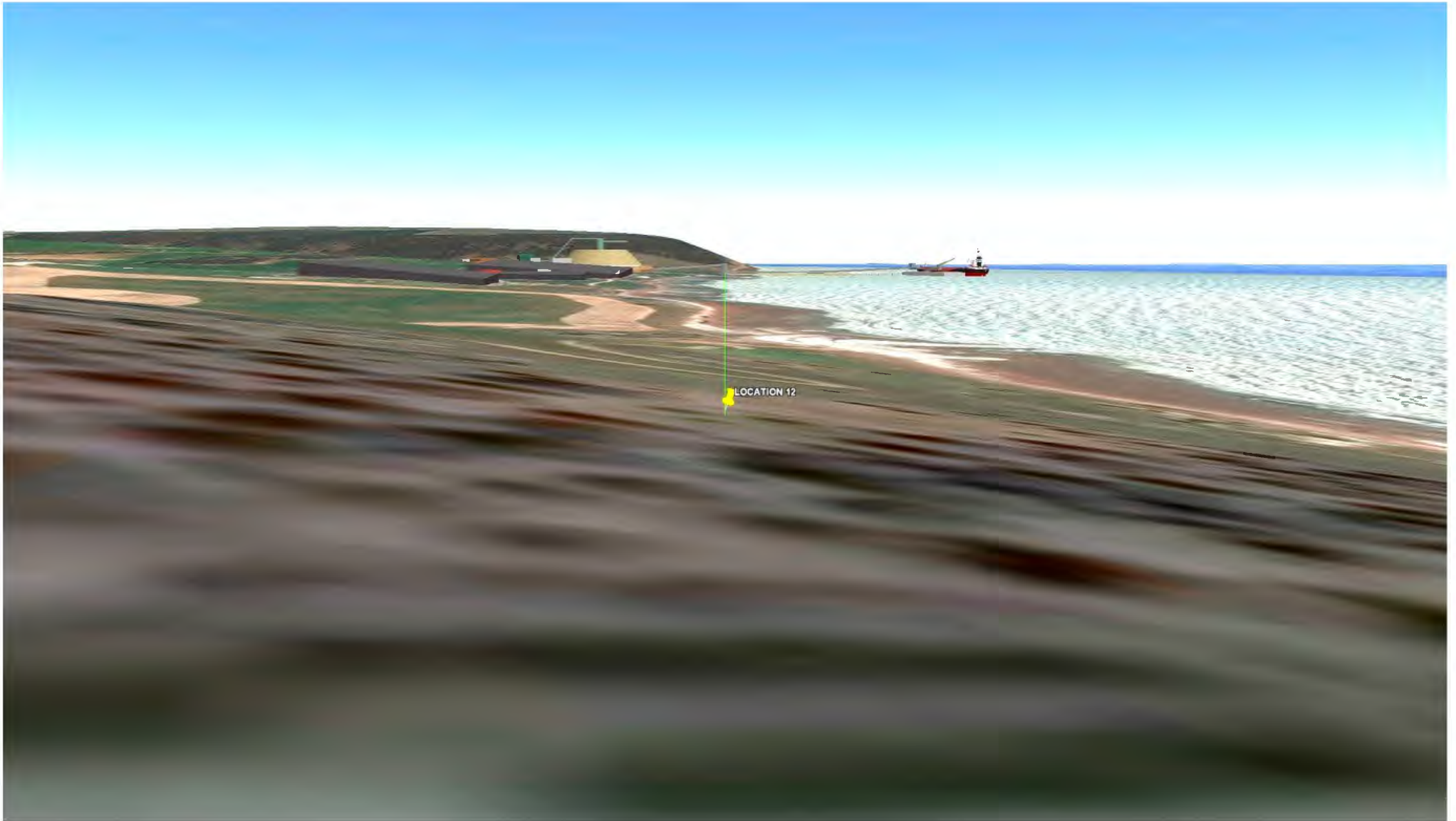




Appendix I

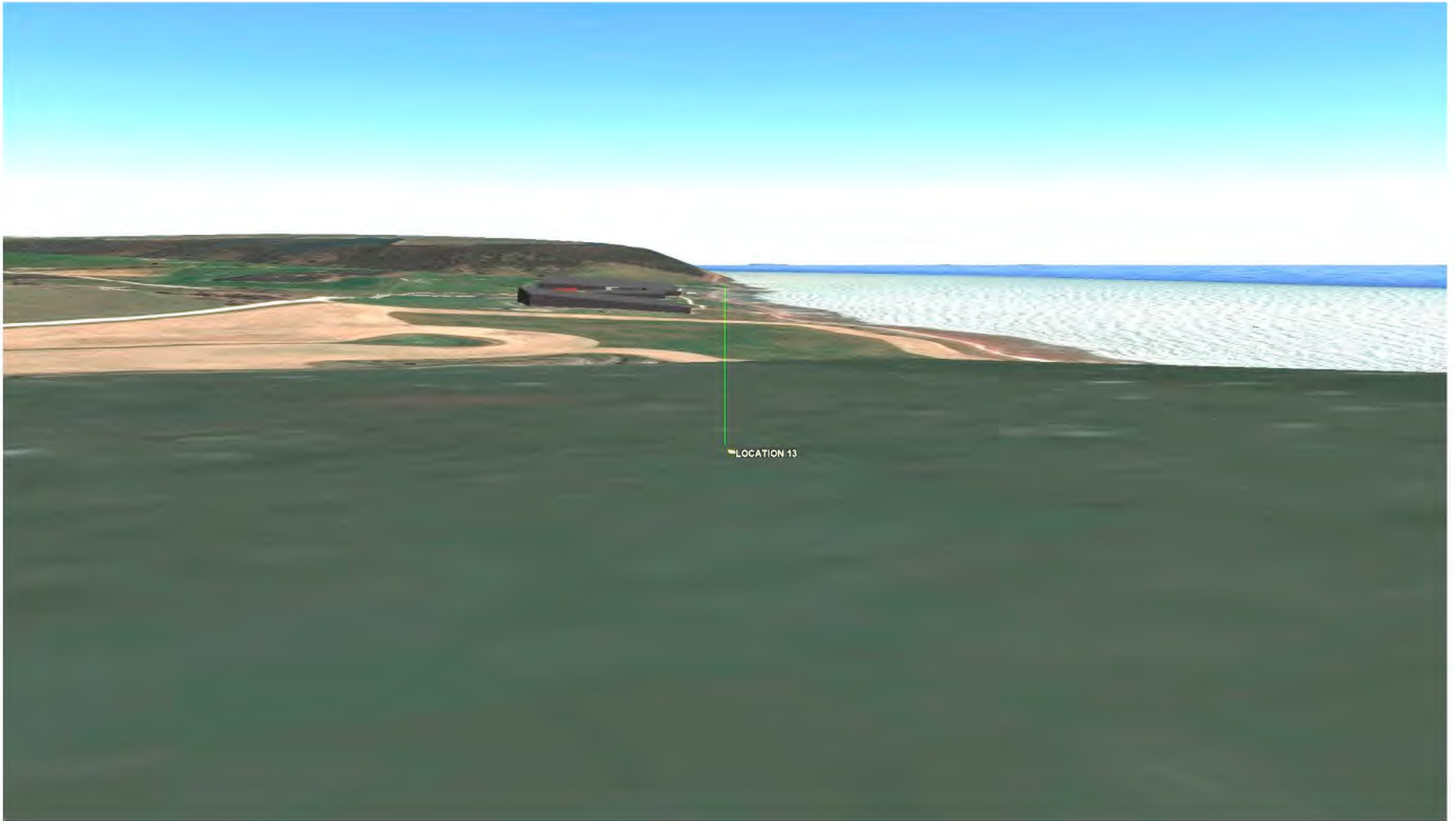
Location 12-Line of Sight

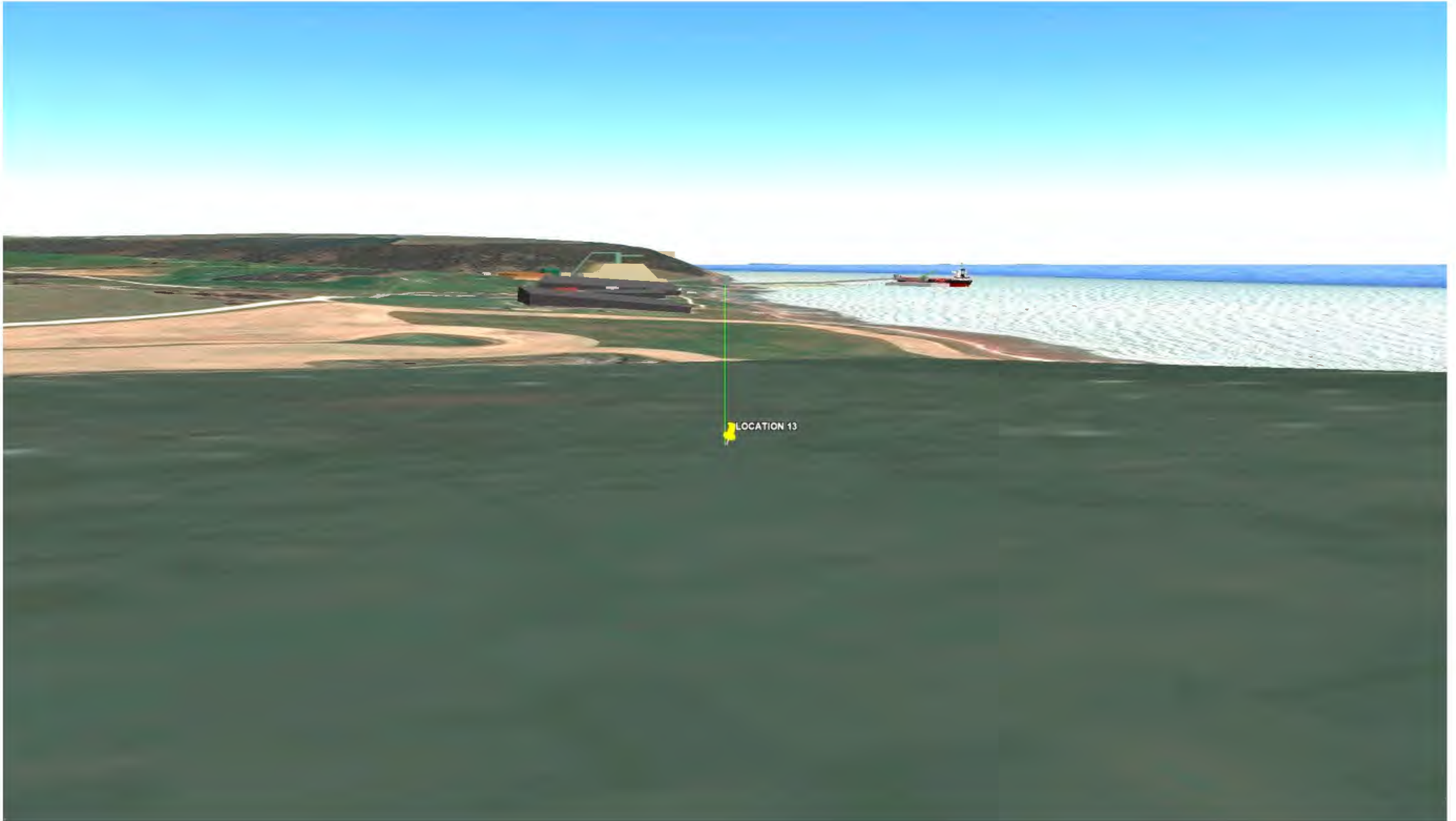




Appendix J

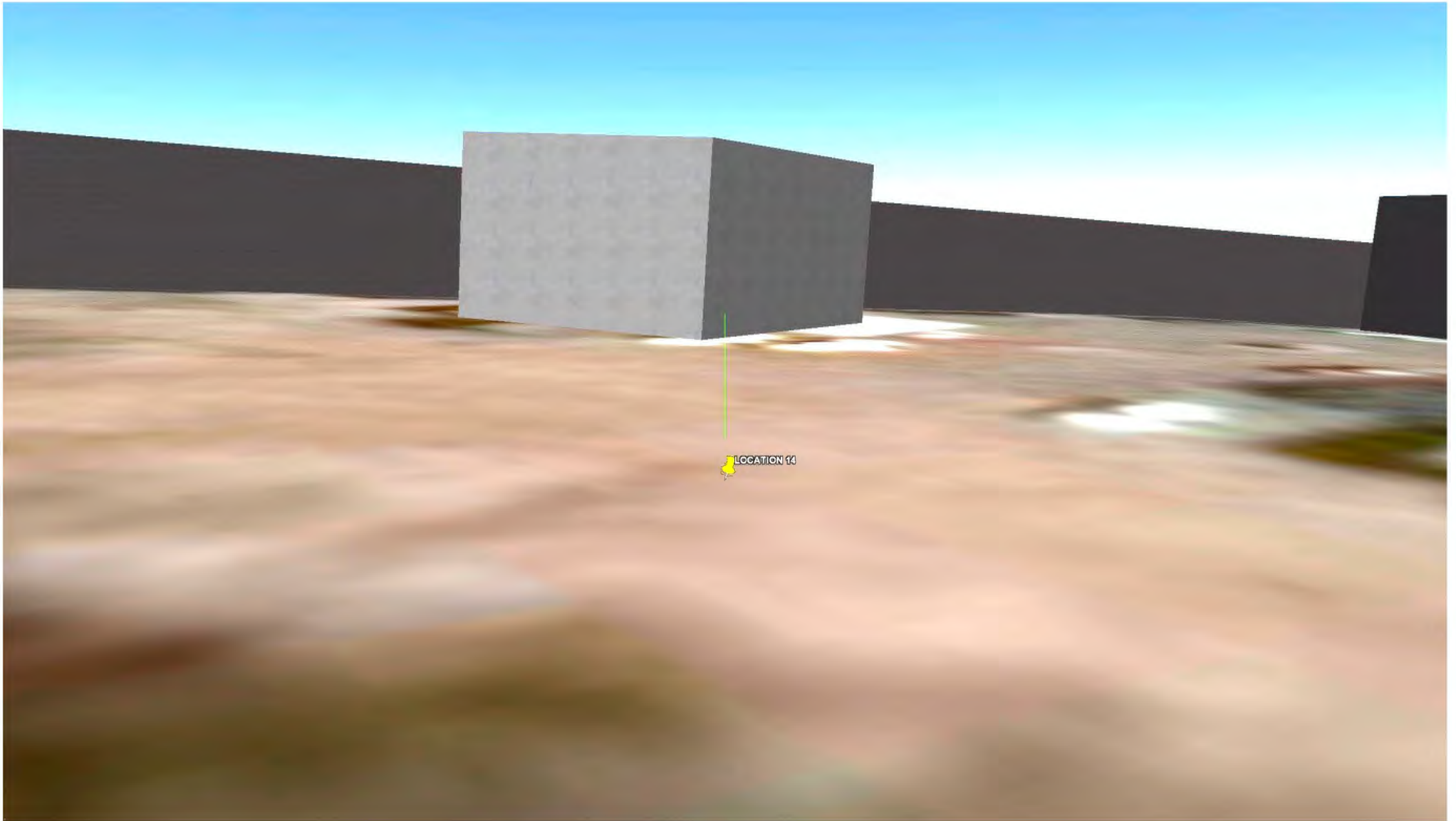
Location 13-Line of Sight





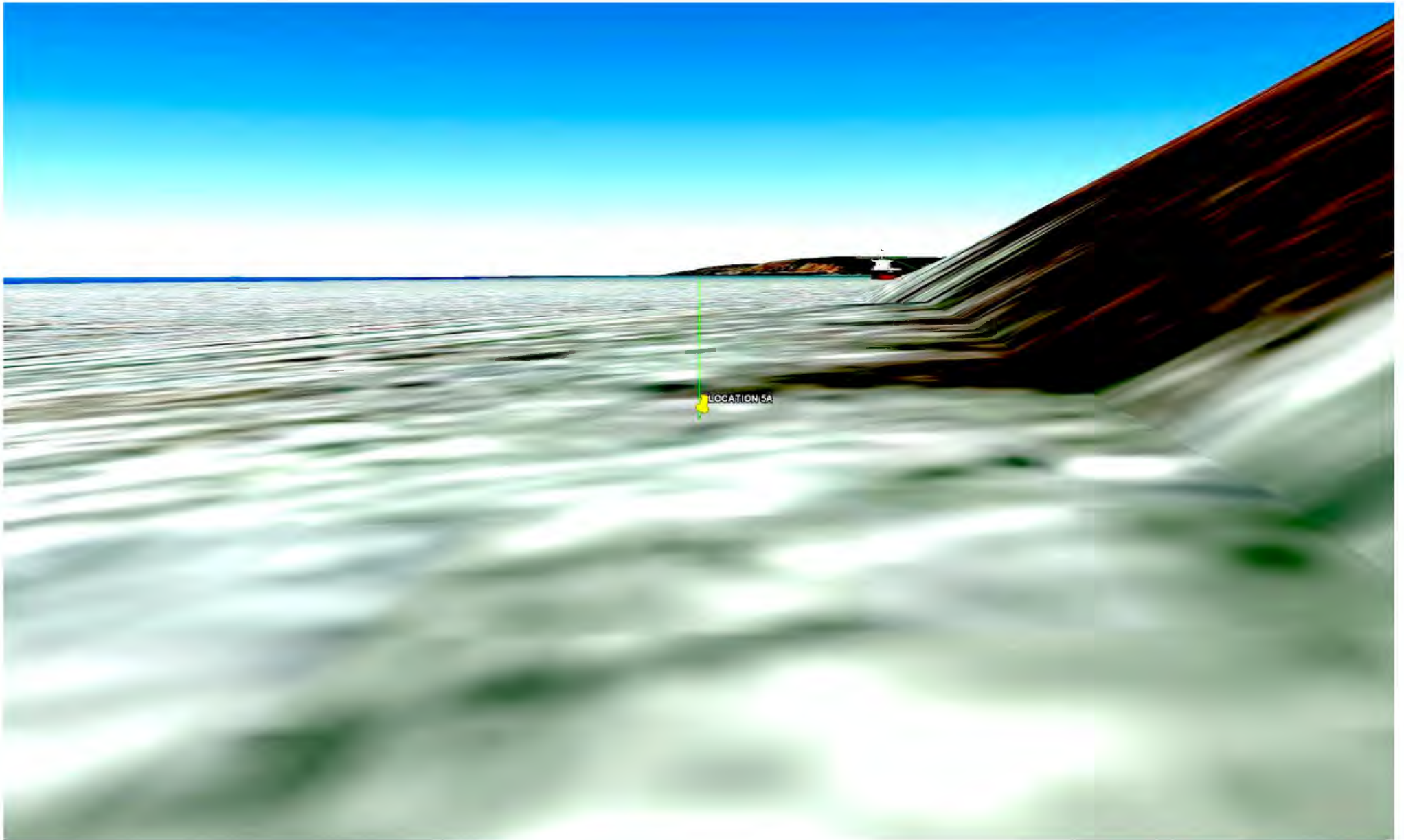
Appendix K

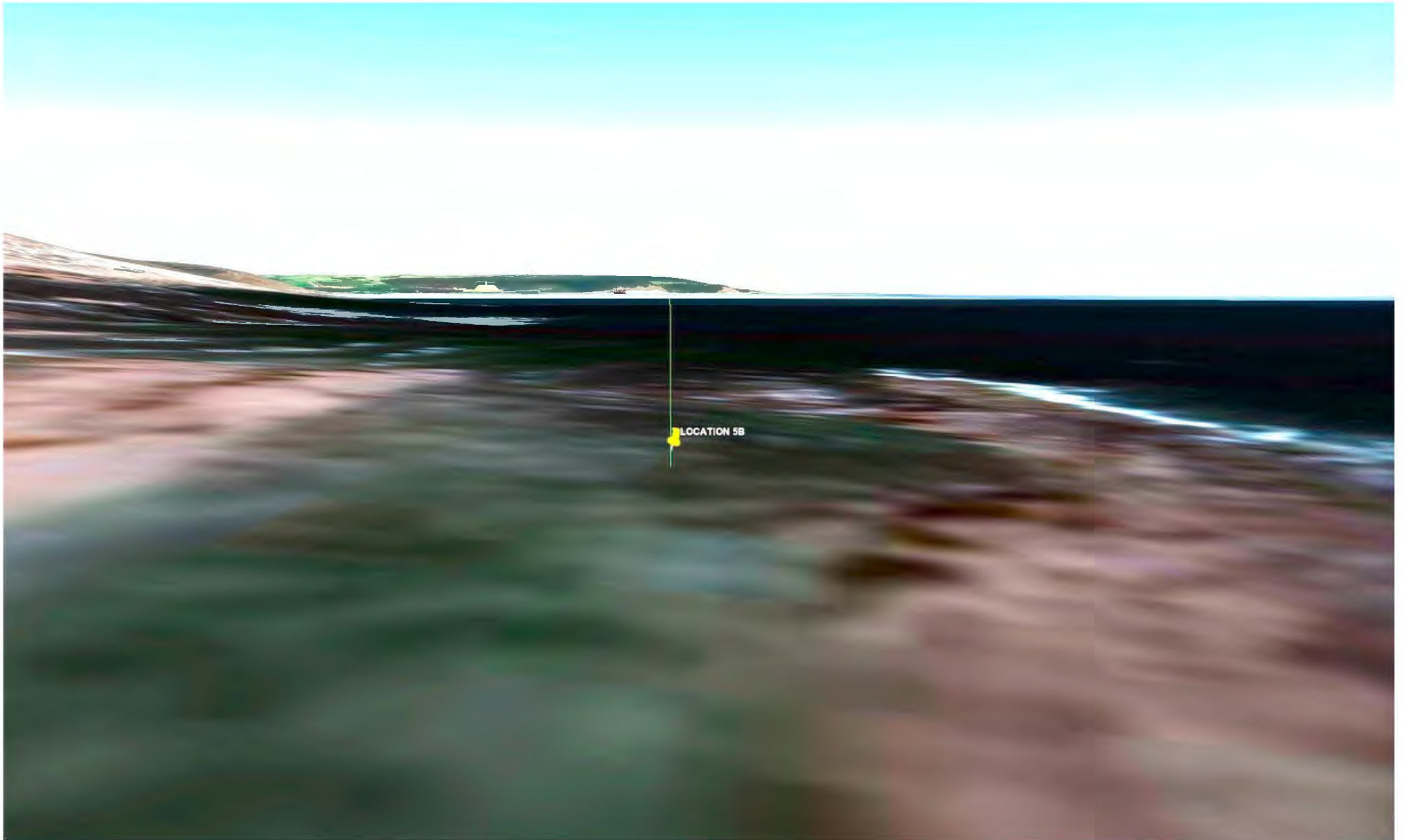
Location 14-Line of Sight



Appendix L

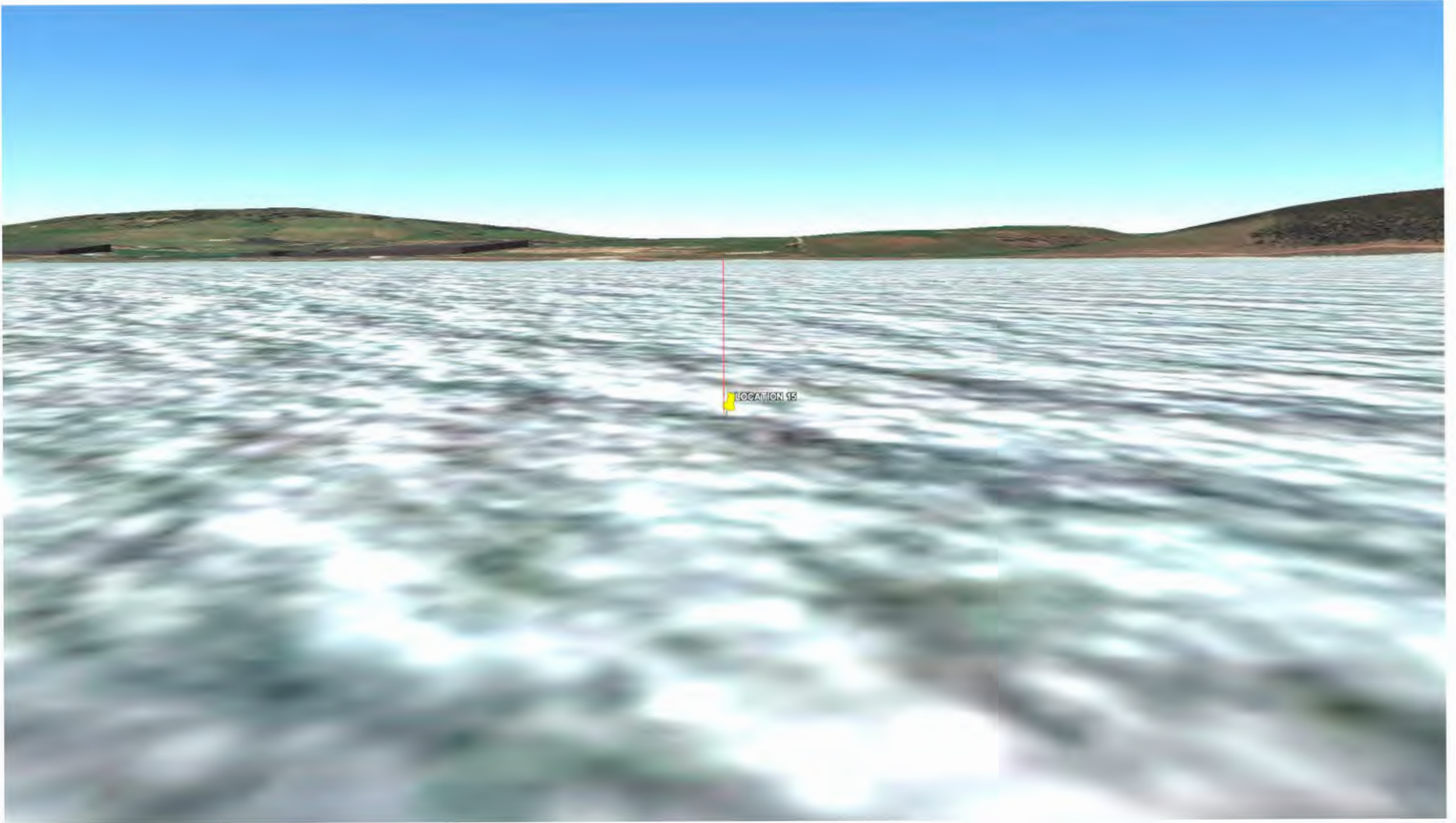
Location 5 (A AND B)-Line of Sight

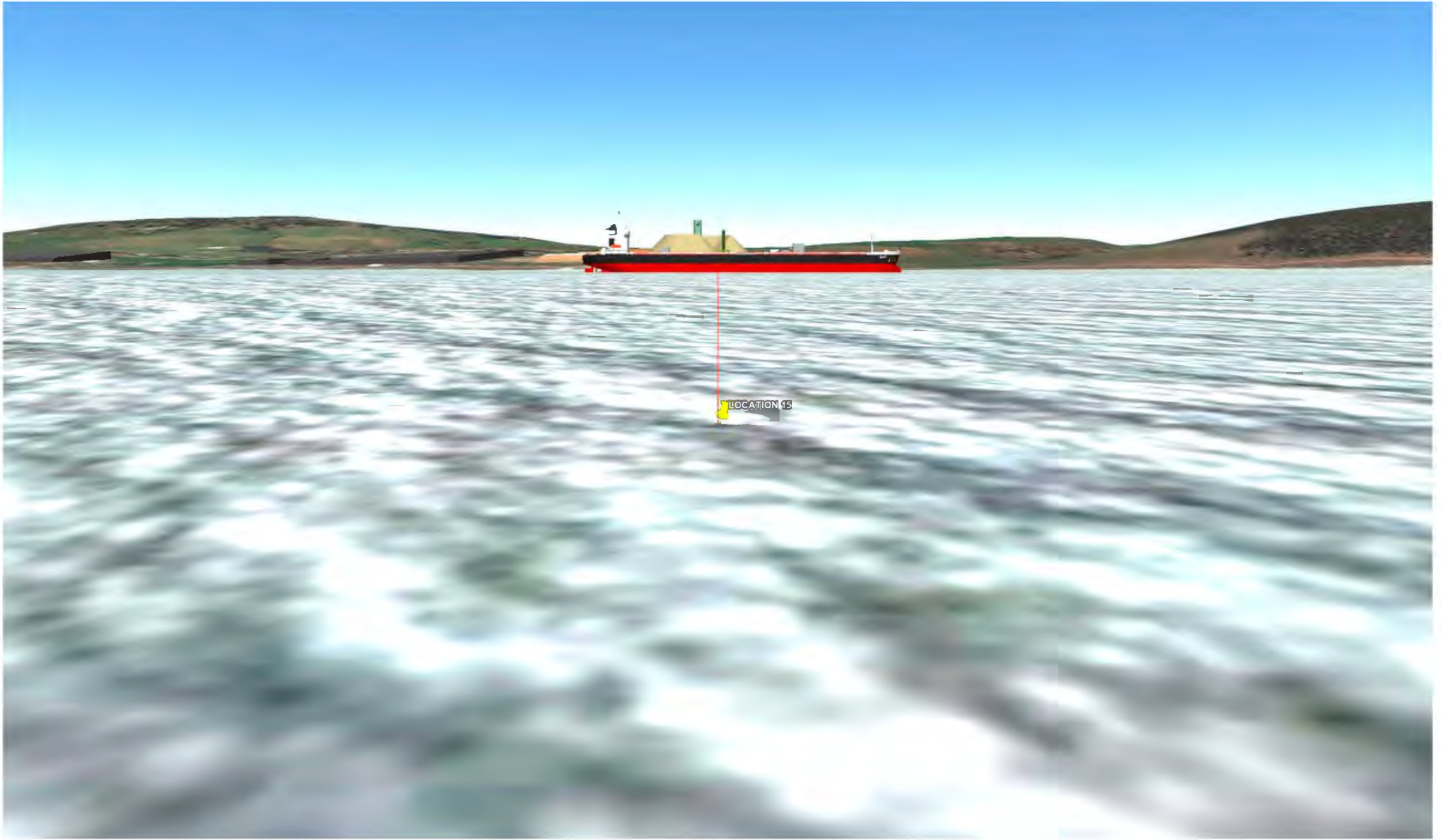




Appendix M

Location 15





Appendix N

Vegetation Assessment



