

# 3D simulation for voluntarily EIA by community

NPO Workshop for Sustainable Community  
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This paper will introduce case examples of a NPO working with business operators to assist in conducting voluntary environmental impact assessment (EIA) for smaller scaled projects. Here, we employ 3D virtual reality technologies to visualize the potential overall impact of the project and invite local residents into the discussion to ensure environmental preservation through effective communication.

## 1. What is voluntary EIA (Fig 1)

We define voluntary EIA as self-initiated environmental assessments for smaller-scaled projects that are not subject to mandatory EIA under governmental regulations, which is conducted by business operators to communicate with local residents over the environmental impacts of various business activities and projects.

This can avoid risks to the environment and also give the locals an opportunity to voice any concerns or ideas to reflect on the design proposals, which leads to improved environmental awareness and contribution to community planning.

## 2. How the voluntary EIA works (Fig 2)

Since the EIA activities described here are completely voluntary, there are no rigid rules or procedures to follow. What is most important for business operators is to commit themselves to listen to the residents' opinion on environmental preservation measures.

Normally, these voluntary EIA excluding post-project analysis would take around a half-year period. If it is considered there is no need for further EIA at the stage of prior assessment, publication of its reasons and already made efforts is recommended.

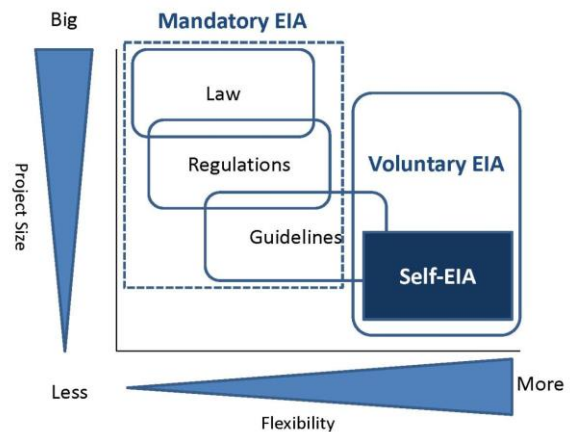


Fig 1 Status of voluntary EIA

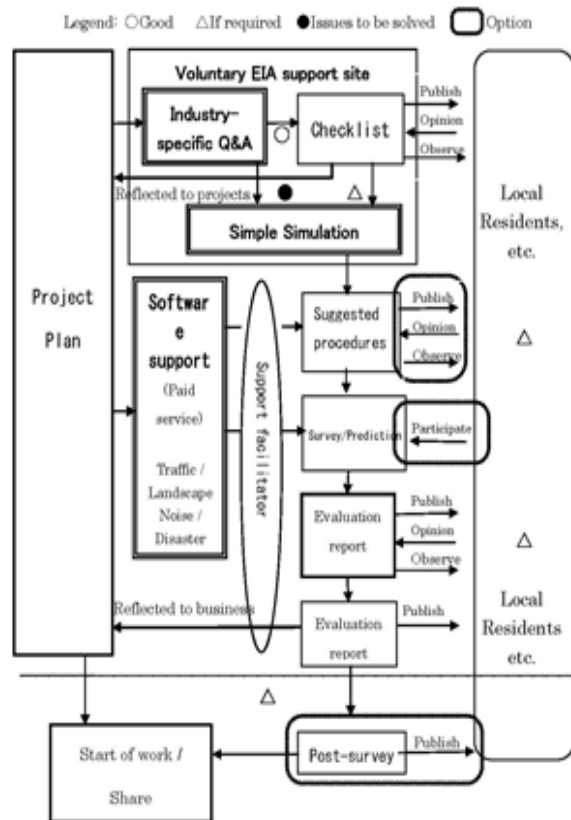


Fig 2 How voluntary EIA works

### 3. Real World Examples (company names undisclosed)

#### 【Case 1】 Quarry Site (around 8 hectares of land)

Despite the proposed quarry site was only 1/3 of the size subject to mandatory EIA, the company still chose to perform voluntary EIA out of concerns of potential opposition from the locals. The company proactively chose to visualize and simulate through a 3D VR environment over elements such as landscape changes, sunshine and shades, airflow changes (fig 3), and the movements of industrial vehicles. The simulations results are published on the Internet and various seminars and discussion forums were held and encouraged the inhabitants to raise any concerns.

Although the project was eventually abandoned due to reasons unrelated to the EIA itself, this voluntary EIA drew the warm attention of the local municipal government, paving way to a second example to be described in Case 2.

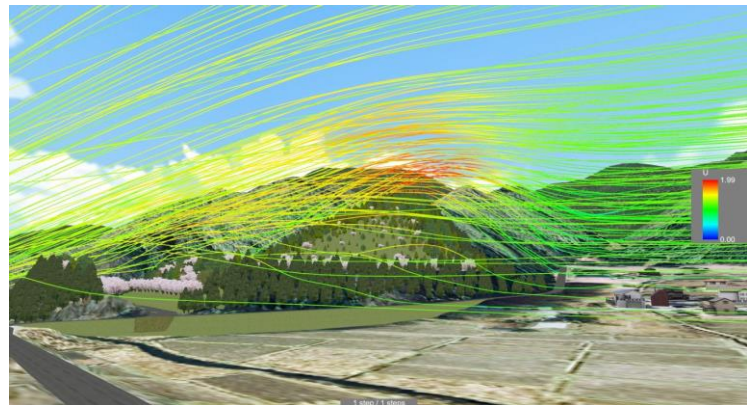


Fig 3 Wind analysis simulation

#### 【Case 2】 Solar Power Plant A (around 900kW of power)

Another subsidiary under same parent company from Case 1 drafted a plan to convert an ex-fish hatchery reservoir into a solar power plant. The municipal government at first deemed the site “unsuitable”, out of concerns over potential negative landscape impacts. Undaunted and determined to persuade the governing bodies, the company voluntarily subjected themselves to EIA and openly discussed with the local residents their visions of the projects. Similar to Case 1, they also willingly publicized various 3D VR simulation results such as landscape changes, sunlight reflection issues, and movements of large industrial vehicles over the Internet. Various seminars and discussions with the local residents were held to find workarounds or innovations to improve the designs without adversely affecting the environment. The locals and the company ultimately reached a new proposal which was well thought out enough to finally receive the go-ahead sign from the municipal government.

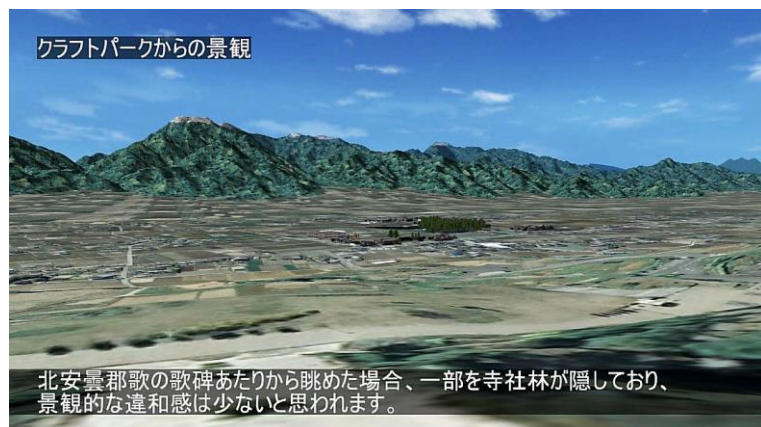


Fig 4 Landscape simulation

### 【Case 3】 Solar Power Plant B (around 500kW)

Considering that photovoltaic power plant near the site was sued by local residents, a subcontractor from the project in Case 2 performed self-EIA to effectively communicate with the plaintiffs. They made similar efforts to Case 2 and explained traffic safety features so the construction will not endanger an elementary school nearby (Fig 5). It resulted in satisfactory launch of the plan.



Fig 5 Image of road safety management

### 【Case 4】 Waste Incinerator Construction and Operation – Site Environmental Supervisor (Ongoing Project)

The NPO's service was sought for an interjurisdictional tender project to propose plans for the construction and operation of a waste disposal incinerator. Elements and concerns such as the final project appearance that cannot be represented through standard EIA protocols were recreated through 3D-VR visualizations. All books and record related to the plan are currently publicized and explained to the residents at the meeting, to improve overall project clarity and transparency.

## 4. Establishment of the Simplified Self-Assessment Website

To encourage more businesses to perform self-EIA, the Simplified Self-Assessment Website was launched on April, 2015 (Fig 6). The website has mainly 3 features:

- ① A simple checkup over the necessity of EIA for the company or project of interest.

Sets of industry-specific Q&A questionnaires are filled out by the user to determine whether EIA is necessary. Various environmental consideration checklists and suggested procedures to perform the self-EIA will be generated by the system (Fig 7) .

- ② Development and distribution of free software that can assist in EIA and environmental diagnosis.

\*“Solar Panel Reflection Check” allows the inputting of parameters such as longitude, latitude, and panel angles, to retrieve sunlight reflection angles, categorized by different dates and times, including solstices (Fig 8) .

\*“Green Coverage Rate Calculation” can calculate the coverage rate of visible green areas within the visual range (Fig 9) .

\*“Environmental Diagnosis Result Mapping Support” feature assembles the site photos taken from smart devices and reflect them on maps for better understanding.



**一般的な配慮事項**

**大きな建物**

**事業の性格把握**

[1] 大きな建物

Q1: それは何の建物ですか?

- ◎ 総合ビルディング(オフィスや店舗、住居などが混在)
- ◎ 商業施設・ショッピングモール等の集客施設
- ◎ 小中高高等学校や保育園・幼稚園など
- ◎ マンション

Q2: どのような場所ですか?

- ◎ 主に商業施設や業務系施設が多い市街地
- ◎ 主に住宅が多い市街地
- ◎ 主に田畑が多い場所
- ◎ 主に山林や海辺が多い場所

Q3: 新たな土地の造成や改変が伴いますか?

- ◎ ある
- ◎ ない

Q4: どのくらいの大きさですか?

※記入できない項目がある場合はこちら

敷地面積(m<sup>2</sup>):

建物面積(m<sup>2</sup>):

延床面積(m<sup>2</sup>):

Q5: 駐車場は何台収容しますか?

乗用車(台):

大型車(台):

Q6: 周囲は交通量の多いところですか?

- ◎ 多い
- ◎ 多くない

Fig 6(right) Simplified check for each sector

Fig 7(left) Front page of assessment website

③References and Background Materials: Introducing the details of various case studies and information helps to design and implementation of the assessment site.

This website can be freely accessed by anyone, which also allows governmental agencies or local residents to also evaluate the any proposals they may have at hand, or as a part of business planning.

In order to popularize the idea of self-EIA, various activities such as seminars and environmental facilitator education lessons are also held via the aid of online materials or cloud services.

### 太陽光パネル反射光チェック

「太陽光パネルからの反射」の簡易シミュレーションを行います。  
太陽光パネル設置場所の緯経度と太陽光パネルの斜度を入力してください。

北緯:  (°)  
東経:  (°)  
太陽光パネルの斜度:  (°)

日付	曜日	時刻	太陽の方位(°)	太陽の仰角(°)	反射光の方位(°)	反射光の仰角(°)
夏至 (7/21)		5:00	66.52	2.78	—	—
		6:00	74.68	14.27	—	—
		7:00	82.57	26.21	262.57	-23.79
		8:00	90.91	38.37	270.91	91.63
		9:00	100.92	50.49	280.92	79.51
		10:00	115.41	62.07	295.41	67.93
		11:00	142.23	71.69	322.23	58.21
		12:00	191.19	74.68	11.19	55.22
		13:00	231.36	68.08	51.36	61.92
		14:00	251.47	57.32	71.47	72.68
冬至 (12/22)		15:00	263.54	45.42	83.54	84.58
		16:00	272.63	33.24	92.63	-16.76
		17:00	280.66	21.13	—	—
		18:00	288.59	9.34	—	—
		8:00	130.10	11.44	310.10	118.56
		9:00	141.33	19.96	321.33	110.04
		10:00	154.53	26.45	334.53	103.55
		11:00	169.57	30.22	349.57	99.78
	12:00	185.53	30.74	5.53	99.26	
	13:00	200.99	27.93	20.99	102.07	
	14:00	214.81	22.21	34.81	107.79	
	15:00	226.63	14.25	46.63	115.75	
	16:00	236.66	4.68	56.66	125.22	

※太陽光の方位、及び反射光の方位:90°が真東、270°が真西  
※太陽の仰角、及び反射光の仰角:水平が0°

### 緑視率計算サービス

■緑視率とは  
緑視率とは、評価対象の建造物等を視界に入れた際、視界に入る自然の緑の割合のことです。

国土交通省による社会実験では、緑視率が2.5%以上確保されていると人は安心感を覚えると考えられています。もちろん、これは個人差があり、価値観や生活スタイルによって必要とされる緑視率の割合は違うのだと思われます。

この2.5%をひとつの目安に、様々な人の目線からチェックすることで、景観や緑地のデザインを検討する材料にしようとするものです。

■使い方  
このソフトは、読み込んだ画像上の色を識別し、設定した範囲の色が画像全体に占める割合を計算します。これを使って、画像上において緑地として識別させたい範囲を設定して、緑視率を簡単に把握します。

新たに造成される土地に計画された緑地をシミュレーションすることによっていただけます。たとえば、再開発計画や道路設計、公園造成等の計画です。

■評価の目安

指標	定義	ランク	評価(コメント)
緑視率	人の視界に入る自然の緑の割合	30%以上	良好
		25%以上、30%未満	概ね問題ない
		20%以上、25%未満	自然の緑が少ない印象を与える
		20%未満	少ない可能性がある

■手順

1. 緑色の範囲選択  
緑色と判定する色相の範囲を「色相範囲」に入力してください。

色相範囲:  度 ~  度

2. ファイルの選択  
解析をするファイルを選択してください。  
※注1: 5MB以下のサイズのファイルを選択して下さい  
※注2: 対応しているファイル形式: gif, png, jpeg, bmp

選択されていません

3. 解析実行  
「解析実行」ボタンをクリックして、解析を実行します。

Fig 8 Sunlight reflection check

Fig 9(right) Green coverage rate calculation service