

"Project Formulation Survey" under the  
Governmental Commission on the Projects for  
ODA Overseas Economic Cooperation  
in FY2012

Summary Report

Solomon Islands and other Pacific Ocean countries

Preparatory survey on environmentally friendly  
soil absorption systems in Solomon Islands and  
other Pacific Ocean Countries

March, 2013

Joint Venture of Taisei Kogyo Co., LTD and Original Engineering  
Consultants Co., LTD

## Introduction

The soil absorption system developed or designed by Taisei Kogyo Co. Ltd has been proven to be very environmentally friendly with very low energy usage thus considered to be very ideal a model/or system to be introduced in Solomon Islands and other Pacific Ocean Countries. Since Honiara city had been without public toilets for years after the demolition of old facilities, solely due to their unhygienic conditions, the team is confident that with this project coming to realization, the problem attached to nonexistence of waste water treatment plant will be mitigated in Honiara plus other urban centers.

With the soil adsorption system introduced, the unhygienic conventional methods adopted for discharging gray water and sludge from public utilities (toilets) into the ocean endangering livelihood should be minimized if not totally resolved. Once implemented, this system will assist in controlling or preventing future occurrences of water and food borne diseases which had been prevalent in Honiara over recent years. It is equally be certain of that the proposed project will enhance the needed employment for the 64,000 residents of Honiara and a proper site for disposal and treatment of fecal wastes.

Nationally, the project falls within the Government policy of improving standard sanitation conditions for both urban and rural areas in the country. On top of that, it will aid towards achieving the Millennium Development Goals under the United Nations goal in alleviating illiteracy in developing nations such as Solomon Islands and other Pacific Ocean Countries.

The proposed project will contribute significantly to the Solomon Islands Government's national development strategy. Just as what happened in Japan, introduction of Taisei Soil System (TSS) in Solomon Islands should greatly improve/enhance the poor sanitation condition the country is currently facing. The rapid infrastructure development and the increase in population require the immediate provisions of TSS to minimize effects brought about by unsanitary conditions prevailing especially in densely populated areas. The project will also ensure better quality of the receiving water bodies thereby reducing further environmental degradation.

## **I . Description of the current situation and development needs of the concerned development issues in the surveyed countries**

Honiara City is situated on the central portion of Guadalcanal province and only had few public toilets for years after the demolition of the old facilities due to their unhygienic conditions and currently, there are no existence of any sewage treatment plants in Honiara city and the entire Solomon Islands. Although sewer lines and outfalls have been constructed only in limited areas in the downtown of Honiara city, waste water generated from individual households, public,

commercial, and industrial facilities has been discharged directly into the sea without any form of primary treatment. It is with the insufficient sanitation management that a brownish discoloration appears along the coast line in the city. With tourism projected to become a mainstay of the economy after the logging industry is phased out in the next few years, pollution of surrounding waters is becoming a pivotal concern.

During the preparation to host the Pacific Arts Festival held on the first week of July last year (2012), the need for public toilets had become very critical and some temporary facilities were constructed in the city. However, a conventional disposal method has been adopted for discharging gray water and sludge from these public toilets, and insufficiently treated gray water and sludge have immersed into the ground through simple septic tanks, resulting in pollution of the water environment and threatening the spread of water and food borne diseases, particularly with regular fish poisoning due to fecal pollution of the surrounding water bodies. The fecal pollution is no doubt originated from improper discharge of waste matters from existing toilet septic tanks and absence of proper treatment facilities. There is a health risk to the Honiara residences and visitors given the present population changes and fears for a major outbreak of diarrhea are being raised. The leading causes of morbidity are presented in Table 1. Table 1 indicates that some 24,000 people suffered from diarrheal disease in 2011.

**【Table 1 : Leading causes of Morbidity in Solomon Islands】**

	2002	2003	2004	2005	2006	2007	2008	2010	2011
ARI	19.4 %	17.9 %	20.9 %	21.3 %	22.7 %	21.1 %	29.1 %	30.8 %	31.0 %
Diarrhoea	1.5 %	1.7 %	1.7 %	2.4 %	1.9 %	2.4 %	2.2 %	2.2 %	3.0 %
Fever	17.6 %	15.4 %	14.5 %	13.6 %	13.6 %	12.6 %	10.7 %	- %	- %
Red eyes	1.5 %	1.3 %	1.3 %	1.7 %	2.1 %	1.7 %	1.7 %	2.1 %	2.0 %
Yaws	2.9 %	3.7 %	2.5 %	2.3 %	1.9 %	2.0 %	2.2 %	2.6 %	2.0 %
Skin diseases	4.8 %	4.8 %	4.8 %	5.0 %	4.4 %	5.5 %	5.3 %	12.1 %	12.0 %
Ear infection	2.7 %	2.9 %	2.9 %	3.0 %	2.9 %	3.2 %	3.4 %	3.6 %	3.0 %
Vaccine Preventable	0.005 %	0.001 %	0.003 %	0.022 %	0.003 %	0.008 %	0.013 %	0.03 %	0.01 %
STI	0.2 %	0.3 %	0.3 %	0.4 %	0.5 %	0.6 %	0.4 %	0.2 %	0.4 %
Penile discharge	0.10 %	0.12 %	0.11 %	0.11 %	0.20 %	0.20 %	0.12 %	0.2 %	0.2 %
Vaginal discharge	0.10 %	0.1 %	0.14 %	0.18 %	0.23 %	0.28 %	0.16 %	0.2 %	0.2 %
Genital ulcer	0.04 %	0.04 %	0.04 %	0.12 %	0.04 %	0.1 %	0.07 %	0.1 %	0.1 %
Clinical malaria	18.9 %	20.8 %	17.4 %	17.0 %	15.8 %	15.4 %	11.9 %	14.1 %	10.0 %
Others	30.6 %	31.4 %	33.8 %	33.4 %	34.3 %	35.7 %	33.3 %	35.4 %	38.0 %
Solomon Islands	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
	744956	792341	918739	960002	1071746	972732	680555	723905	803538

Source : HIS monthly report from 2002-2011

The proposed project will assist to prevent future occurrence of diarrheal and also falls within the government policy of improving standard sanitation conditions for both rural and urban areas in the country, helping towards achieving the millennium goals under the United Nations.

## **II . Possible applicability of the SME's products and technologies, and prospects for future business development**

### **(1) Project Objective**

Access to proper water and sanitation is an universal human right (UN Declaration July 2010). Water and sanitation can be directly linked to health, dignity, equality and safety, and sustainable environments as well as being an economic investment.

The proposed project is aimed at introducing and constructing soil absorption systems, referred to as TSS, designed by a Japanese manufacturer, Taisei Kogyo Company Ltd. with funding support based on ODA grant from the Japanese Government.

The major objectives of the proposed project are:

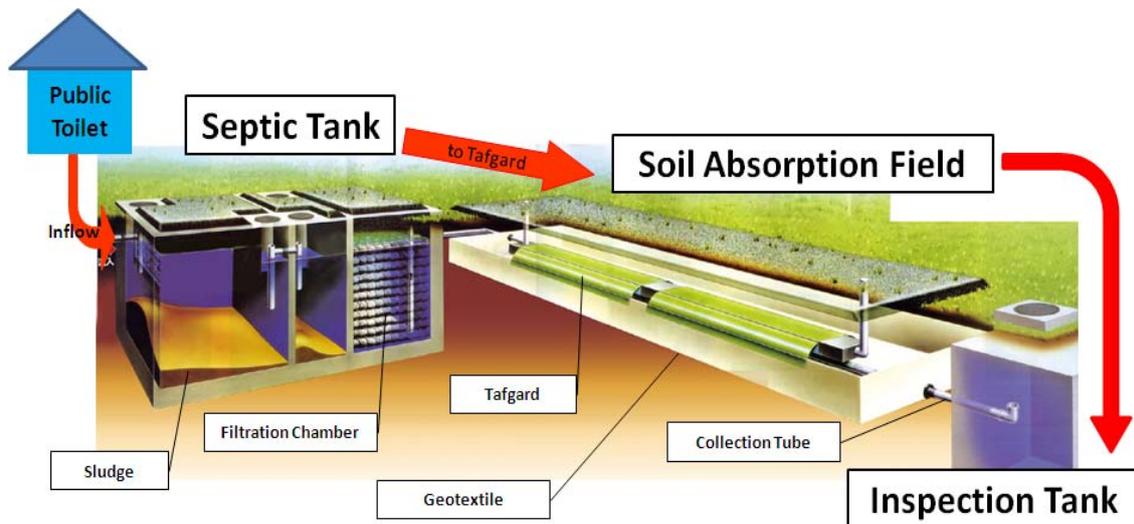
- 1) To help supplement the National Health Strategy by positively promoting better health practices, good hygiene, diarrhea control and proper human waste disposal management;
- 2) Improvement of sanitation by introducing TSS;
- 3) Human resource development by performing technology transfer of TSS and training of effective maintenance;
- 4) Structuring of business models by trial of pay toilets and sales of possible by-products;
- 5) Creation of job opportunities and promotion of economic independence through sustainable business development and local produce procurement.

### **(2)Taisei Soil System (TSS)**

Taisei Soil System (TSS) mainly composed of a septic tank and soil absorption field is very environmentally friendly with limited usage of energy. This system promotes recycling of wastewater with the gray water and sludge discharged from public toilets recycled through degradation in soil by natural process without use of electricity in the case where it can let wastewater treated in a septic tank be flowed into a soil absorption field by gravity generated from difference of grand level.

Furthermore, the gray water treated in a soil absorption field is stored in an inspection tank through a collection tube and can be reused for flushing toilets whereas the treated gray water and nutrients from soil can contribute to planting on the soil absorption field. With regard to maintenance, Taisei Soil System requires minimal maintenance. It is recommended that inspection tanks be opened for inspection of water quality at least six months after commencing operation in flat areas, and at least one year after commencing operation in mountainous areas.

The concept chart of TSS is presented in Figure1.



**【Figure 1: Concept Chart of Taisei Soil System (TSS)】**

### (3) Project Outline

In order to ensure the health and safety of the public in Solomon Islands, the proposed project is staged into 3 program components:

**Phase 1:** Feasibility study for introduction of TSS

**Phase 2:** Monitoring a demonstration of TSS

**Phase 3:** Preparation of the proposed project with ODA grant from the Japanese Government

The phase 1 involves the following activities:

- 1) Gathering of data and information on the existing public toilets and septic tanks installed in Honiara City:
- 2) Site survey needed to confirm technical feasibility to introduce TSS into existing public toilets including geotechnical investigations and water environment research
- 3) Attendance at meetings with Honiara City Council, the Ministry of Health and Medical Services (MHMS) and other government agencies
- 4) Selection of an optimum public toilet for demonstration of TSS
- 5) Preparation of drawings and cost estimation of the enhancement for the selected toilet
- 6) Preliminary study needed to spread TSS across the city:

The phase 2 involves the following activities:

- 1) Transportation of construction materials for TSS from Japan
- 2) Procurement of other materials for the systems in Honiara City
- 3) Enhancement of the selected toilet by converting the existing septic tank into TSS
- 4) Monitoring a demonstration of the selected toilet:

5) Site survey needed to confirm possible existing toilets in the following facilities for enhancement:

6) Convening meetings with Honiara City Council and other government agencies

7) Detailed study needed to expand the soil absorption systems across the city:

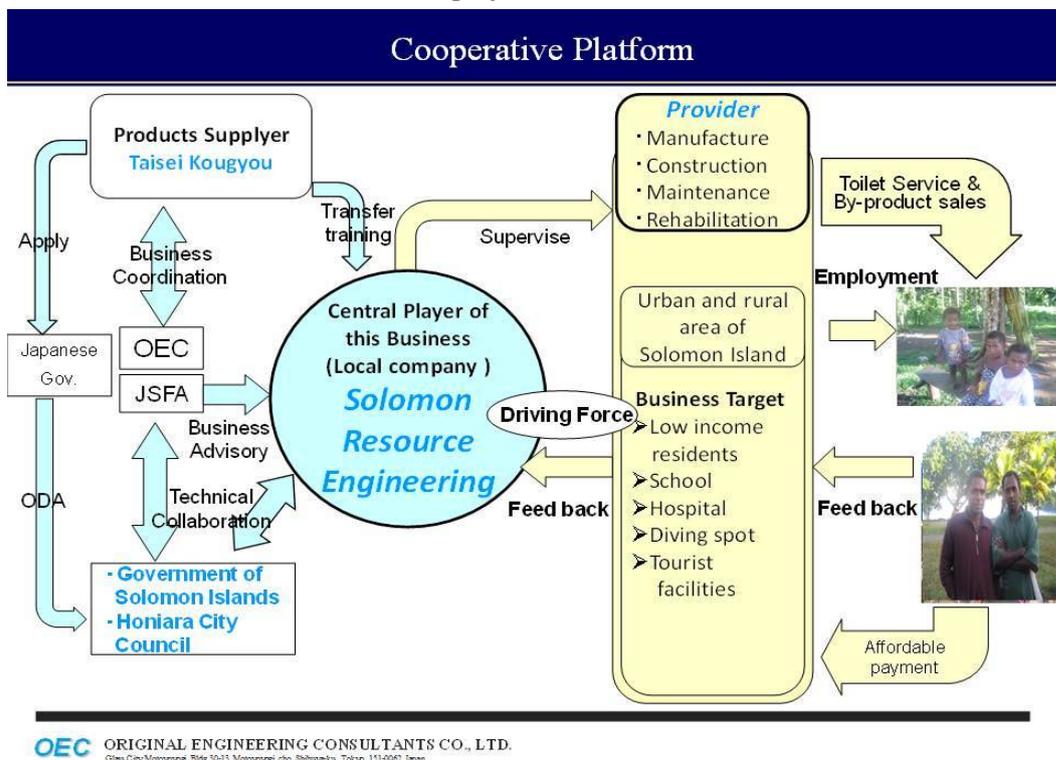
The phase 3 involves the following activities:

1) Preparation of proposals to apply for ODA grant from the Japanese Government

2) Coordination of the site survey for the project by JICA mission

3) Conclusion of the bilateral agreement for ODA

4) Tender submission for the ODA project from JICA



**【Figure 2: Division of Roles in the Proposed Project】**

### III. Expected development impact and effect on business development of the proposing SMEs in the surveyed countries through proposed ODA projects

TSS can be constructed in Solomon Islands by converting existing public toilets with septic tanks. It should be noted that wastewater treated by TSS is not discharged to various receiving bodies of water including rivers, streams and sea, resulting in prevention from environment degradation and health hazards. On the contrary, conventional treatment methods like septic tanks and joulkasou are likely to make receiving water bodies contaminate when they are

maintained in unsuitable ways.

Table 2 shows a comparison with various types of wastewater treatment methods in terms of cost, capacity, time, environment impacts, and others. Comprehensive evaluation indicates that TSS is the most suitable for application in Solomon Islands.

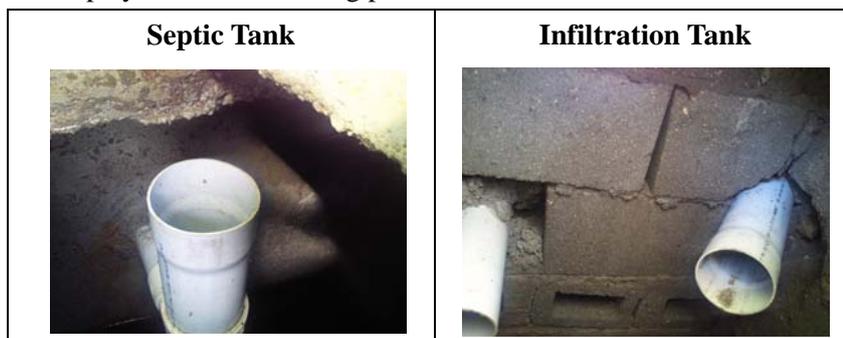
**【Table 2: Comparative analysis with various types of Treatment Methods】**

Name	Best condition	Pit Latrine	Septic tank and soak pit	Taisei Soil System	Joukasou	Pipe line and waste water treatment plant
Initial cost	Low cost is best	⊙	⊙	○	△	×
Maintenance cost	Low cost is best	⊙	○	○	△	×
Treatment capacity	High capacity is best	×	△	⊙	⊙	⊙
Treatment time	Short is best	○	○	○	⊙	⊙
Influence to underground water	Low influence is best	×	×	○	○	⊙
Influence to river and ocean	Low influence is best	△	△	○	○	○
Beautification campaign	High impact is best	—	—	⊙	○	○
Visual effect for education	High impact is best	—	—	⊙	⊙	⊙
<b>Comprehensive evaluation</b>		×	×	⊙	○	×

⊙Best ○Good △No Good ×Bad

The following findings were obtained during the site visits:

- 1) Handling of gray water and sludge from individual septic tanks have not been done properly due to lack of adequate collection, treatment and disposal facilities
- 2) Excreta and wastewater generated from individual households and public toilets should be treated in septic tanks, however; gray water and sludge in septic tanks are sweeping into underground without any proper treatment. The actual condition of an existing septic tank is displayed in the following photos.



- 3) TSS can be connected to existing public toilets and expected to make good performance.
- 4) It is recommended that demonstration and monitoring of TSS be conducted at the St. Nicholas School with a population of about 1,500 in terms of locations of existing toilets and ideal sizes of open space outside the school buildings. Comparison with other possibly suitable sites is given in Table 3.

**【Table 3: Comparison with Possibly Suitable Sites for Demonstration】**

Name	Best condition	Public toilet	St Nicholas School	King George VI School	Solomom Islands National University	Airport	Central Market
Capacity Estimation of numbers of user	Estimate easily is best	x	⊙	⊙	○	△	x
Affordability of Size	Small size is best	x	⊙	○	△	△	x
Affordability of construction cost	Low cost is best	x	⊙	△	△	△	x
Advertising effectiveness	High impact is best	⊙	○	○	○	○	⊙
Educational effectiveness	High impact is best	○	⊙	⊙	○	△	○
Efficiency of Maintainance	Low cost is best	x	⊙	○	○	○	x
<b>Comprehensive evaluation</b>		<b>5</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>6</b>

⊙Best ○Good △No Good xBad

- 5) The project team obtained an official request letter from the Chairman of the St. Nicholas School Board of Governors to support the demonstration and monitoring of TSS.
- 6) The government viewed the proposed project as important for the country and the Prime Minister and senior government officials had spoken in favor of it.
- 7) The government addressed that the need to improve sanitation based on TSS for people in Solomon Islands was of paramount importance to the health and prosperity of the whole nation.
- 8) Ministry of Health and Medical Services (MHMS) and Honiara City Council wrote official request letters to address that they were in full support of the proposed project.

#### **IV. Proposals for formulating ODA projects**

Now that the site visits were already done, Phase-1 of the project will be completed at the end of this February. Phase-2 will start as of April followed by a demonstration of TSS at the St. Nicholas School. It is anticipated that approximately one (1) year would be needed to complete Phase-2, including preparing materials, constructing TSS, monitoring its performance and training local constructors. After or upon completion of the demonstration stage, the following benefits are expected in the targeted areas:

- 1) Reductions in occurrence of water and food borne diseases
- 2) Contribution to beautification campaign by planting flowers on the soil absorption field
- 3) Creation of community awareness of proper wastewater treatment by capturing attentions of Teachers and students at the school
- 4) Creation of community awareness for proper maintenance of public toilets by training teachers and students at the school

For Phase-3, the proposed project will be supported with ODA grant from the Japanese Government. The following prospective projects are expected:

- 1) Construction of TSS projects for almost all schools in Honiara City  
(Project cost estimation: JPY408,000,000)
- 2) Expansion of TSS projects to rehabilitation of medical facilities in Guadalcanal Islands  
(Project cost estimation: JPY149,600,000)
- 3) Expansion of TSS projects to Solomon Island National University
- 4) Expansion of TSS projects to proposed Growth Centers in Malaita and else where
- 5) TSS construction and maintenance technology training projects  
(Project cost estimation: JPY10,000,000)

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Preparatory survey on environmentally friendly soil absorption systems in Solomon Islands and other Pacific Ocean Countries



**SMEs and Counterpart Organization**

- Name of SME : Taisei Kogyo Co., LTD
- Location of SME : Yonago, Tottori, Japan
- Survey Site • Counterpart Organization (Tentative): Honiara, Solomon Islands • Environmental Health Department of Honiara City Council ,Ministry of Health and Medical Services, etc

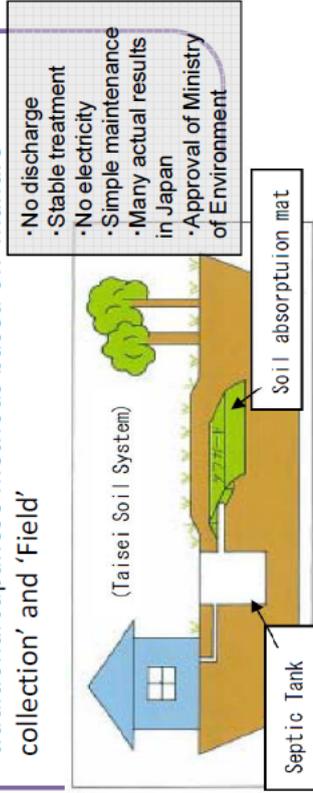
**Concerned Development Issues**

- Tourism • • • Beautification of urban areas and Improvement of ocean environment
- Sanitation • • • Improvement of water environment and awareness toward sanitation
- Health • • • Reduction in water-borne diseases



**Products and Technologies of SMEs**

Taisei Soil System(TSS) can treat wastewater by traditional Japanese methods based on 'Manure collection' and 'Field'



**Proposed ODA Projects and Expected Impact**

- <ODA Projects>Improvement of School Sanitation • • • • Installation and technical transfer of TSS at schools in Honiara city. Education for improvement of awareness toward sanitation among teachers and students.
- <Expected Impacts> Reduction in water-borne diseases, Improvement of sanitary environment , Improvement in awareness toward sanitation, Increase in employment, Expansion of tourism by improving ocean environment

**Future Business Development of SMEs**

In cooperation with Solomon Resource Engineering, (Phase-1) **Pilot Project and Technical Transfer** for Installation and technical transfer of TSS. Education for improvement of awareness toward sanitation.(Phase-2) **Improvement of cost and maintenance** for Further spread of TSS in Solomon Islands and other Pacific Ocean Countries.