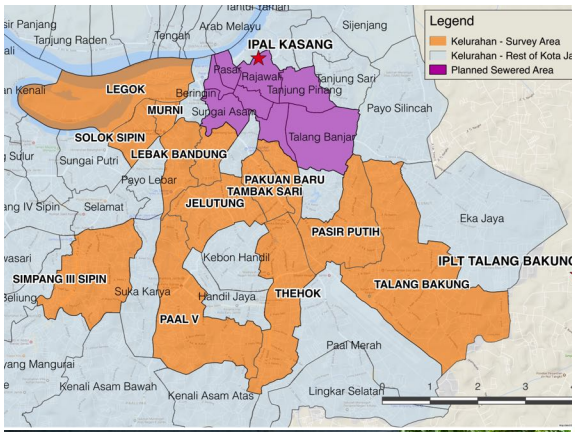
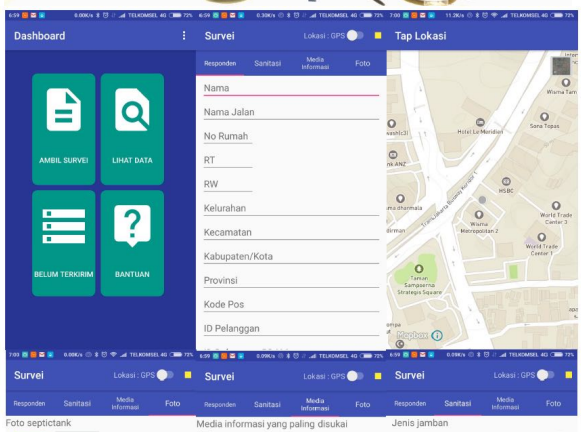
The views expressed in this presentation are the views of the author/s and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this presentation and accepts no responsibility for any consequence of their use. The countries listed in this presentation do not imply any view on ADB's part as to sovereignty or independent status or necessarily conform to ADB's terminology.

SURVEYING FOR SEPTAGE MANAGEMENT PLANNING

A Case Study from the City of Jambi, Indonesia





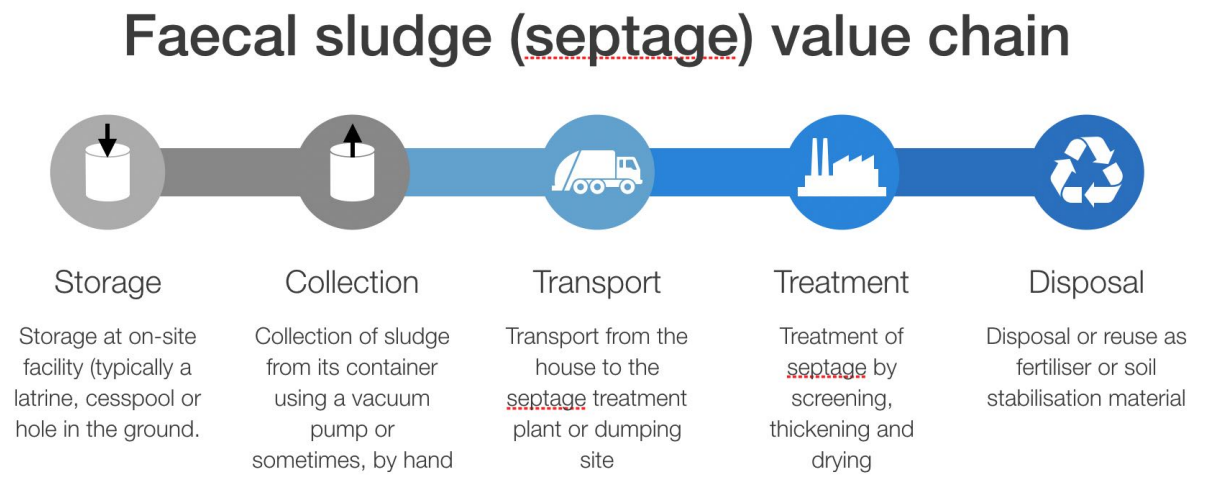
Australian Government
Department of Foreign Affairs and Trade

ADB

This brief outlines the results and lessons learnt from the preparation and execution of a city-wide survey to support the development of a Septage Management Plan in the City of Jambi, Sumatra, Indonesia. The document has been prepared by the Capacity Development Technical Assistance (CDTA) project, which has been funded by the Sustainable Infrastructure Assistance Program (SIAP) with financing by DFAT, administered by ADB. The CDTA is to support long-term sustainability of the Metropolitan Sanitation Management Investment Programme (MSMIP) loan 43251-025.
The survey itself was financed by the Water Financing Partnership Facility (WFPF).

RATIONALE AND KEY FEATURES

One of the fundamental vulnerabilities in the urban sanitation value chain is the lack of reliable and accurate data on which base policy, financing and operational decisions. In the case of faecal sludge (referred to as “septage”), the uncertainty is greater that in centralised wastewater systems because of the disaggregation and disparity of on-site facilities and user perceptions and habits.



With this in mind, the CDTA project team carried out a detailed survey of more than 40,000 households (equivalent to an estimated population of 185,000 inhabitants, i.e. approximately one-third of the total population of the city) in Jambi, Indonesia. The objective is to collect sufficient data to form the basis for the city’s Septage Management Plan.

The survey is one of the first of its kind in Indonesia and hopes to establish a model for future surveys in Jambi and other Indonesian cities to support the strategies and decision-making in integrated urban wastewater management. The work was carried out from the beginning of December 2017 to the end of February 2018 and involved the mobilisation of more than 400 people who were trained about the purpose, importance and specific tasks of the survey.

40,123	21	400
Households surveyed (one-third of the city)	Survey coordinators, one for each neighbourhood	Local surveyors, most of them neighbours

BACKGROUND

The Asian Development Bank (ADB) is implementing the INO 43251-025 - Metropolitan Sanitation Management Investment Project (MSMIP) to provide centralized (or off-site) sewerage and wastewater treatment facilities within the central districts of the cities of Jambi (Jambi Province), Makassar (South Sulawesi Province) and Pekanbaru (Riau Province) through a $200 million loan. Similar investments in Palembang (South Sumatra Province), also included in the MSMIP, will be financed through a separate grant from the Australian Government.

The new centralized off-site sewerage systems will not be available for more than 10% of the population in this first stage. This means that on-site systems and septage management will remain the predominant method of sanitation for many decades in Jambi and elsewhere in Indonesia. Therefore, it is of crucial importance to regulate and develop appropriate on-site wastewater management septage collection and treatment practices at the local government level.

As a first step, it was proposed to produce a Septage Management Plan for the City of Jambi as a decision-support tool, which could then serve as a model for the rest of the MSMIP target cities and elsewhere in Indonesia. This approach offers the advantage of improving the knowledge on on-site sanitation systems and their management, enabling Service Delivery Organisations (SDOs) to operate and maintain the overall sanitation system and ensure the recovery of all operational costs.

On-site systems and septage management will remain the predominant method of sanitation for many decades in Jambi and elsewhere in Indonesia.

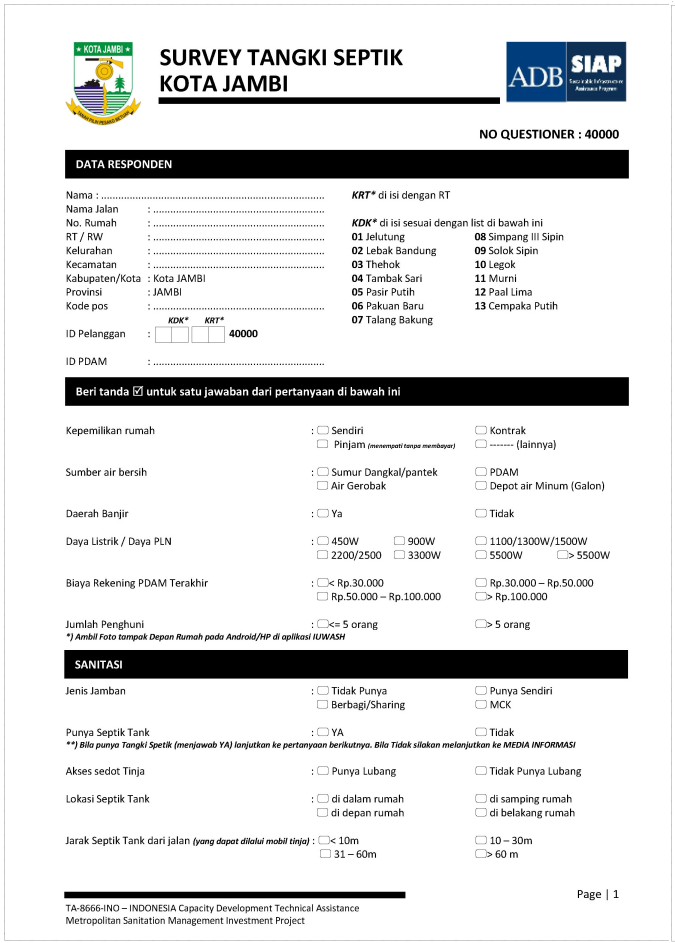
The plan, one of the first of its kind in Indonesia, includes provisions for the establishment of scheduled desludging of septic tanks, in line with the policy of the Ministry of Public Works and Housing (MPWH). The task is financed with funds available from the Water Financing Partnership Facility (WFPF).

The first ingredient needed for septage management is reliable data. The first task in the plan was a detailed census of the existing on-site facilities at more than 40,000 households, roughly one-third of the City.

The first task proposed for the development of the SMP was a detailed census of the existing on-site facilities throughout a representative area of the city. Consequently, a survey of 40,123 households (or 200,000 beneficiaries approximately) was carried out, covering roughly one-third of the City.

DATA COLLECTION

- Name and full address details
- Internal identification code
- Property ownership status
- Source of the drinking water in the house
- Type of building: residential, commercial, government, etc.
- Flood risk area status
- Type of sanitation facility
- Accessibility of septic tank for inspection
- Location of tank in the house
- Distance from tank to the street
- Width of the street
- Type of wastewater going into the tank
- Material of the septic tank
- Number of tanks in the house
- Age of the tank
- Size of the tank
- Point of discharge of the tank effluent
- Has the tank ever been desludged?
- Time since last desludging
- Form of payment for the last desludging
- Fee paid for desludging
- Interest in owning a septic tank, if not already?
- Geographical coordinates of tank, measured with GPS device in situ
- Date of the interview



SURVEY TANGKI SEPTIK KOTA JAMBI

NO QUESTIONER : 40000

DATA RESPONDEN

Nama : .....
Nama Jalan : .....
No. Rumah : .....
RT / RW : .....
Kelurahan : .....
Kecamatan : .....
Kabupaten/Kota : Kota JAMBI
Provinsi : JAMBI
Kode pos : .....

*KRT** di isi dengan RT

*KDK** di isi sesuai dengan list di bawah ini

01 Jelutung **02** Lebak Bandung **03** Thehok **04** Tambak Sari **05** Pasir Putih **06** Pakuan Baru **07** Talang Bakung **08** Simpang III Sipin **09** Solok Sipin **10** Legok **11** Murni **12** Paal Lima **13** Cempaka Putih

ID Pelanggan : KDK* KRT* 40000

ID PDAM : .....

Beri tanda ☑ untuk satu jawaban dari pertanyaan di bawah ini

Kepemilikan rumah : ☐ Sendiri ☐ Pinjam *(menempati tanpa membayar)* ☐ Kontrak ☐ ------ (lainnya)

Sumber air bersih : ☐ Sumur Dangkal/pantek ☐ Air Gerobak ☐ PDAM ☐ Depot air Minum (Galon)

Daerah Banjir : ☐ Ya ☐ Tidak

Daya Listrik / Daya PLN : ☐ 450W ☐ 900W ☐ 1100/1300W/1500W ☐ 2200/2500 ☐ 3300W ☐ 5500W ☐ > 5500W

Biaya Rekening PDAM Terakhir : ☐ < Rp.30.000 ☐ Rp.30.000 – Rp.50.000 ☐ Rp.50.000 – Rp.100.000 ☐ > Rp.100.000

Jumlah Penghuni : ☐ <= 5 orang ☐ > 5 orang

**) Ambil Foto tampak Depan Rumah pada Android/HP di aplikasi IUWASH*

SANITASI

Jenis Jamban : ☐ Tidak Punya ☐ Berbagi/Sharing ☐ Punya Sendiri ☐ MCK

Punya Septik Tank : ☐ YA ☐ Tidak

***) Bila punya Tangki Spetik (menjawab YA) lanjutkan ke pertanyaan berikutnya. Bila Tidak silakan melanjutkan ke MEDIA INFORMASI*

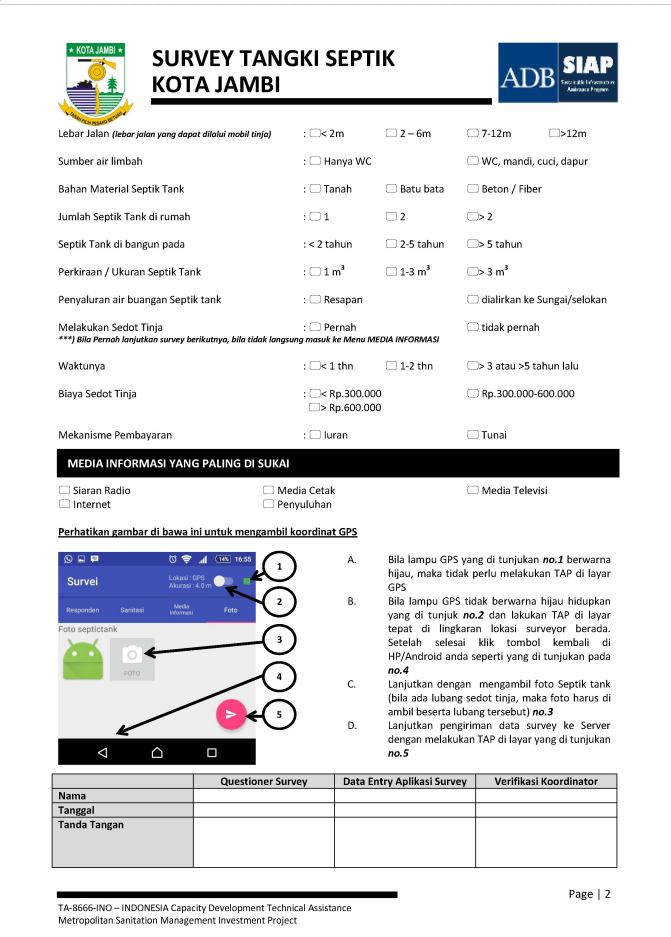
Akses sedot Tinja : ☐ Punya Lubang ☐ Tidak Punya Lubang

Lokasi Septik Tank : ☐ di dalam rumah ☐ di depan rumah ☐ di samping rumah ☐ di belakang rumah

Jarak Septik Tank dari jalan *(yang dapat dilalui mobil tinja)* : ☐ < 10m ☐ 31 – 60m ☐ 10 – 30m ☐ > 60 m

Page | 1

TA-8666-INO – INDONESIA Capacity Development Technical Assistance
Metropolitan Sanitation Management Investment Project



SURVEY TANGKI SEPTIK KOTA JAMBI

Lebar Jalan *(lebar jalan yang dapat dilalui mobil tinja)* : ☐ < 2m ☐ 2 – 6m ☐ 7-12m ☐ >12m

Sumber air limbah : ☐ Hanya WC ☐ WC, mandi, cuci, dapur

Bahan Material Septik Tank : ☐ Tanah ☐ Batu bata ☐ Beton / Fiber

Jumlah Septik Tank di rumah : ☐ 1 ☐ 2 ☐ > 2

Septik Tank di bangun pada : ☐ < 2 tahun ☐ 2-5 tahun ☐ > 5 tahun

Perkiraan / Ukuran Septik Tank : ☐ 1 m^3 ☐ 1-3 m^3 ☐ > 3 m^3

Penyaluran air buangan Septik tank : ☐ Resapan ☐ dialirkan ke Sungai/selokan

Melakukan Sedot Tinja : ☐ Pernah ☐ tidak pernah

****) Bila Pernah lanjutkan survey berikutnya, bila tidak langsung masuk ke Menu MEDIA INFORMASI*

Waktunya : ☐ < 1 thn ☐ 1-2 thn ☐ > 3 atau >5 tahun lalu

Biaya Sedot Tinja : ☐ < Rp.300.000 ☐ > Rp.600.000 ☐ Rp.300.000-600.000

Mekanisme Pembayaran : ☐ Iuran ☐ Tunai

MEDIA INFORMASI YANG PALING DI SUKAI

☐ Siaran Radio ☐ Internet ☐ Media Cetak ☐ Penyuluhan ☐ Media Televisi

Perhatikan gambar di bawa ini untuk mengambil koordinat GPS

A. Bila lampu GPS yang di tunjukan ***no.1*** berwarna hijau, maka tidak perlu melakukan TAP di layar GPS

B. Bila lampu GPS tidak berwarna hijau hidupkan yang di tunjuk ***no.2*** dan lakukan TAP di layar tepat di lingkaran lokasi surveyor berada. Setelah selesai klik tombol kembali di HP/Android anda seperti yang di tunjukan pada ***no.4***

C. Lanjutkan dengan mengambil foto Septik tank (bila ada lubang sedot tinja, maka foto harus di ambil beserta lubang tersebut) ***no.3***

D. Lanjutkan pengiriman data survey ke Server dengan melakukan TAP di layar yang di tunjukan ***no.5***

	Questioner Survey	Data Entry Aplikasi Survey	Verifikasi Koordinator
Nama			
Tanggal			
Tanda Tangan			

Page | 2

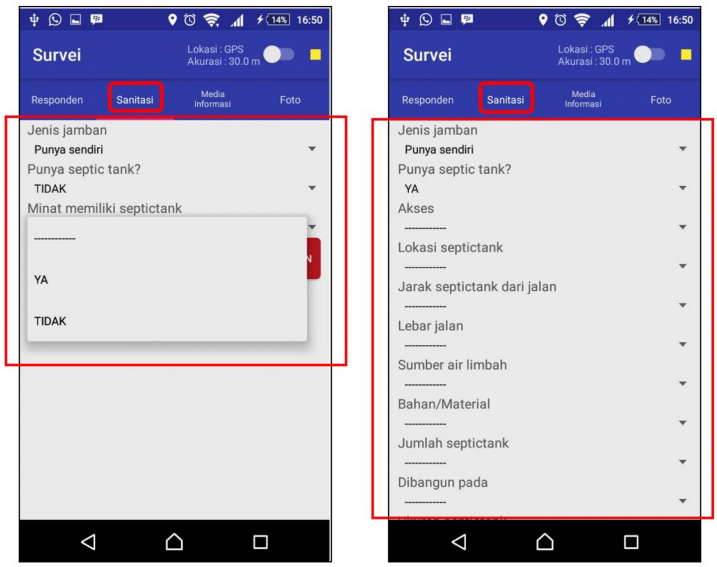
TA-8666-INO – INDONESIA Capacity Development Technical Assistance
Metropolitan Sanitation Management Investment Project

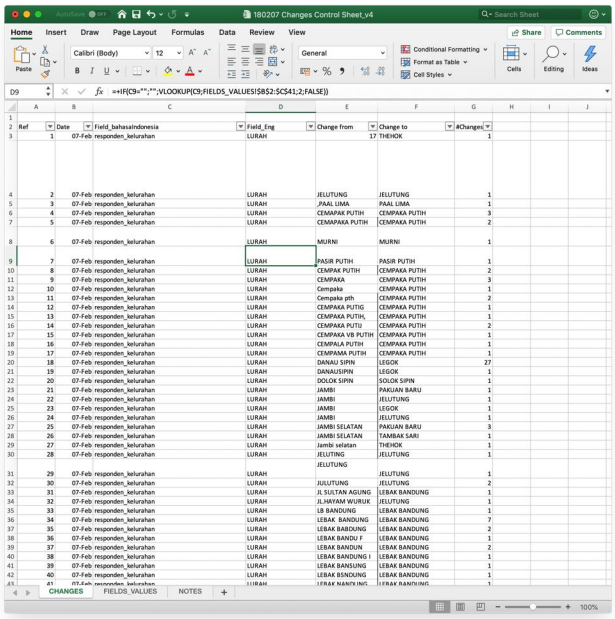
A comprehensive form was designed for the collection of data regarding physical, economic and technical features of the on-site sanitation facilities and their households.

SURVEY TOOLS

Smartphone App

The surveyors used an Android mobile phone application to record the answers given by the respondents, including the recording of GPS position. The application used was originally developed and tested by IUWASH in Surakarta and Bandung as part of recent projects and was consequently adapted specifically to the needs of the Jambi SMP survey in a collaboration exercise. The record of each property and septic tank surveyed included two pictures taken with the camera of the mobile phone used.





Data cleaning and validation

After the database was fully populated with the 40,123 records, the data were exported onto a spreadsheet and processed for error-checking, integrity and standard formatting, for example:

- Allocation of unique IDs to each record to allow for tracking of changes and correlation with the original survey data
- Correction of upper/lower case differences in the text input
- Correction of spelling of street names of district names.
- Standardisation of the answers

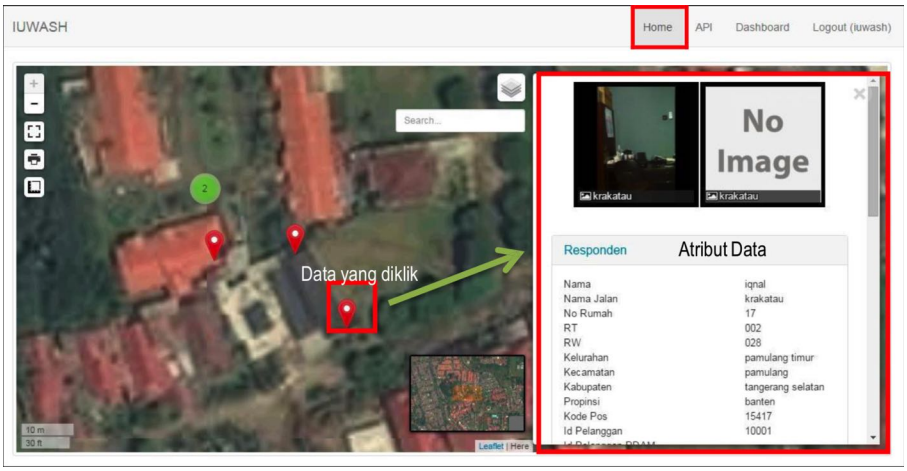
Approximately 1,100 records were found to have incorrect GPS coordinates, due to lack of mobile phone signal at the moment that the GPS position was recorded by the surveyor. These records were been processed individually and geographically located based on the address and other data provided.

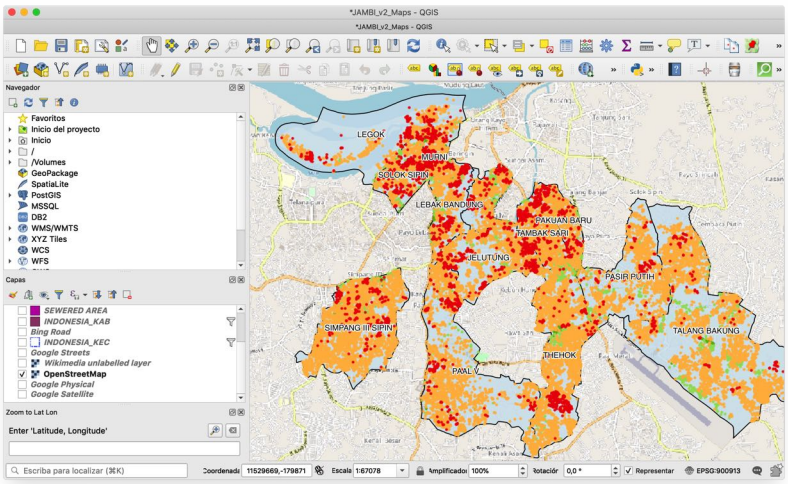
The result of the data cleansing exercise was a coherent set of data that allows for systematic, computerised analysis.

Survey Database

The data obtained by the surveyors and validated were uploaded to a database hosted on a server that was managed by the CDTA consultant and accessible via web-based portal -also formerly developed by IUWASH- for consultation and processing. Overall, the database contains 40,123 records with 42 properties each record, i.e. approximately 1.68 million data items.

The data server has different user categories with distinct access, read and write rights. It also allows for editing of data (by high-level users) and exporting of selected records.





GIS Tool

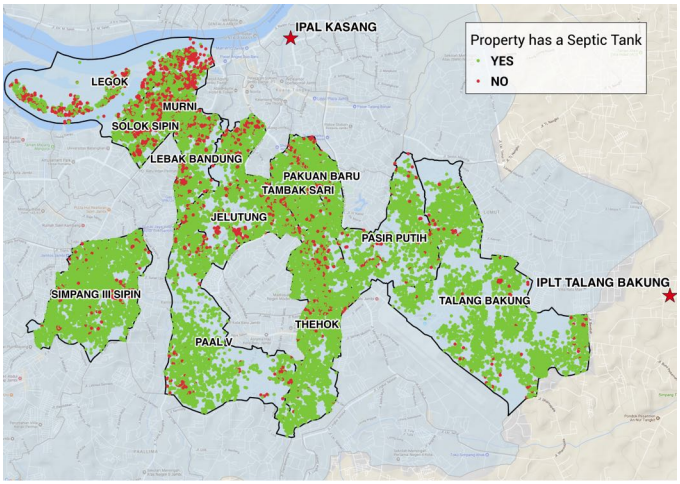
The processed data were input to a geographical information system (GIS) using the open-source client application QGIS for visual and spatial analysis. The use of spatial data visualisation was a fundamental aid for understanding and conveying a number of important insights about the existing condition of on-site sanitation facilities in the city. Furthermore, QGIS is a professional GIS application that is built on top of Free and Open Source Software (FOSS). The file formats operated by QGIS and used by the CDTA team in the context of the survey and the Jambi SMP are 100% compatible and interoperable with the majority of the free and proprietary GIS software.

The use of spatial data visualisation was a fundamental aid for understanding and conveying a number of insights about the existing condition of on-site sanitation facilities in the city.

RESULT EXAMPLES

Existence of Sanitation Facilities

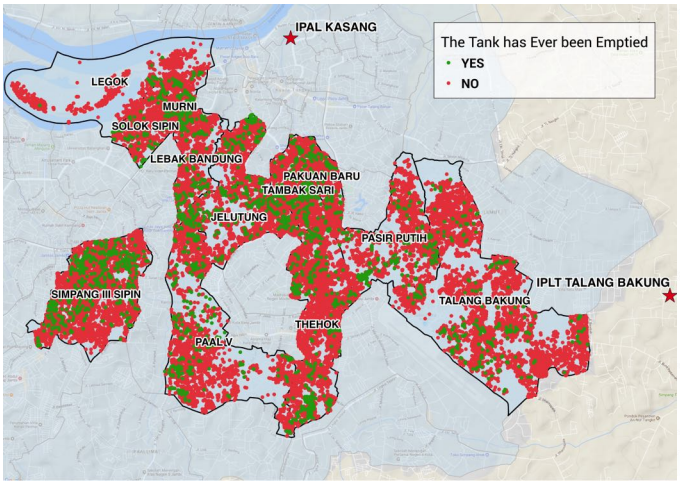
Nearly 90% of the households in the area surveyed declared to have some form of on-site sanitation facility, i.e. a septic tank, a communal tank or a pit.



DOES THE PROPERTY HAVE A SEPTIC TANK?		
DISTRICT/SUB-DISTRICT	**NO**	**YES**
DANAU SIPIN		
LEGOK	42,4%	57,6%
MURNI	22,4%	77,6%
SOLOK SIPIN	24,5%	75,5%
JAMBI SELATAN		
PAKUAN BARU	9,6%	90,4%
PASIR PUTIH	4,6%	95,4%
TAMBAK SARI	8,4%	91,6%
THEHOK	7,5%	92,5%
JELUTUNG		
CEMPAKA PUTIH	12,5%	87,5%
JELUTUNG	12,4%	87,6%
LEBAK BANDUNG	18,9%	81,1%
KOTA BARU		
PAAL LIMA	5,3%	94,7%
SIMPANG III SIPIN	4,1%	95,9%
PAAL MERAH		
TALANG BAKUNG	2,0%	98,0%
TOTAL	**11,2%**	**88,8%**

Emptying of Facilities

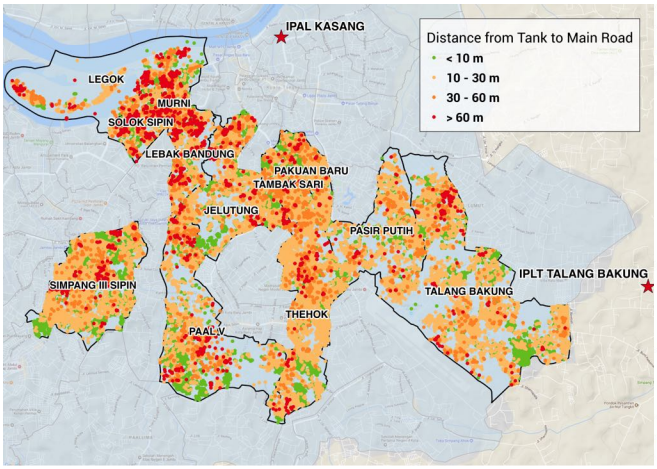
The vast majority of them (93%) have never been emptied. Of those that have been, the majority belong to government buildings (15%). This means that actually very few domestic septic tanks (< 5%) are ever emptied.



HAS THE TANK EVER BEEN DESLUDGED?		
DISTRICT/SUB-DISTRICT	**YES**	**NO**
DANAU SIPIN		
LEGOK	2,7%	97,3%
MURNI	10,9%	89,1%
SOLOK SIPIN	5,9%	94,1%
JAMBI SELATAN		
PAKUAN BARU	8,2%	91,8%
PASIR PUTIH	8,5%	91,5%
TAMBAK SARI	8,5%	91,5%
THEHOK	7,7%	92,3%
JELUTUNG		
CEMPAKA PUTIH	9,4%	90,6%
JELUTUNG	9,1%	90,9%
LEBAK BANDUNG	7,2%	92,8%
KOTA BARU		
PAAL LIMA	8,6%	91,4%
SIMPANG III SIPIN	8,3%	91,7%
PAAL MERAH		
TALANG BAKUNG	4,0%	96,0%
TOTAL	**7,3%**	**92,7%**

Distance from the Road to the Facility

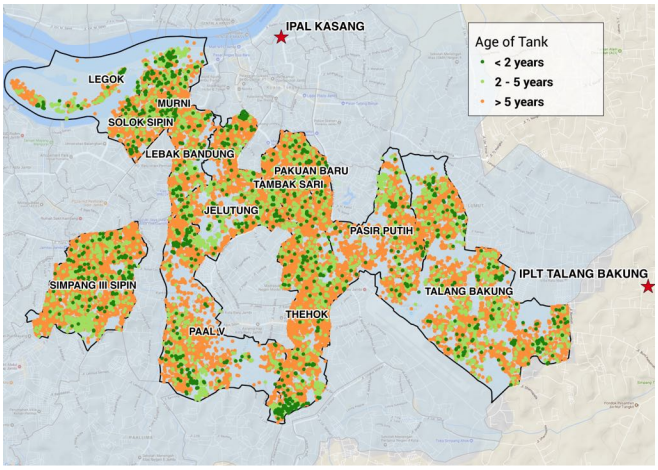
The majority of septic tanks (85%) are located at a distance of less than 30 m to the streets. Many of these streets are narrow lanes (less than 2 m) in the interior of large blocks delimited by the main city avenues, without proper access for the vacuum trucks. This is an important obstacle to septic tank desludging, which would require appropriate equipment.



DISTANCE FROM THE TANK TO THE ROAD				
DISTRICT/SUB-DISTRICT	**< 10m**	**10 - 30m**	**30 - 60m**	**> 60m**
DANAU SIPIN				
LEGOK	26,0%	41,0%	16,7%	16,3%
MURNI	22,1%	52,4%	17,2%	8,2%
SOLOK SIPIN	26,6%	48,1%	14,7%	10,6%
JAMBI SELATAN				
PAKUAN BARU	33,4%	55,8%	8,1%	2,6%
PASIR PUTIH	26,3%	61,9%	10,4%	1,4%
TAMBAK SARI	25,9%	57,9%	14,4%	1,8%
THEHOK	24,4%	66,9%	6,8%	1,9%
JELUTUNG				
CEMPAKA PUTIH	22,6%	51,7%	13,5%	12,2%
JELUTUNG	38,1%	53,1%	5,8%	3,0%
LEBAK BANDUNG	21,9%	46,9%	17,9%	13,3%
KOTA BARU				
PAAL LIMA	40,7%	43,2%	11,2%	4,9%
SIMPANG III SIPIN	40,0%	49,2%	7,4%	3,4%
PAAL MERAH				
TALANG BAKUNG	34,1%	56,4%	7,1%	2,4%
TOTAL	**31,3%**	**54,0%**	**10,0%**	**4,8%**

Age of Facilities

Most septic tanks (82%) are older than 5 years. Together with the fact mentioned above that the vast majority have never been emptied, makes for a strong case for both the emptying and the renovation of many of these tanks.

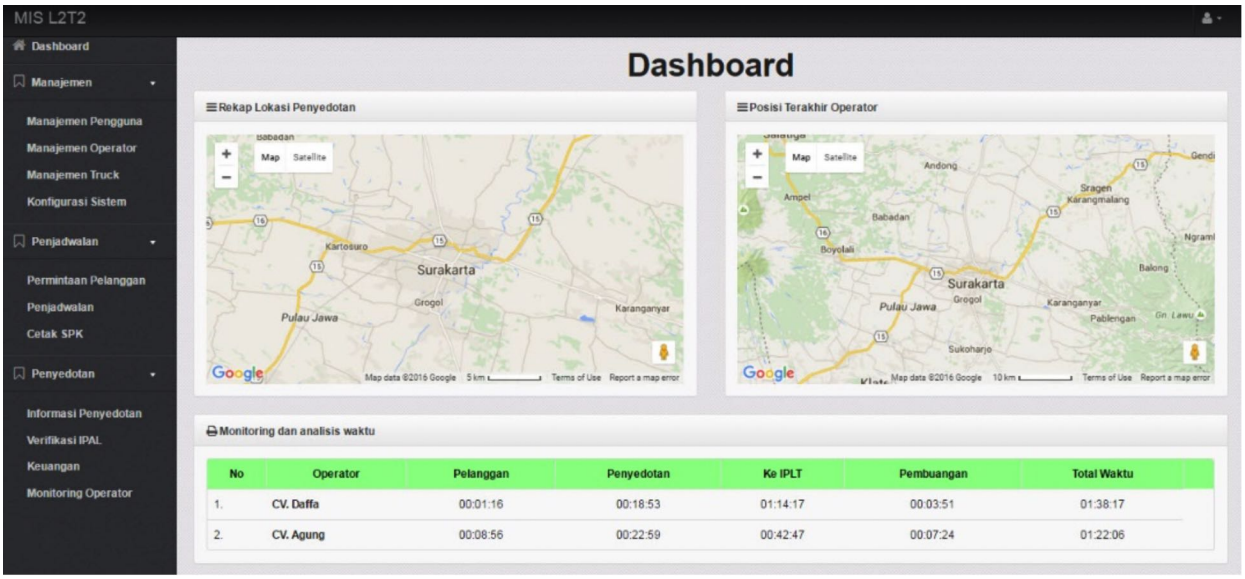


TANK AGE			
DISTRICT/SUB-DISTRICT	**< 2 Years**	**2 - 5 Years**	**> 5 Years**
DANAU SIPIN			
LEGOK	8,0%	25,4%	66,6%
MURNI	4,0%	6,9%	89,1%
SOLOK SIPIN	3,8%	12,5%	83,7%
JAMBI SELATAN			
PAKUAN BARU	3,5%	10,7%	85,7%
PASIR PUTIH	3,0%	11,1%	85,9%
TAMBAK SARI	1,6%	9,0%	89,4%
THEHOK	3,9%	13,4%	82,7%
JELUTUNG			
CEMPAKA PUTIH	7,4%	5,9%	86,6%
JELUTUNG	3,2%	17,8%	79,0%
LEBAK BANDUNG	3,0%	13,0%	84,0%
KOTA BARU			
PAAL LIMA	5,9%	13,8%	80,3%
SIMPANG III SIPIN	2,7%	14,4%	82,9%
PAAL MERAH			
TALANG BAKUNG	4,3%	16,0%	79,6%
TOTAL	**4,0%**	**13,9%**	**82,2%**

USE OF THE SURVEY DATA

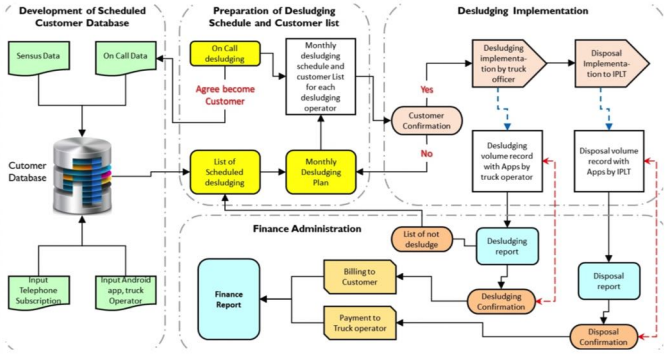
The processed survey data is, in itself, valuable for a first round of analysis and extraction of insights about the existing condition of sanitation facilities. However, the most valuable application is through its use on a management information system (MIS). The CDTA project developed such a MIS based on previous models by and with the assistance of IUWASH. The City Government of Jambi will use this system to complete the survey and implement the Septage Management Plan, allowing the local office to:

- Build and manage customer databases
- Prepare the septic tank desludging schedules
- Send instructions to the truck operators
- Supervise & Monitor the desludging process
- Analyse desludging reports
- Financial management: payment registration, billing and accounting.



The web-based Portal application is used to manage the implementation process of customer desludging services as well as disposal of sludge at the IPLT. Features available in the web-based Portal application are: development of customer database, desludging truck operator database, work order system and accounting systems. This application can also be used to monitor truck movement by displaying it with maps on the application dashboard.

The MIS utilises Geographic Information System (GIS) technology that records the location of customers, the treatment plant and the vacuum truck through GPS devices. The truck routes can be planned, optimised and executed based on requests by the customers or mandatory, planned schedules. It also helps reinforce compliance.



KEY LESSONS LEARNT

01

Plan for data gaps and errors

The results of the survey were satisfactory in terms of i) how the survey was planned and executed, and ii) the consistency and sufficiency of the data for its purpose and considering the scale of the exercise. However, there are errors and gaps that need to be planned for. For instance: data about fees paid for either water supply or previous desludging services (necessary for the calculation of the willingness to pay) are very difficult to acquire. Also, some devices will fail to record the GPS coordinates at a certain point, so it is useful to have backup measures.

02

Fully engage the local people

The surveyors were all neighbours of the districts covered, as were the coordinators responsible for training and supervising the surveyors. The local leaders played a decisive role in encouraging the neighbours to participate, by actively learning the importance of the exercise first and later promoting it among the people who would ultimately respond to the questionnaires. This engagement has proven essential in creating a feeling of legitimacy among the people, who in most cases took part actively because they perceived the exercise will bring a genuine benefit to their lives.

03

Collaborate. Leverage on previous work

Some of the core tools used in the survey are adaptations of tools developed and used by IUWASH in previous projects in Indonesia, namely Surakarta and Bandung. They had already been developed and tested precisely for the same problem, and it was a matter of approaching the institutions involved and agreeing a collaborative effort. The Jambi project gained not only in efficiency, but also from building on previous knowledge. IUWASH will also be able to test their tools in further environments. This collaboration has proven essential in the outcome and will continue to be so in the implementation stages.

04

Dream big, act practical

The survey, unique in its kind and scale in Indonesia, was possible because of an innovative and bold approach that combines technology adapted ad-hoc, team building and collaboration, use of open source and free software, and governance mechanisms designed specifically for the purpose. The use of spatial data visualisation was a fundamental aid for turning large volumes of data into useful information, and for conveying important ideas to the local decision makers. Training has been a core element in the planning and execution of the survey: all coordinators were trained before the surveyors were. Training covered not only the tasks related to the tools and questionnaires, but also collaboration and coordination aspects.