

# Understanding problems associated with small-scale Private Sewage Systems (PSS) from regulators' perspectives

## Appendices





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Ioanna Akoumianaki and Adekunle Ibiyemi

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**Authors:** Ioanna Akoumianaki<sup>1</sup> and Adekunle Ibiyemi<sup>1</sup>

<sup>1</sup>James Hutton Institute, Craigiebuckler, Aberdeen, AB15 8QH

**Project specification development and management/Method development/Workshop facilitation:**

Ioanna Akoumianaki

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# APPENDIX I.

## I.1 Processing PSS modelled locations

By Ade Ibiyemi

### Spatial data used

Septic tank address base dataset given by Scottish Environment Protection Agency (SEPA) [1] is the main dataset used to identify locations of septic tanks. The other datasets used are waterbody rivers, boundary line high water (coastline), catchments of waterbody, bathing and shellfish area. A 100 by 100 metres grid dataset was created for use with these data. ESRI ArcGIS was used to process spatial data whilst scripts written with Python programming language were used for data analysis and for generating spreadsheet outputs.

### Spatial data processing and outputs

Septic tank address base dataset has duplicates and it is considered these locations with duplicates depict multiple households in each location. The data, therefore, was reprocessed to get a unique address per location and number of associated duplicates assigned to a new column as number of households per location. Analysis of the data is shown in the spreadsheet produced from the spatial dataset output [2,3].

The hectare (100 x 100 m) grid dataset created was overlaid with processed septic tank locations and total households summed for each grid to hold total household per grid for the output dataset. The number of septic tanks (septic tanks cluster) that makes up the total household number was also created. Furthermore, catchments, coastline and Scotland local authority (LA) datasets were overlaid with the grid dataset. The centroid of each grid dataset was generated and converted into points. The nearest distance (metres) from these points to the waterbody rivers and coastlines datasets were generated and joined with the grid datasets [4,5].

Waterbody catchments were grouped by identification number, indexed by total households in a grid, tabulated by nearest distance to waterbody rivers and to coastline by classes, summed by number of septic tank location and then pivoted or cross tabulated. This process was similarly done for bathing water and shellfish areas catchments [6]. Finally, analysis of distances from the grid centroid with maximum total households for catchments datasets were produced [7].

1. Metadata: Septic Tanks MMap Addressbase Plus.rtf
2. Spatial dataset: Septic\_tank\_locations\_by\_households
3. Spreadsheet: Septic\_tank\_locations\_by\_households.xlsx
4. Spatial dataset: Septic\_tank\_locations\_by\_Ha\_grids
5. Spreadsheet: Septic\_tank\_locations\_by\_Ha\_grids.xlsx
6. Spreadsheet: Sreas\_households\_NDist\_RiversandCoastline\_analysis\_SQHA\_data.xlsx
7. Spreadsheet: NearestDistaneToWaterbodies\_SA\_BW\_analysis\_bymaxlocation\_SQHA\_data.xlsx

The shapefile linking PSS locations with the processed information, waterbodies and waterbody status and Scotland's soil maps (<https://soils.environment.gov.scot/>) is available to SEPA upon request.

## I.2 Qualitative research – Workshops

The approach to collecting evidence focused on understanding how SEPA and LA staff that participated at the workshops experience and identify problems and regulatory weaknesses, and how they interpret barriers to PSS improvements. The workshops were facilitated by the first author of this report. The workshop discussions were structured around questionnaires which were developed based on current regulatory practices on PSS (APPENDIX II.5) agreed with the Project Steering Group.

Qualitative evidence statements referring to their observations, experiences and interpretations of problems as stated during the workshop discussions, were recorded. These statements formed the qualitative evidence base. This evidence is

summarised here. The intention is to store this evidence for a later thorough evaluation in a future project.

The project complied with General Data Protection Regulation (GDPR) and James Hutton Institute's rules on Research Ethics for Human Participants. All attendees provided signed consent to their voluntary participation in the workshops.

## APPENDIX II. Questions

Each questionnaire provided information on the purpose of each workshop and questions (APPENDIX 1.-3), terms of reference (APPENDIX II. 4) and relevant regulations (APPENDIX II. 5). The three questionnaires are presented below.

### II.1 CREW project CWR2020\_07: "Problems associated with small-scale private sewage systems (PSS) in Scotland and options to prevent and resolve these problems" – Questionnaire 1

#### What is this about?

This is a set of questions developed to help identify the small-scale PSS-related problems and their causes as part of the project objective:

"The CREW Project Team should hold workshops to identify the problems SEPA and local authorities face with small-scale PSS and the barriers to their resolution."

List of questions to help identify the small-scale PSS-related problems and their causes

1. How many complaints related to PSS does your team/department/local office get a month?
2. Is the frequency of small-scale PSS-related complaints related to specific occasions/events?
3. List the PSS-related issues reported in complaints based on complainants' descriptions: What is the most common, e.g., odour, ponding, discharges to watercourses etc.?
4. List the PSS-related issues reported based on officers' inspections following complaints: What is the most common? Are they similar to the issues described in the complaints submitted?
5. Where exactly in each LA/catchment do PSS-related issues (based on complainants' descriptions and/or officers' inspections) refer to?
6. Who are the complainants, e.g., permanent residents of an area, tourists/visitors or else?
7. Do complainants mention PSS-related impacts in complaints? What is the most common impact?
8. What are the major technical PSS failures/problems detected during inspections from officers following complaints?
9. What are the key reasons that led to the technical problems identified during the inspections that were performed to address complaints?

### II.2 CREW project CWR2020\_07: "Problems associated with small-scale private sewage systems (PSS) in Scotland and options to prevent and resolve these problems" – Questionnaire 2

#### What is this about?

This is a set of questions developed to help identify weaknesses in the small-scale PSS-related regulatory practice as part of the project objective:

*"The CREW Project Team should hold workshops to identify the problems SEPA and local authorities face with small-scale PSS and the barriers to their resolution."*

List of questions to help identify the weaknesses in the small-scale PSS-related regulatory practice

1. Steps followed by Regulatory Authorities when responding to PSS-related complaints:
  - 1.1. Are the steps for taking action clearly described in the Regulations/other policy documents/websites?  
e.g., how LA Environmental Health Officers decide if there is statutory nuisance/public health risk from PSS; or how SEPA local officers decide if an incident has an environmental impact.

- 1.2. What are the key criteria for deciding what if any action (e.g., inspections, contacting PSS owners/complainants, serving abatement notices, investigating permission/authorisation, seeking collaboration between LAs and SEPA, or forcing owners to take action) is taken per case?
  - 1.3. Does the complaint submitted to LA/SEPA mention that the problem is PSS-related?  
If yes, is this information reliable?
  - 1.4. How soon after a potentially PSS-related complaint has been submitted do you respond?
  - 1.5. Are there any procedural "grey areas", e.g., is it always clear who within your organisation is responsible, what needs to be done, or who is the offender?
  - 1.6. Do you liaise with/provide advice to/financially support complainants and offenders to facilitate resolution of the problem?
  - 1.7. Do you address all PSS-related complaints? What happens when a PSS-related complaint is out with your organisations' remit, e.g., do you inform the complainant what to do? What do you do to stop complaints from "falling through the cracks"?
  - 1.8. Do you have in mind a case of complaint that was resolved after inspection and identification of the cause ("success story")? What helped, what worked?
  - 1.9. Do you have in mind a case of complaint that couldn't be resolved? What didn't work and why?
2. Planning permission process (incl. both new building, extensions, change of use, upgrades etc):
    - 2.1. Is the same process/framework applied across all local authorities/SEPA's local offices?
    - 2.2. Is the same procedure applied for new buildings, extensions, change of use, upgrades (for properties served by PSS)?
    - 2.3. What factors influence the assessment of applications for properties served by PSS? Are factors such as PSS impact on the environment, proximity to the public sewerage services, or consultation process taken into account?  
If not, why not?
    - 2.4. List/discuss weaknesses of the procedures involved in assessing/processing planning applications, the planning consultation process, the criteria for granting planning permissions to properties served by PSS and post-approval compliance (enforcement). What is the key weakness?
    - 2.5. Are there any notable legal loopholes in the framework for granting planning permission for properties served by PSS that may increase risk to the environment/neighbours?
    - 2.6. What is the role of developers in the process (in the context of PSS, sharing vs connections on the mains or public septic tanks)? Is their role consistent with the Regulations and environmental goals?
    - 2.7. Do Regulatory Authorities liaise with/contact applicants' pre-approval to raise awareness about e.g., PSS management/maintenance, alternative options (e.g., reedbeds), PSS carbon footprint, potential for sharing with neighbours or connection on the mains?
    - 2.8. Do Regulatory Authorities contact applicants/visit sites post-approval to check compliance with the planning permission? If not, why not?
    - 2.9. Do you have in mind a case whereby the process followed led to granting planning permission to buildings served by PSS despite close proximity to the mains or environmental risk? Is this rare?
  3. Processing of applications for building warrant (when the new building is served by PSS and in case of any change in drainage, e.g., changing from using a septic tank to public sewer or vice versa)
    - 3.1. Is the same process/framework applied across all LAs?
    - 3.2. What factors influence the assessment of applications for buildings served by PSS? Are factors such as density of PSS in an area, PSS carbon footprint, wider drainage/landscaping in a neighbourhood or proximity to SW sewerage network taken into account?
    - 3.3. Does the Building Standards Register mention the type of drainage/PSS proposed?



- 3.4. What is the most common type of PSS in applications for building warrant?
  - 3.5. List/discuss weaknesses of the procedures involved in assessing/processing applications for properties served by PSS. What is the key weakness?
  - 3.6. What is the role of PSS suppliers, approved certifiers/assessors in ensuring the quality and suitability of PSS and soakaway installation and design/ensuring connections on the mains where these are possible?
4. Procedures following approval of application for building warrant in buildings served by PSS, incl. Inspections of building work on-site and checks on compliance with building regulations (enforcement).
    - 4.1. Is the same process/framework applied across all LAs?
    - 4.2. List/discuss weaknesses of the procedures involved.
    - 4.3. What is the role of PSS suppliers, approved certifiers/assessors in ensuring the quality and suitability of PSS and soakaway installation/ensuring connections on the mains where these are possible?
    - 4.4. Do Regulatory Authorities liaise with/contact applicants' post-approval to raise awareness about e.g., PSS management/maintenance, potential upgrades or any change?
5. Procedures related to selling or renting a property served by a PSS.
    - 5.1. How are Regulatory Authorities involved in these processes?
    - 5.2. What are the key weaknesses?
    - 5.3. Can these procedures ensure compliance with the Regulations? If not, why not?
    - 5.4. An Energy Performance Certificate (EPC), a document which records the amount of carbon dioxide a building produces and also shows a building's energy efficiency, is submitted with the completion certificate and required when a property is constructed, sold or rented out. Are EPC assessors estimating emissions from PSS? If not, why not?
    - 5.5. Do Chartered Surveyors producing Home Reports contact LAs/SEPA and do they include sufficient information on the type and state of the PSS?
6. List key procedures involved in SEPA registration/licensing process (regulatory perspective). What are the key weaknesses?
7. How do Regulatory Authorities detect/become aware of PSS-related problems before these problems lead to complaints or environmental degradation/statutory nuisance? Is there a regulatory mechanism or procedure allowing for early and timely detection of problems caused by breaching building, planning and environmental/nuisance regulations and PSS-related management and maintenance guidance (e.g., as in NetRegs)?
8. Can you identify any problems with the PSS-related Regulations, e.g., need for updates, clarification, adjustments for new evidence/needs, requiring follow-up inspections for compliance etc.?  
Can you report specific examples for each problem?

## II.3 CREW project CWR2020\_07: “Problems associated with small-scale private sewage systems (PSS) in Scotland and options to prevent and resolve these problems” – Questionnaire 3

### What is this about?

This is a set of questions developed to help identify barriers to implementing current regulations or improving/minimising PSS-related problems/weaknesses and their causes as part of the project objective:

*“The CREW Project Team should hold workshops to identify the problems SEPA and local authorities face with small-scale PSS and the barriers to their resolution.”*

List of questions to help identify barriers to implementing current regulations or improving/minimising PSS-related problems/regulatory weaknesses and their causes

1. Barriers related to data/evidence availability:
  - 1.1. Is there any readily available information or estimate on the number of existing domestic (households) properties served by PSS? If not, does the lack of information influence the effectiveness of PSS-related regulations and how?
  - 1.2. Is there a digital database/register (e.g., Building Standards Register) allowing for electronic interrogation of PSS characteristics, such as number of properties served/population equivalent, type of activity, type of development, location, date of building warrant, SEPA authorisation or type of sharing?
  - 1.3. Is there a register of complaints, e.g., statutory nuisance/water environment-problems?
  - 1.4. Is it easy to update, export and share with other public organisations (e.g., Improvement Service) and Regulatory Authorities available data, e.g., PSS locations from Council TAX lists of the properties that don't pay for Scottish Water sewerage, SEPA sewage registration/license locations, or locations and complaints related to PSS, or properties served by PSS recorded in the Building Standards Register? If not, why not?
  - 1.5. Is there a way to identify PSS owners/users' needs?
2. List/discuss barriers related to responding to PSS-related complaints
3. List/discuss barriers related to minimising weaknesses (identified in Workshop 1) of the processes involved in granting a planning permission for buildings served by PSS?
4. List/discuss barriers related to minimising weaknesses (identified in Workshop 1) of the processes involved in approving applications for buildings warrants and inspecting quality of building works in PSS-served buildings?
5. List/discuss barriers related to minimising weaknesses (identified in Workshop 1) of the processes involved in selling/renting PSS-served properties?
6. List/discuss barriers related to ensuring that PSS management and maintenance is fit-for purpose.
7. List/discuss barriers related to factoring in net-zero strategies in the PSS installation approval/authorisation/design – infrastructures.
8. List/discuss barriers related to factoring in extreme weather risk (ToC, runoff, groundwater flooding) in the planning process/the building regulations for PSS.
9. List/discuss barriers related to detecting PSS-related problems.
10. What is the greatest barrier in minimising PSS-related pressures?
11. What is the greatest barrier in minimising PSS-related statutory nuisance?

## II.4. Terms of reference

**Small-scale Private Sewage Systems (PSS):** Here the term includes all types of sewage treatment systems serving up to nine households that are not vested in Scottish Water, and includes septic tanks, package treatment plants, passive treatment systems (e.g., Reedbeds) and infiltration systems (i.e., soakaways).

**Regulatory practice:** A set of practices that are to be applied by the Competent Authorities (i.e., SEPA and local authorities) to the development, implementation and maintenance of controls—including laws, regulations and guidelines—in order to achieve objectives for small-scale PSS (see Section 4):

- Building Regulations
- Planning Regulations
- Environmental Regulations
- Statutory nuisance definition and responsibilities for local authorities:
- Owners' and local authorities' responsibilities and owners' rights
- Codes of Practice – Guidance

**PSS-related problems.** This includes discharges to the environment and statutory nuisance.

**PSS-related impacts.** This refers to the reasons that led complainants to submit PSS-related complaints and includes (not an exhaustive list): effects on everyday life, visitors, commercial/economic activity, public health, reputation and housing prices.

**Causes of small-scale PSS problems.** This includes:

- Technical causes incl. poor management/maintenance
- Breaching of terms of building/planning/environmental regulations
- Regulatory weaknesses
- Legal/social/financial/expertise/awareness barriers

**Regulatory Weaknesses:** Limitations in the regulatory practice that cause delays, confusion and misunderstandings.

**Barriers:** Factors, situations, or perceptions that make it difficult or impossible for regulatory authorities to implement current regulations, achieve their objectives or improve/minimise weaknesses.

## II.5 Regulatory practices relevant to the project

- Building Regulations
  - <https://www.legislation.gov.uk/ukpga/1990/43/part/II/2020-12-31>
  - <https://www.gov.scot/policies/building-standards/monitoring-improving-building-regulations/>
  - <https://www.gov.scot/publications/building-standards-technical-handbook-2020-domestic/>
- Standard 3.8: Private sewage water treatment – treatment plants
- Standard 3.9: Private sewage water treatment – infiltration systems
- Standard 3.12: Sanitary facilities
- Standard 3.26: Dungsteeds and farm effluent tanks
- Standard 3.27: Water efficiency
- Standard 6.9: Energy performance certificates
- Planning Regulations
  - <https://www.transformingplanning.scot/media/2244/planning-act-commencement-regulations-information-note-march-2021.pdf>
  - <https://www.mygov.scot/planning-permission>

- Environmental Regulations
  - o <https://www.legislation.gov.uk/asp/2013/5/2019-10-16>
  - o <https://www.sepa.org.uk/regulations/water/septic-tanks-and-private-sewage-treatment-systems/>
  - o <https://www.legislation.gov.uk/ssi/2011/209/contents/made>
- Statutory nuisance definition and responsibilities for local authorities:
  - o Environmental Protection Act 1990
  - o Public Health etc (Scotland) Act 2008
- Owners' and local authorities' responsibilities and Owners' rights
  - o <https://www.legislation.gov.uk/ukpga/1968/47>
- PART IIA: Shared PSS
- 12-17: Connecting to Scottish Water
- Codes of Practice – Guidance
  - o <https://www.britishwater.co.uk/news/news.asp?id=566678&hhSearchTerms=%22septic+and+tanks%22>
  - o <https://www.britishwater.co.uk/page/Publications>
  - o <https://www.netregs.org.uk/environmental-topics/water/trade-effluent-managing-liquid-wastes/using-septic-tanks-and-package-treatment-plants/>
  - o <https://www.citizensadvice.org.uk/scotland/consumer/water/water-and-sewerage-s/septic-tanks-s/>
  - o <https://www.nsf.org/standards-development/standards-portfolio/water-wastewater-standards>

# CREW CENTRE OF EXPERTISE FOR WATERS

**CREW Facilitation Team**

**Hydro Nation International Centre**

**James Hutton Institute**

**Craigiebuckler**

**Aberdeen AB15 8QH**

**Scotland UK**

**Tel: +44 (0)344 928 5428**

**Email: [enquiries@crew.ac.uk](mailto:enquiries@crew.ac.uk)**

**[www.crew.ac.uk](http://www.crew.ac.uk)**



**Hydro Nation  
International  
Centre**



The James  
**Hutton  
Institute**



**Scottish Government  
Riaghaltas na h-Alba  
[gov.scot](http://gov.scot)**

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