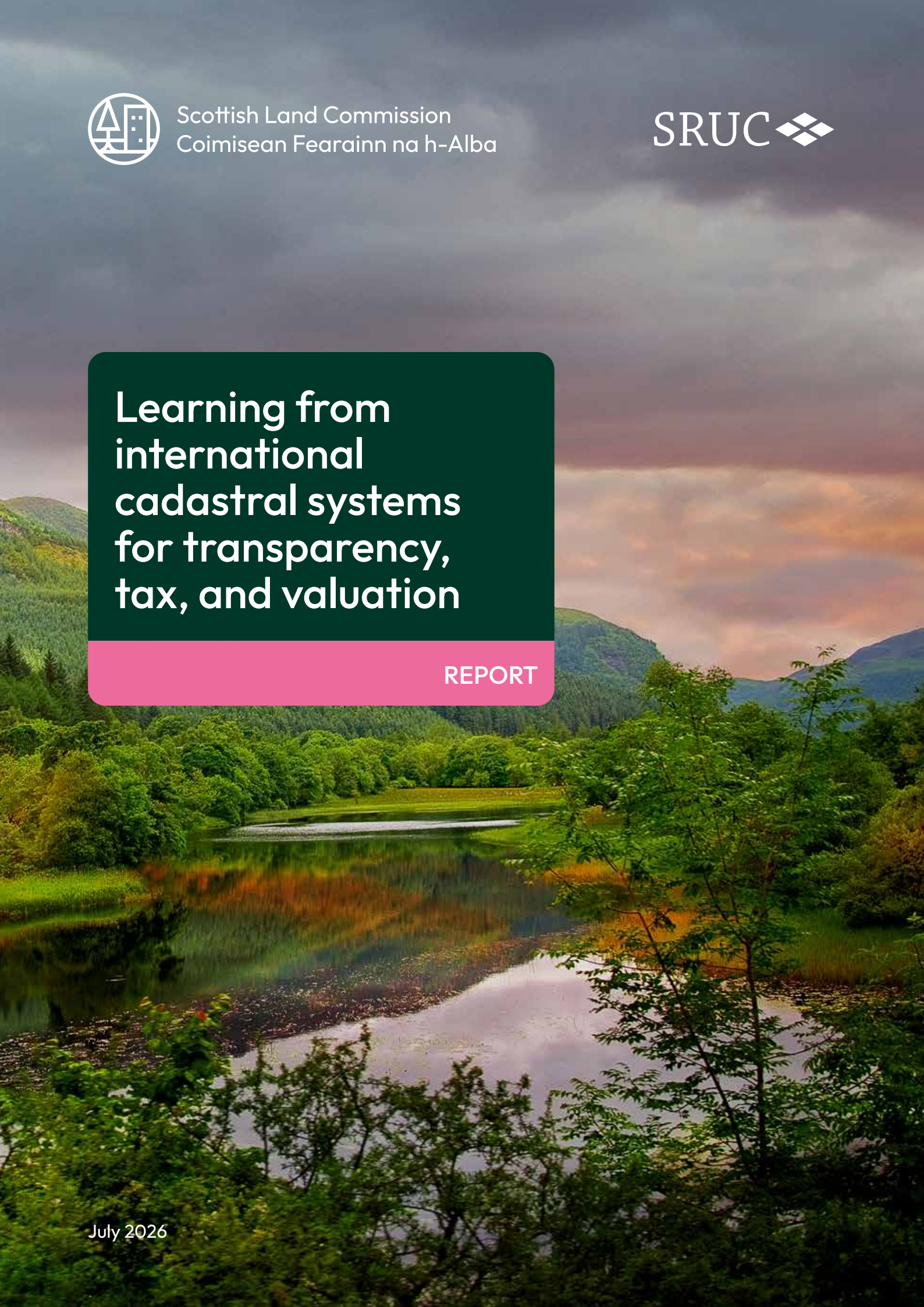


Scottish Land Commission
Coimisean Fearainn na h-Alba

SRUC

Learning from international cadastral systems for transparency, tax, and valuation

REPORT

July 2026

Contents

Acknowledgements
This report should be cited as: Merrell, I., Spijkerboer, J., Coleman, N., and Doyle, C. (2026) Learning from international cadastral systems for transparency, tax, and valuation. Scottish Land Commission

Report authors

- Ian Merrell - Scotland's Rural College
- Jan Spijkerboer - Kadaster (Netherlands Cadastre, Land Registry and Mapping Agency)
- Natasha Coleman – Scotland's Rural College
- Carey Doyle - Scotland's Rural College

For further information on this project contact

James MacKessack-Leitch
Scottish Land Commission,
An Lòchran,
10 Inverness Campus,
Inverness, IV2 5NA

Tel: 01463 423 300

Executive summary

This research examines how cadastral systems—combining land registers (legal ownership data) and cadastre (spatial parcel data)—support land taxation, valuation, and ownership transparency. It compares Scotland's system with those in the Netherlands, Finland, Estonia, and Belgium to identify best practices and inform future land reform and potential land tax policy.

A central finding is that completeness of the land register is critical. Scotland is unique in that ownership lies over two registers – the historical Register of Sasines (containing 31.6% of land registered at the time of writing), and the modern Land Register (containing 59.8% of land registered at the time of writing). It is the only case study without full coverage. This significantly limits the ability to identify landowners, model potential taxation options, and support evidence-based land policy. In contrast, all comparator countries have near or fully complete systems, forming a reliable foundation for taxation and governance.

Modern cadastral systems are evolving into multi-functional Land Information Systems (LIS) that integrate legal, spatial, and additional datasets such as land value and land use. These systems are fully digital and increasingly interoperable across government, supporting a wide range of functions including taxation, planning, environmental policy, and infrastructure development.

The international examples highlight different strengths. The Netherlands demonstrates best practice in advanced analytical use. Estonia stands out for its interoperability through the X-Road system[1], enabling real-time data exchange across government. Finland offers a highly efficient and accessible system, while Belgium provides a long-standing example of a cadastre designed primarily for taxation. Other countries typically require mandatory valuation and land use data, whereas Scotland's system has gaps and inconsistencies due to non-mandatory fields and variable data entry. This reduces the system's usefulness for more advanced policy analysis, such as modelling potential tax options.

Transparency and accessibility vary across countries but are shown to deliver clear benefits. More open and free systems, such as those in Estonia and Finland, increase public trust, improve market efficiency, and support innovation, however, require more public money to operate.

Institutional arrangements also differ, although most countries manage cadastral and land register functions within a single organisation, improving efficiency and coordination. Estonia demonstrates that similar outcomes can be achieved through strong interoperability between separate institutions. Integration with other public systems—such as tax, planning, and agricultural databases—is a key feature of high-performing systems.

For any form of land value taxation, a complete and accurate cadastral system is essential. International examples show different approaches, including taxes based on land value, buildings, or spatial characteristics such as location.

[1] See Box 2 in the main text of the report - https://x-road.global/

1. Introduction

The Scottish Government made a commitment in the Budget (2024/25) and the Scottish tax Strategy to consider the role of tax to support land reform and reduce greenhouse gas emissions from land, including potentially a carbon land tax. In recent advice to Scottish Ministers, the Scottish Land Commission (SLC - 2026)[2] recommended "the need for more systemic improvements to the tax infrastructure – the data, valuations, capacity and systems" (p.4). Another SLC (2025)[3] report also emphasised the need for complete data on ownership, land values, and land use to support land taxes. A complete and accurate **cadastral system** is essential for facilitating a land tax. A cadastral system can also play an important role in formulating, implementing, and evaluating a country's land use policy framework. A cadastral system is the infrastructure (i.e. the administrative and legal structures) that manages records, registers and other data sources concerned with land ownership, usage, and value.

According to the United Nations Economic Commission for Europe's international standards, a cadastral system should include:

A Register of Titles (also known as a Land Register): Textual Data that records legal information, identifying who owns the land and what rights or restrictions apply.

A Cadastre: Spatial data that maps and defines the location, boundaries, and extent of land parcels.

The combination of these two elements provides legal certainty of ownership (textual data from the Land Register in the form of deeds) and the size/volume of a land parcel[4] (spatial data from the cadastre). For countries in the European Union, the INSPIRE dataset framework harmonises cadastre data requirements.

Additional information can be included in a cadastral system around land value (i.e. the value of the most recent transaction, or from another official source), responsibilities (i.e. legal obligations around the management of the land), rights (i.e. how land can be occupied, used, controlled, and transferred), and in some cases land use and designations (i.e. if any part of the land is designated as a Nature Reserve or similar).

---

[2] Scottish Land Commission (2026). Tax options for reducing emissions from land and supporting land reform: Advice to Scottish Ministers. https://www.landcommission.gov.scot/downloads/SLC-Tax-Advice-FINAL.pdf

[3] Scottish Land Commission (2025) WPI Economics: Approach to land valuation in the tax system. Available at: Approaches to land valuation in the tax system. https://blogs.gov.scot/digital/2025/10/03/mapping-the-future-scotlands-lidar-revolution/

[4] A land parcel is defined as "a continuous area, or more appropriately volume, that is identified by a unique set of homogeneous property rights" (Dale and McLaughlin, 2000)

A well-functioning cadastral system is also a mechanism to ensure transparent land governance, fair and appropriate taxation on land[5], and a reliable means to value land. They can increase trust and scrutiny in policy decisions by being transparent and can form a basis for evidence-based policy-making.

A Land Information System (LIS) is the next stage of development from a cadastral system, as it combines more data sources for elsewhere in a government. A LIS is defined as:

> "A Land Information System refers to all land-related data banks that have the land parcel as the common geographic unit, and that by means of coordination and standardization together provide an integrated methodology for the collection, maintenance, updating, and utilization of land-related information. It can be conceived as the final product of a complete network of the following three general land-related data banks or land recording systems: 1—the cadastral survey; 2—the land registration system; and 3—all relevant public, private, and mixed land information sources." (Quintero, 2004)[6]

Table 1: Elements of a Cadastral System

System	Data involved	Primary Purpose
Register of Titles / Land Register	Textual data of ownership, rights and restrictions	Legal certainty of ownership, rights and restrictions
Cadastre	Spatial data of land parcels	Maps and defines the location, boundaries, and extent of land parcels
Cadastral System	Register of Titles and Cadastre data combined	Administrative and legal structures to manage the Register and Cadastre
Land Information System (LIS)	All of the above, plus other available spatial data sets concerned with land	Multi-functional, for policy design/ implementation/monitoring & evaluation, research, and private sector business

[5] A recent report produced for the Scottish Land Commission confirms the importance of a complete cadastral system in four international examples. Beebee, M., Chitrao, A., Gregory, R., and McPherson, E. (2025) Approaches to land valuation in the tax system. Scottish Land Commission.

[6] Guintero, J, R. (2004) Land Information System. International Encyclopaedia of the Social & Behavioural Sciences. https://www.sciencedirect.com/science/chapter/referencework/abs/pii/B0080430767991071

The aim of this research is to explore how different cadastral systems operate in practice, the type of data collected, typical users of the system (both public and private sectors) and other points of relevance for purposes around taxation, valuation and ownership transparency.

To achieve this, international comparative research was conducted, comparing the Scottish system to four other European countries, the Netherlands, Finland, Estonia, and Belgium. The case studies highlight similarities and differences between different systems, as well as providing interesting or best practice examples to be considered in a Scottish context.

2. The Scottish context

Scotland has the oldest land registry in the world – The General Register of Sasine's – in which the Registration Act 1617 of the old Parliament of Scotland, introduced a description-based account of landownership in Scotland. The first entry in this register was in 1617.

Later, the Land Registers (Scotland) Act 1868 modernised the system and shortly afterwards (1871-1905) search sheets were introduced which showed the history of transactions for any given property. In 1948 Registers of Scotland (a public body) was established, who hold responsibility of maintaining and improving the land register to the present day.

The Land Registration (Scotland) Act 1979 created the first map-based register in Scotland – what could be considered a very limited form of cadastre. Digitising this register began shortly after in 1981.

The Land Registration etc. (Scotland) Act 2012 introduced electronic documents, signatures and registration, and remains the most recent relevant Act.

In 2018, ScotLIS was introduced which can be considered a Land Information System that combines the cadastre, the land registry and other elements including Ordnance Survey data and satellite imagery (see Box 1 below).

During the Covid-19 pandemic in 2020 RoS made the decision to accept digital copies of scanned documents (and later made it the default approach) through a Digital Submission Service[7]. Registers of Scotland also keep an additional 23 registers which were introduced as part of their statutory duties; these include the Register of Community Interests in Land (introduced through the Land Reform (Scotland) Act 2003), the Register of Persons Holding a Controlled Interest in Land (introduced though the Land Reform (Scotland) Act 2016) and the map-based Crofting Register (introduced by the Crofting Reform (Scotland) Act 2010).[8]

[7] Registers of Scotland (2021) Digit submissions analysis

[8] Registers of Scotland (2026) Our History

To this day, some properties remain on the Register of Sasines, as the 'trigger point' for moving on to the new register is a transaction transferring the property[9]. Work has been ongoing (since the mid-1990s) to add the historical Register of Sasines to a modern spatial cadastral system. Recently, the 'Indicative Sasines' dataset was released which is the first time the Register of Sasines has been produced spatially[10].

The Land Register is still incomplete. Approximately 59.8% of land in Scotland is now on the Land Register, roughly 4.6% is being processed, leaving roughly 31.6% remaining in the Register of Sasines[11].

Scotland has an ongoing Land Reform policy programme which has the aims of reducing concentration of landownership and increasing both the diversity and transparency of landownership. A complete cadastral system (i.e. all land parcels in Scotland are included on the cadastre, and both modern and Sasines registers are included) could help alleviate some issues around transparency of ownership[12]. The recent Land Reform (Scotland) Act 2025 introduced compulsory Land Management Plans for landholdings of over 1000ha, which could be incorporated and validated through a cadastral system. It could also allow for more informed decisions to be made around potential future taxation and land valuations.

The primary function of the land register and cadastre is to provide legal certainty of ownership, and the coverage is national (although coverage is incomplete), including the territorial seabed 12 nautical miles from shore and other land covered by water.

[9] Not all transactions over the property will result in a trigger point (e.g. a transaction which is a discharge/deed of servitude will not result in a trigger point)

[10] Registers of Scotland (2026) The Indicative Sasines data set is a "way of showing indicative ownership and boundaries of Sasines titles, [a] visual representation of Sasines registered titles, providing information to help in answering 'who owns Scotland?', [a] first step to establishing ownership which is not yet shown on the land register"

[11] Registers of Scotland (2026) – Land Mass Coverage in Scotland

[12] Scottish Land Commission (2023) Transparency of Ownership and Land Use Decision-Making

BOX 1

ScotLIS is Scotland's Land Information System. It is maintained by Registers of Scotland and is publicly available to explore here: https://scotlis.ros.gov.uk/ . On ScotLIS a user can find property owners, search for property prices, buy property documents, and check if a property is on the land register. The search function allows users to explore via a map (the cadastre data) or by title number (the Land Register data). There is also the 'ScotLIS for business' service which provides business user greater functionality and accessibility.

Figure 1 . Map-based (cadastre) element of ScotLIS

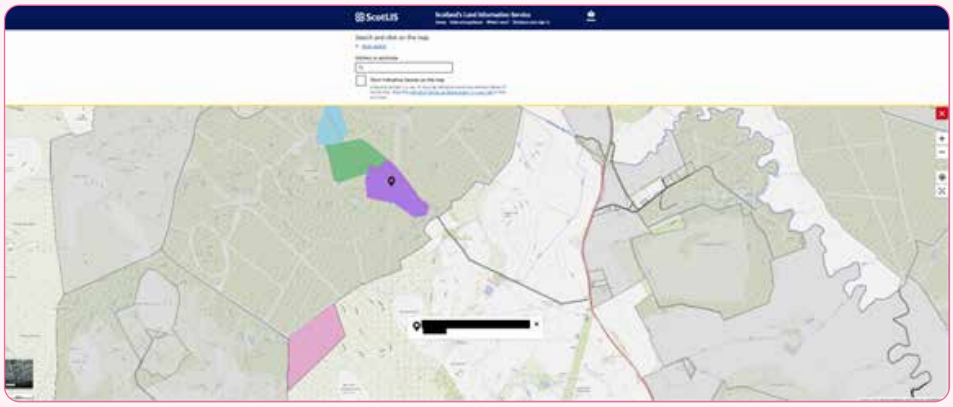


Figure 2. View of the land register element of ScotLIS

The image above shows the map feature, using Ordnance Survey data as the base layer. Multiple land parcels are visible.

The highlighted Title refers to four parcels (highlighted as different colours).

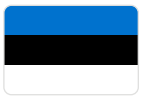
Note: There are areas of this map where ownership is not land registered and therefore left off the cadastre data.

Note: No price/value data is available for this example deed but will be provided where available. In this example, "love favour and affection" was the consideration stated in the deed of transfer which is reflected in the title sheet of the land register (as per property law and land registration legislation).

3. Methodology

A pragmatic methodology was developed to answer the research questions in a timely and robust manner. The overall aim of the methodology was to develop and populate a comparative framework. To achieve this, a combination of desk-based enquiries, a survey, and a follow-up semi-structured interview were conducted for each case study country. The rationale for selecting each case study was as follows:

Finland, managed by the National Land Survey. Finland is a relevant case due to the highly digitised nature of their cadastral system and land registry which integrates well with other e-government services.



Estonia, managed by the Estonian Land and Spatial Development Board. The Estonian example is particularly interesting considering the rapid land reform agenda that occurred after 1991 following the collapse of the Soviet Union when a new digital cadastral system was implemented (which differed from other Eastern Bloc countries such as Latvia).

Netherlands, managed by Kadaster. The Dutch cadastral system is considered an example of best practice – it is an open and accessible system that also includes novel data such as telecoms networks, ships, aircrafts and 3D modelling.

Belgium, managed by the General Administration of Patrimonial Documentation (part of the Ministry of Finance). Belgium is an interesting case as they operate under a rationale that has remained somewhat consistent since the 19th Century. It has a primary focus on using the cadastral system for taxation purposes.

Participants from each country were sourced through the teams' professional networks, all of whom were experts in their country's cadastral system, or who directly worked for the agencies/organisations responsible for maintaining the system.

An initial framework was developed, and questions were designed to answer each element of the framework. Questions were assessed to determine which would be more suitable for a survey (mainly factual and quantitative answers), and which were more applicable to explore during an interview. This resulted in a survey[13] and interview schedule (Appendix 1). The survey was distributed using JISC[14] to each participant first, and their answers were then used to populate the comparative framework. Following this an interview was held with each participant to fill in any gaps, provide more nuance and discuss their opinions on the operation of the system.

However, there are limitations to this approach. The findings are based on a focused set of European case studies and expert input, and do not capture the full range of international practice. In addition, differences in legal frameworks and governance structures mean that direct policy transfer is not always possible.

[13] Template available on request.

[14] Industry standard software for the Higher Education sector which is GDPR compliant and highly secure - https://www.jisc.ac.uk/

4. Findings

4.1. International case studies – Historical development

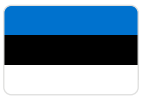
To begin, a contextual and historical introduction of each international case study is provided. The Netherlands and Belgium share a similar historical trajectory and primary purpose (a cadastre for tax purposes), as both have their roots in the Napoleonic era. Estonia and Finland also share similar roots, this time starting with the Swedish Kingdom.

Netherlands

The Dutch Kadaster (Land Registry and Mapping Agency) began in 1811 under Napoleonic occupation with the primary objective of providing a tax base. The original surveying work was completed in 1832 and recorded owners, plot shapes, and land usage. Over time, the role of the Kadaster shifted from purely fiscal (tax-related) to legal. It became the definitive public register for identifying owners of real estate, ships, and aircraft. For example, the first Land Consolidation Act in 1924 made the cadastral system a key tool to aid the re-parcelling plan and provide legal certainty of ownership and tenancy rights.

In 1994, the Kadaster became an independent government body. While independent, it remains supervised by the Ministry of Housing and Spatial Planning. Now completely digital, the Kadaster links with other vital registries, such as the BAG (Buildings and Addresses Register), the Trade Register, and the BRP (Personal Records Database) and could be considered a LIS. Today the primary purpose of the Kadaster is to ensure legal certainty of land parcels, and it has national coverage (including ships).

Estonia



In the 17th Century, Estonia was part of the Swedish Empire which conducted land surveying and cadastral mapping (see also Finland). In 1710 the Russians took control of Estonia and much of the cadastre was destroyed during the war. However, the Russians largely left the existing landownership pattern alone. In 1918 Estonia gained independence from Russia and the Cadastral Office was founded to redistribute land to dispossessed Estonians. However, during Soviet control (1940-1991) private property was abolished and the previous land registry was also abolished (including over 210,000 cadastral units). Following Estonia's independence in 1991, a period of rapid land reform occurred, and land was returned to owners dispossessed during the Soviet occupation. Due to this somewhat late start compared to other countries, Estonia's Land Register and cadastre began as digital systems.

These two elements are managed by separate institutions, with the Land Register being maintained through the Ministry of Justice and district courts (to provide a judicial route for disputes), and the cadastre maintained by the Estonian Land and Spatial Development Board.

The Estonian Land Board was established in 1990 – its main duties included coordinating and implementing land reform, maintaining the cadastre, and coordinating land consolidation. In 1994 the Land Cadastre Act was introduced which set out the duties and rules[15]. The Land and Spatial Development Board, or MaRu, is a new government agency that began operating on January 1, 2025, under the jurisdiction of the Ministry of Economic Affairs and Communications, bringing together the practical land and spatial services and competencies offered by various state agencies, as well as new strategic spatial planning tasks[16]. In this sense, Estonia now has a Land Information System, which includes the land register, cadastre, and various other spatial data sets from a range of different governmental bodies. This is integrated through software called X-Road (see Box 2 for further details).

The primary function of the cadastre is fiscal (i.e. to provide a basis for tax) and it also has a secondary function of helping to ensure legal certainty of ownership. The land register's primary function is ensuring legal certainty but also serves to demonstrate restricted real rights (including mortgages), and other encumbrances concerning immovable property. Both elements have national coverage.

[13] Template available on request.

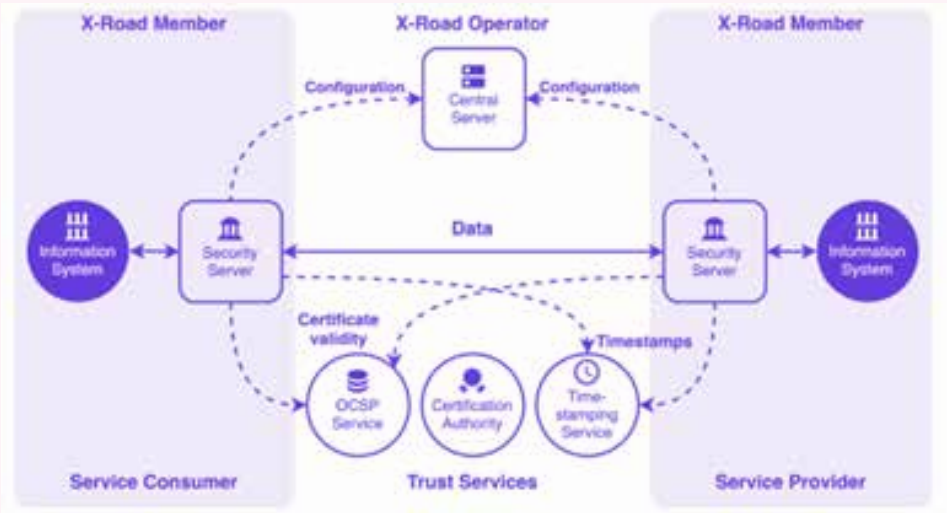
[14] Industry standard software for the Higher Education sector which is GDPR compliant and highly secure - https://www.jisc.ac.uk/

Box 2. X-road

X-Road is open-source software developed in Estonia that provides unified and secure data exchange between organisations in a collaborative ecosystem. It streamlines data exchange processes, enhances security, and facilitates interoperability, enabling organisations to derive greater value from their data assets. https://x-road.global/

In a national implementation, X-Road is deployed nationwide, and the aim is to use it for data exchange between organisations across administrative sectors and business domains. In Estonia, multiple public sector organisations make their data available to each other, including the land registry and cadastre, which many departments use as their 'base layer' for ownership. Globally, 29 ecosystems have been deployed by governments or other organisations.

Figure 3. Demonstration of the architecture of a service provider and a service consumer sharing data.



Finland

Like in Estonia, the roots of the Finnish cadastre began during the Swedish Empire's control of the country. Shortly after being incorporated into the Russian Empire in 1809, Finland began operating its own cadastre in 1812, before gaining full independence in 1917. At this time, the Land Registry and cadastre were coordinated at the regional scale, with 75 municipality records being held and governed in local courts across Finland. Very early digitisation began in 1958 (to aid with land consolidation) and a digital land register was introduced in 1970.

In 2005 a single nation-wide cadastre was established by merging all the previously regional systems, which is maintained by the National Land Survey of Finland (a branch of the Government that sits within the Ministry of Agriculture and Forestry). In 2010 the land register also moved into the control of the National Land Survey which brought the cadastre and land register under the same authority[17]. In its most modern iteration, the Finnish system can be considered a multi-functional LIS with national coverage that various other spatial data from municipalities and governmental bodies included.

Belgium

Similarly to the Dutch case, the Belgian Cadastral system was introduced by Napoleon in the early 19th Century. The primary objective (which remains to this day) was to map Belgium for taxation purposes. After Waterloo, the surveying was continued by the Dutch until it was finalised in 1843, with Belgium becoming independent in 1831 during this process.

The cadastre was originally created for tax purposes, but its functionality has increased to include mortgages, ownership, and land values over time. In 1976 the cadastre began to be digitised. Another major (and recent) change was the merging of three elements – The Cadastre, Registrations Offices, and the Mortgage Registry, each of which had a differing role in the functioning of the system – into one new federal public service (General Administration of Patrimonial Documentation) that managed the entire process. This required significant civic reorganisation. Now, this service registers new deeds, determines land taxes, holds mortgages on record, as well as maintains and updates the cadastral system. Part of the data is decentralised and maintained by the regional governments of Flanders, Brussels and Wallonia.

The primary function of the cadastre remains to this day to be for fiscal (i.e. tax) purposes and has a secondary function of helping to ensure legal certainty of ownership. It has national coverage (decentralised to regional offices in some circumstances) and also includes ships.

[17] https://eurogeographics.org/app/uploads/2018/11/Halme-PCC-Vienna-20112018.pdf

4.2. Comparative framework

This comparative framework is a result of desk-based research, a short survey and an interview (both completed by the same person in each organisation). The tables are grouped by three themes; ‘Operation in practice’, ‘Data used’ and ‘Typical Users’.

The tables are largely descriptive, allowing for comparative thematic analysis (discussed in the next section). As the two elements of the Estonian system are governed by separate organisations, they are represented in two separate rows of each table.

4.2.1. Operation in practice

1. Legal and institutional basis			
	1a. Legal basis	**1b. Institutional home**	**1c. Link to Land Registry**
Scotland	The most recent Act is The Land Registration etc. (Scotland) Act 2012 which provided for the creation of the cadastral map.[18]	Registers of Scotland (RoS)	Same organisation[19].
Netherlands	Act of 3 May 1989, containing regulations concerning the public registers for registered property, as well as concerning the Land Registry (Land Registry Act). Cadastre Decision of 6 November 1991	The Netherlands' Cadastre, Land Registry and Mapping Agency – in short Kadaster – collects and registers administrative and spatial data on property and the rights involved.	Same organisation
Estonia - Cadastral System	Administrative law	Land and Spatial Development Board. Under the jurisdiction of the Ministry of Economic Affairs and Communications	Separate, but communicate with each other via X-Road (see Box 2).
Estonia - Land Registry	Court procedure rules. The Land Register Act entered into force on 1 December 1993.	The Land Register is administered by the county courts and falls under the jurisdiction of the Ministry of Justice.	As above
Finland	Cadastral Register Law (Kiinteistörekisterilaki 392/1985) and Real estate formation Law and Act (1997). These laws are similar and are developed from laws dating back to the Swedish Kingdom (1757).	Maanmittauslaitos, National Land Survey	Same organisation
Belgium	Different Royal Decrees and Regulations [20]	General Administration of Patrimonial Documentation. Previously three elements - registration, surveying and valuation	Same organisation. 'Legal certainty' and 'Measurement and valuation' (translated) teams.

[18] The cadastral map shows the totality of registered real rights in land. It consists of cadastral units, which each represent a single registered plot of land. Prior to the 2012 Act, the Land Register Rules under the Land Registration (Scotland) Act 1979 provided that the Keeper of the Registers of Scotland would maintain an index map delineating all registered rights, titles, and interests in land.

[19] It is worth highlighting the role of Ordnance Survey (OS) as national mapping agency. The Ordnance Survey map continues to be the base map for the Land Register and therefore for the cadastral map.

[20] Royal Decree of 3 December 2009 regulating the operational services of the Federal Public Service Finance: Belgian Official Gazette. Article 127 of the Mortgage Act. Articles 236 and 236/1 of the Code of Registration, Mortgage and Registry Fees. Articles 144 and 144/1 of the Code of Inheritance Tax.

2. Operation of system		
	2a. Registration process	**2b. Disputes and resolution**
Scotland	Solicitor, Buying agent. A notary is not required in the process, but a solicitor may also be a notary [21]	No direct judicial role. Occasionally a deed will be submitted which conflicts with an already existing registered title which RoS will communicate with the submitting agent to find out if it is a valid deed. The Land Tribunal for Scotland dealdeals with boundary disputes. Title Inaccuracies Enquiries service supports investigations into potential inaccuracies and identify where a title rectification is appropriate.
Netherlands	Notary	In the first instance any complaints or disputes are voiced to the Dutch Kadaster, and if still unresolved then the case is dealt with through the Court Administrative Law
Estonia - Cadastral	Submitted to the Cadastre by a licensed land surveyor	The boundary determination procedure[22]. This procedure is carried out when surveying work becomes necessary. During this process, the boundaries are determined and marked on site, and the updated boundary data are then submitted to the Cadastre for registration. The boundary determination procedure may also be initiated by landowners themselves for the purpose of clarifying and establishing the exact location of boundaries.
Estonia – Land Registry	Landowner / individual responsible for registering	Court procedures.
Finland	Landowner / individual responsible for registering	'Border Demarcation Survey' (translated). A cadastral surveyor (sometimes with two trustees) goes to the land and takes measurements and conducts archive research. A decision is provided which, if disputed, then goes to the court system for a decision[23]. There is also a process when it comes to inheritance – if a decision cannot be reached between siblings (for example) inheriting a farm, then the cadastral surveyors can split the farm in the most equal way possible.
Belgium	Notary, other agreements also possible to register	If there is a dispute about a boundary measurement, the surveyor first tries to reach agreement. If that fails, a justice of the peace decides the matter.

[21] In rare circumstances citizens can submit personal presentments, but they will be subject to additional identity verification and fraud prevention checks.

[22] In order to carry out the land reform quickly, it was possible to privatize land based on planning materials, meaning that land parcels could be registered without conducting an actual land survey. As a result, approximately one third of boundary points in the Cadastre today have not been surveyed or physically marked in nature.

[23] The State is obliged to pay compensation for errors that are a consequence of decisions taken in cadastral surveys since 1 July 1985

3. Associated costs and funding		
	3a. Cost to establish, operate and update the system	**3b. Cost to user for registration and revenue generated**
Scotland	Establishment costs are unclear as the system has been evolving for many years. £100.5 million (2024-25) operating costs.	Variable fees for registration[24]. £102.7 million income (2024-25) generated from registration fees (and other services).
Netherlands	It cost roughly €15.2 million to establish the system, and roughly €200 million annually to operate and update the system.	€103.50 for registration. Unknown how much this generates in revenue.
Estonia - Cadastral	The latest version of the cadastral system began in 2021 and has so far cost €1.2 million. An annual operating budget of €50,000[25].	No fee is charged for submitting or amending cadastral data, including changes related to a land parcel. Fees are instead paid to private sector surveyors to conduct the work and submit.
Estonia – Land Registry	Not publicly disclosed. It is part of the broader National Land Survey budget.	Fees for real estate sale transactions are paid to Notaries not the Land and Spatial Development Board. A state fee must be paid for amendments made to the Land Register. No revenue is generated directly from these services.
Finland	Establishment costs are unclear as the system has been evolving for many years. Government budget for upkeeping and improving the cadastral system is €10 million annually[26].	€160[27] for registration. Fees from surveys and registrations generate €50 million annually.
Belgium	Not publicly disclosed. It is part of the broader General Administration of the Patrimonial Documentation budget (which has a rough annual budget of €178 million).	The registration fee is 0.10% - 0.15% of the purchase price. Unknown how much this generates in revenue.

[24] For transferal of a deed, the fee is variable according to value or consideration of property. For a straightforward deed, fees vary between £80 (property valued between £0 and £50,000) to £8250 (property valued at over £5,000,001). Some applications may need to be registered across more than one title or in both Sasine's and the Land Register and additional fees will apply to those applications. For more information see here. Fees are reviewed periodically, and if applicable lowered.

[25] These funds come from the European Union, rather than public money which all of the other systems are (partially) funded by.

[26] This budget is to improve boundary marks, update rights, solving ownerships of jointly owned areas.

[27] Other fees include parcelling land and border demarcation (both roughly 1000 EUR). Finland also has a 'land swap' (translated) system, where if two landowners want to swap parcels for consolidation reasons, then this can be done for free.

4. Technology and innovation		
	4a. Degree of digitisation	**4b. Interoperability**
Scotland	Fully digital via ScotLIS for the modern Land Register (see Box 1)[28].	Tax system, land valuation, policy analysts[29].
Netherlands	Fully digital.	Tax system.
Estonia – Cadastral	Fully digital (which requires a login via E-Government services).	Land Register, Tax system, Land Valuation, Planning system.
Estonia – Land Register	The transition to a fully electronic system began in 2010, and since 1 January 2015 all files have been maintained electronically[30].	X-Road system (see Box 2).
Finland	Fully digital via NLS Mapsite[31].	Information is automatically transferred to other State agencies via a series of Application Programming Interface (API)[32].
Belgium	Fully digital via website MINFIN (which requires a login via E-Government services).	In-house between the different teams and other departments.

[28] Systems and processes are digital as far as possible. The majority of applications are submitted digitally, and updated title information following registration is provided digitally via ScotLIS. Business access is provided to users who are signed up to online services. Registers of Scotland operates an accessibility policy to ensure services are as accessible and usable as possible for all abilities and disabilities. Should a customer have accessibility issues, RoS can provide assistance, for example if they are unable to make a digital submission RoS can issue and accept a paper application form. Bulk data services are paid for on a per-request basis.

[29] In relation to land valuation and policy analysts, users don't necessarily interact directly with ScotLIS or with title registration, but Registers of Scotland does provide bulk data services that bring services to these types of users, for example bulk data is provided to the Scottish Assessors for valuation and electoral registration purposes and to Scottish Government for analysis and policy development. They also provide peripheral services, such as the provision of GIS data for local authorities, Scottish Water etc. to support their land management.

[30] Real estate data are available online through the e-Land Register. Although information can also be viewed in English, this version is a machine translation and has no legal force; only the original extract in Estonian has legal effect.

[31] Website: https://asiointi.maanmittauslaitos.fi/karttapaikka/?lang=en

[32] An API is a set of rules that enables software applications to communicate with each other. NLS have 39 APIs which are used by public sector organisations and private businesses. Many of these provide real-time updating, so manual updating is not required.

4.2.2. Data used

5. Data – Content and quality				
	5a. Spatial data	**5b. Legal / administrative data**	**5c. Fiscal data**	**5d. Updating data**
Scotland	2D Boundaries	Ownership (mandatory), Tenure[33] (mandatory), Rights (mandatory), Restrictions[24] (mandatory), Responsibilities[34] (mandatory)	Land value[35] (mandatory), Property (or Buildings) value[35] (mandatory), Land use designation[36] (optional or voluntary)	Upon Transaction or sale. Less than one week[37]
Netherlands	2D Boundaries, apartment rights (urban)	Ownership (mandatory), Rights (mandatory), Restrictions (mandatory), Responsibilities (mandatory)	Land value (mandatory), property (or buildings) value (mandatory), land use designation (mandatory)	Upon Transaction or Sale, Real-time. Less than one week for deed to appear on register/ cadastral system
Estonia – Cadastral	2D Boundaries, point data	Rights (mandatory), Restrictions (mandatory),	Land value (mandatory), Land use designation (mandatory),	Upon Transaction or Sale, regularly (scheduled), Real-time. One week to one month to appear on cadastral system

[33] Tenure relates to Ownership and Tenancy, but only long-term (more than 20 years) commercial leases are registered in the Land Register.

[34] Restrictions and responsibilities: The Keeper of the Registers of Scotland registers burdens, rights and charges. Registration of burdens, rights and charges is required in the Land Register by legislation in order to create real rights in land. However, the terms "restrictions" and "responsibilities" are not used in the Scottish land registration system.

[35] Land Value and property or buildings values are collected for feeing purposes only where there is no "consideration" for the property. There are not separate values for the buildings and the land. The value provided will relate to the title including any buildings on the title.

[36] Land Use Designation – not mandatory but is collected. If provided, this information will be stored in the backend system and further quality assured for bulk data requests.

[37] A new deed will appear on the Application Record upon submission. The time taken to complete the application and for it to appear on the Title Sheet Record will depend on the type and complexity of the application. The majority of new cases are completed and despatched within 35 days (Dealings with Whole 95%, First Registrations 63%, Transfers of Part without unregistered prior applications 80.3% - figures from latest KPI update).

5. Data – Content and Quality (continued)				
	5a. Spatial data	**5b. Legal / administrative data**	**5c. Fiscal data**	**5d. Updating data**
Estonia – Land Registry	N/A	Ownership (mandatory), Restrictions (mandatory), Mortgages (voluntary)	N/A	Upon transaction. One week to one month
Finland	2D Boundaries	Ownership (mandatory), Rights (optional or voluntary)[38], Restrictions (mandatory)	Land value (mandatory)	Real-time updating, one week to one month for deed to appear on register
Belgium	2D Boundaries	Ownership (mandatory), Rights (hunting and fishing) (optional)	Land value (mandatory) but only visible for owner or tax institutions	Weeks to months depending on complexity

[38] In Finland, some rights are optional. For example, road rights sometimes date back 100-200 years and there are different laws for different decades. Some short-term rights are not included on the system. Finland run an exercise where they will go to a village or town and discuss with residents any old rights (e.g. road rights) that remain and look to modernise them and add to the cadastral system. Roughly one third of land in Finland has now gone through the modernisation process.

In the table below, 'open access' implies that data (at least partially) is open for users to explore and view data on land ownership and land parcel size. In some cases, this is available for free, in other cases it is a chargeable service or by request.

6. Data – Governance and accessibility		
	6a. Data governance	**6b. Accessibility**
Scotland	The person granting the deed to be registered, and the applicant, and their solicitors or legal advisers all have a duty of care to ensure that the application is accurate and free of false information[39]. Quality & Data Improvement Team assesses the quality of land and property information.	Partially accessible. Open access to explore and receive limited information, a fee of £3 per title is charged for the full title information which is downloaded. Bulk downloads are available as 'reports' which are priced per request[40].
Netherlands	The data are accurate because of the connection with the Personal Records Database (BRP). This database contains the personal data of people who live in the Netherlands (residents) and of people who live abroad (non-residents). If an owner of a parcel dies their name is still in the cadastral system until the notary makes a deed which is registered to the new owner. If a parcel is split, it is also visible on the cadastral map. Every deed has a unique number. Also deeds from earlier time's (after 1832) are digital available.	Partly accessible. Some cadastre information is available for free, but you have to pay for services/details concerned with land registry data (title sheets, Cadastral extract, map, mortgage).
Estonia - Cadastral	In general, the accuracy of the data is determined by the data provider (the land surveyor or the provider of restriction data). The accuracy of the Topographic Database data is determined by the Land and Spatial Development Board.	Open access. Bulk downloads of the full dataset are available online for free. All users can explore and access all information for free (via E-Government services), in return, everyone can see who has accessed their information.

[39] See sections 111 and 112 of the Land Registration etc. (Scotland) Act 2012. The Keeper will reject applications if they don't meet certain conditions of registration – as per sections 21 to 28 of the 2012 Act. The most common reasons for rejecting applications can be accessed here.

[40] Data is fully available, some of that data is free to access, with more extensive data being available for a small fee. Data is made available via ScotLIS to public and account holding users. Some data services are also provided separately under licence. Some data that Registers of Scotland collects is not shown on ScotLIS since there are certain fields that we are required by statute to show, and personal data is provided in line with GDPR (see RoS Privacy information on their website).

6. Data – Governance and accessibility (continued)		
	6a. Data governance	**6b. Accessibility**
Estonia – Land Registry	In general, the accuracy of the data is determined by the data provider	The register is public and accessible to everyone; however, access to the full file requires a legitimate interest, except for owners and certain officials (such as notaries, bailiffs, courts, and supervisory authorities), who are not required to prove such interest.
Finland	Some information is guaranteed to be accurate by state (owner, real estate entity) and if mistakes happen state pays compensations. Borders are not guaranteed to have accurate digital coordinates. In general border marks go over coordinates and individual cadastral survey maps go over cadastral coordinates.	Partly accessible. Certain basic cadastral data, such as property boundaries and the digital cadastral index map, can be viewed for free. Data regarding land ownership, mortgages, and cadastral property, often located in the Land Information System, is legally protected. Access to this data requires a legal purpose and often a fee.
Belgium	The data are accurate[41].	Partly accessible, via request only if it possible within the Royal Decree and it will be charged.

7. Performance		
	7a. Completeness	**7b. Other performance indicators**
Scotland	Less than 60%[42]	Customer satisfaction index. Open case work indicator.
Netherlands	100%	Customer satisfaction, data accuracy, operational indicators.
Estonia - Cadastral	95-99%	How quickly new deeds are added to the Cadastral system. Data accuracy (low accuracy border points are currently approximately 45% of the data).
Estonia – Land Registry	100%	How quickly new deed appear on the register.
Finland	100% complete	Number of villages/towns surveyed to improve land rights. Goals around adding new deeds to the register/cadastral system (currently 4 months).
Belgium	100% complete	Accuracy of land boundaries, efficiency of the system, service and data accessibility.

[41] Law of 3 August 2012 containing provisions regarding the processing of personal data by the Federal Public Service Finance within the framework of its mandate: Belgian Official Gazette. Law of 30 July 2018 on the protection of natural persons regarding the processing of personal data.

[42] As of January 2026, there is 59.5% land mass coverage – that figure is for fully registered titles. Total indicative land mass coverage is 95.8% when supplemented by casework in progress (4.5%) and indicative Sasines (31.8%). More information is available here.

4.2.3. Typical users

8. Users		
	8a. Public sector	**8b. Private sector**
Scotland	Tax authorities, Court/Judicial system, The Scottish Assessors, Police, Local Authorities (including Planning Departments), Scottish Land Commission, Scottish Fiscal Commission, Historic Environment Scotland, Transport Scotland, Scottish Government (Communities Analysis Division, Community Ownership and other ad hoc requests), housing associations, Accountant in Bankruptcy, KLTR, Scottish Forestry, Scottish Water, Scottish Canals[43].	Surveyors, Valuers/Estate Agents, Banks, Developers / Planners, Solicitors, private searchers (companies offering search services to solicitors or members of the public), energy companies, property management companies, land referencing companies, property market analysts, accountants, land agents, architects, insolvency companies
Netherlands	Tax authorities, Planning departments, Court/Judicial system, Municipalities, Provinces	Surveyors, Valuers/Estate Agents ,Banks, Developers, Estates, Private individuals
Estonia - Cadastral System	Tax authorities, Planning departments, Court/Judicial system. E-services, for example, addresses are land cadastre data and are retrieved from the cadastre for each operation when the address is needed.	Surveyors, Valuers/Estate Agents, Banks, Developers / Planners, Land Managers
Estonia - Land Registry	All public sector organisations use the data through the X-Road system.	Very connected through X-Road. Private companies must register, run a secure server and sign a Data Sharing Agreement. The data is then real-time. Access is free, but there are ongoing costs associated with maintaining a secure server.
Finland	All other state and municipal organisations use information[44].	Information is mostly available to all organizations via request[45]
Belgium	Only if it is a suitable request. There are twelve purposes that article 36 Royal Decree state as suitable requests. Authorities and citizens can apply under this decree.	Information is available via request similar to public sector organisations and a fee will be charged.

[43] Most public sector organisations use ScotLIS as a 'self-service portal'. Bulk data arrangements are governed with Data Sharing Agreements

[44] A land ownership GIS layer is provided to all public organisation free of charge (downloadable). It is automatically added to all systems periodically.

[45] If a large amount of landownership and valuation information is requested, then a valid reason is required (stated in their policies)

9. Future direction		
	9a. Current challenges	**9b. Future strategic direction**
Scotland	Having two registers – the historic Register of Sasine's and the modern Land Registry. Land only moves to the modern system when transacted, so inter-generational ownership does not trigger this move. Trying to get people to voluntarily move over (through discounts) but can't force this.	To reduce the amount of open case work. Exploring further automation. RoS strategic objectives are to: Complete the land register; provide innovative and accessible land and property data; develop and deliver digital improvements; be an effective, efficient and future focused delivery organisation.
Netherlands	To provided improved information on the land market, land mobility and to conduct research on different aspects on the physical living environment	Strengthening legal certainty, accelerating digital innovation, and supporting societal challenges. The organisation is evolving from a traditional registrar into a data-driven partner in the design of the physical living environment.
Estonia - Cadastral System	3D shape files. Using cadastral system for planning decisions and land use policy	Add all restricted rights and new aerial land use data. Improve user experience. Introducing fees to access data.
Estonia - Land Registry	Budgetary considerations	Exploring introducing registration fees and other paid services to generate more income to be able to effectively maintain the register
Finland	Having Rights in the system which are from previous outdated legislation that require updating	3D mapping came in recently, but this is mainly focused on central Helsinki. Joining the land register and cadastral system onto the same software system is the next big challenge.
Belgium	Part of the cadastre is maintained at the regional scale. Just came out of a period of institutional restructuring to resolve many previous issues.	More regional development (e.g. Flanders collects its own taxes at the regional level, so they may introduce their own regional register) and evolution towards data-driven systems

4.3. Thematic analysis and cross cutting themes

Operation of the system

Except for Estonia, the case studies have the same institutional home for both land register and cadastre (including Scotland), combining these elements into functional cadastral systems or LIS.

Advantages of this institutional arrangement include:

- Finland: Efficiency is most important as they went from 6,000 employees to 1,000 by bringing the two systems under one organisation.
- Scotland: Having both legal and mapping elements in the same organisation (the same building in many cases) helps avoid silos and increases communication between the two sets of expertise. There are not two different systems that may be updated at different times.
- Belgium: Significant institutional restructuring was required to bring the previous three elements of the registering, legal and spatial into one organisation. However, interviewees saw this new system as much more efficient and effective now the merge is complete.

Even where systems differ (e.g. the Estonia model which has two institutional homes), the land registry (with textual data describing ownership deeds) always provides the legal ownership certainty, with the cadastre (or LIS) serving other functions (land size, values, use, designations etc.). Estonia shows integration does not require institutional merger, only data interoperability. Real-time data exchange and tax integration can be achieved through interoperability.

Modern cadastral systems are evolving into multi-functional LIS which can aid in more complex data analysis for policy analysts and researchers. All systems have moved or are moving towards being completely digital. Having a completely digital land register and cadastre means that integration with tax systems, planning systems and valuation systems is more efficient and effective. In this regard, Estonia stands out with its X-Road interoperability (see Box 2).

The Netherlands stand out as best practice for the cadastral system to be integrated with other data sources to perform complex Big Data enquiries. The Kadaster Knowledge Graph[46] is an integrated publication of multiple large-scale spatial datasets. It provides a comprehensive overview of the environment for applications like urban planning, land management, and real estate, allowing for a better understanding of how different datasets (e.g., land ownership vs. building type) relate to one another.

[46] Website: https://data.kkg.kadaster.nl/

The person or professional responsible for submitting the registration to the land register varies across the case studies. Notary services are required in Netherlands and Belgium, practice in Scotland is that a solicitor or qualified buying agent is used, and in Estonia and Finland it is the landowner (who may choose to hire a professional). If a register is 100% complete, then registration is easier to achieve as all land parcels have been previously mapped (i.e. there is no need for a 'first registration' process).

Therefore, if there is a dispute over boundaries, each system deals with these matters in slightly different ways. An interesting example here is Estonia – due to rapid land reform following the collapse of the Soviet Union and Estonian independence, many boundaries were inaccurately mapped with an element of trust applied to the system. Now if a boundary dispute does occur then a full survey will be conducted (The Boundary Determination Procedure). In other case studies, the cadastral system has no judicial duties, but information can be provided to court proceedings to evidence a dispute.

Technological advancements can improve accuracy and completeness of a system, improve efficiency, and/or make the cadastral system more multifunctional. Some issues arise around modernising the systems when legacy computer systems are improved on over time, which causes 'lock in' when looking to completely revamping the system (e.g. Finland). Most case studies had made improvements to their internal software and public-facing platforms.

One innovative approach was presented from Finland. Here there is a system where a landowner can walk their boundaries with their mobile phone to improve the accuracy of border markers. Photos are taken at each border marker, and the program automatically assesses whether the boundary is accurate. 30,000 border markers were submitted during the pilot, which they intend to run again in the future.

Finland has a law requiring the registration of all large land sales, information which is provided to municipalities, who in turn can decide to intervene in a land sale (between two private holders) if they require the land for infrastructure projects, urban development or similar public interest purposes[47]. This is an interesting comparison to measures in The Land Reform (Scotland) Act 2025 which may be useful to consider further.

Data

Scotland was the only case study that did not have a complete land register. This is a major barrier to policy development and implementation in potential areas such as land tax and ownership transparency.

[47] Act on Expropriation of Immovable Property and Special Rights (603/1977)

All of the case studies mandated that valuation data (primarily land value) was required as part of the registration process[48]. In the Netherlands, not only is land value mandatory, but also the value of all buildings (commercial and residential) and the land use – all of which are used to calculate taxes. Land value and land use are mandatory in the Estonian system, again for tax purposes. Scotland's valuation data is less clearly integrated, and land use is not mandatory. Other systems treat their cadastre as core to valuation, whereas Scotland treats valuation as adjacent.

The accessibility and transparency of data varied across the case studies. Belgium has the most tightly controlled model, with data only visible via request (with guidance for this set out in legislation). At the other extreme, Estonia has completely open and freely accessible data with no fees attached. A key distinction is that countries are more willing to publish cadastre data (i.e. land parcel size/volume and boundaries bases around the INSPIRE framework) rather than land registry data (i.e. textual data concerned with ownership, rights and restrictions) which is more sensitive in nature. The Finnish participant thought a key advantages of having open and accessible data was that it was good for business and entrepreneurship (Finland[49]). In Estonia where all data is readily available, people are able to see exactly who looked at their entry on the land register/cadastral map – this builds trust and transparency in the system.

In systems where data is partially available for free and partially paid for, an advantage in Scotland was that users will only request the data they need, rather than requesting bulk data which may be unnecessary and cause issues around the distribution of sensitive data (with a similar dynamic in the Netherlands).

Disadvantages of having fully available data are that no fees are generated so the system has to be supported with public money (Finland and Estonia) and it is harder to conduct big data analysis beyond the core function of the cadastral system (Belgium and Scotland).

For example, in Scotland if more fields on the registration form were statutory (e.g. land use), then the data could be used in more complex data analysis. However, some of these fields are not mandatory (as RoS only collects data which is necessary for its purpose in line with GDPR and best practice), and the quality of the data varies therefore making it hard to utilise the data for other purposes.

---

[48] In Scotland a "consideration" (be it monetary or non-monetary) in the deed of transfer is always required for conveyancing and registration. "Value" is collected for feeing purposes - the registration fee is based on the value or consideration whichever is highest.

[49] Although more research is required as to exactly what these benefits are, and the amount of economic growth having access to this data provides.

ScotLIS is the platform for exploring this information visually, with additional data being added/integrated over time[50].

However, integrating further data would require additional funding and some technical barriers may emerge in terms of interoperability or liability around errors.

Taxation

One function of a complete and accurate cadastral system (i.e. cadastre and Land Register) is the ability to use it as a foundation for taxation purposes. These two elements combine to provide a basis for who is to be taxed (i.e. the owner) and the amount of tax (based on land use and/or size of land parcel). Therefore, for taxation purposes, spatial accuracy is just as important as legal certainty.

The primary function of the Belgian system is for taxation and therefore could be studied more if Scotland wished to implement a similar system. Likewise, the Dutch system is also highly effective as a tool in calculating tax; however, in the Netherlands tax is applied to the buildings (residential or commercial) rather than the land itself.

Finland bases their land tax on a map of land values from the 1970s. A subsequent exercise to update this map failed due to a lack of political will to implement these changes/updates. Land values are highest in Helsinki, with more tax paid in urban areas than rural areas, and the more rural and more remote the land, the less tax is paid. The difference between central Helsinki and rural land values has continued to grow yet the land values underpinning these remain the same as the 1970s. Land is only taxable when there is a building on it. A 2% transaction tax is also paid on transaction.

In Estonia, every four years there is a mass land valuation exercise, based on recent sales as comparables. Estonia is a small country, so this is more achievable than in other countries. These valuations are then used as the basis for land tax. Land tax in Estonia does not include standing forest timber values or buildings – just the 'base' land itself. Distance from urban centres is used as one metric to determine value, with tax levels set at the municipal level.

[50] Including access to a Crofting Register layer, an Aerial photography map layer, the Sasines Register indicative ownership layer, the Books of Council & Session, the Register of Judgements, the Register of Inhibitions and National Library Scotland's Historic Maps

5. Lessons learned for Scotland

The foundation to a successful system is completeness.

Scotland was the only country that did not have a 100% complete land register providing the underpinning ownership layer of a functioning cadastral system. This is a structural weakness for using this as a basis for taxation. Tax-oriented systems (Estonia, Belgium) rely on full coverage of both spatial and ownership data. There are also a range of policy benefits beyond tax, particularly with regard to implementing land policy – for example, the Dutch and Finnish systems were both utilised when implementing land consolidation policies .

Any form of land taxation is not possible without a complete evidence base (ownership, land use and/or land parcel size as a minimum) and other policy goals are limited. One issue is that ownership is currently split over two registers. There are currently incentives for landowners whose property is still on the Register of Sasine's – a 25% reduction on registration fees – to move to the new system, although low uptake is hampering progress.

Fiscal data should be compulsory.

Currently there are ways of avoiding having to declare the value of a property in the Scottish system (e.g. if the property is registered in an offshore company, is governed through a Trust, is gifted or part of a will). In cases where a 'consideration' is non-monetary (e.g. when gifted), then a value must be provided to ensure the correct registration fee is paid. Therefore, Scotland has valuation data, but it is not fully embedded in cadastral logic, and in some cases is not provided[52]. Depending on how a potential future land tax would be calculated (e.g. based on size or land use, the size/value of any buildings) knowing the size of a land parcel is a bare minimum, however a more nuanced tax approach could be taken if land value and land use were also known (allowing, for example, lower taxes on less productive land, or land of lower value).

[52] Having this data could also potentially make calculating Council Tax more effective.

[53] Currently in Scotland agricultural land has Non-Domestic Rates and Scottish Government have no current plans to tax this classification of land.

Examples from the international case studies show that taxes can be based on the 'base land' (Estonia), the buildings on the land (Netherlands) or remoteness/rurality (Finland). There are a range of options, but in most of these cases land (or building) valuation is required to make the tax proportionate. Land use is also useful data for designing and implementing a potential land tax – for example, in Estonia timber crops are not included in a tax, and in the Netherlands, farmland is excluded from any tax[53].

Interoperability can aid the process.

Scotland already has a complete Land Parcel Identification System for the agricultural sector, which is the foundation for allocating agricultural subsidies and some grants. This spatial dataset could be integrated into the cadastral system through system interoperability rather than a full institutional restructure (as is the case in Estonia), which can still provide speedy or real-time data exchange between systems and help with tax integration. Similar interoperability could be added to existing databases of non-domestic rates, and potentially licencing and land use planning.

Transparency enhances legitimacy.

The transparency of the system (i.e. the accessibility of free data) enables a range of additional benefits. For example, a fully transparent system (like in Finland and Estonia) increases public scrutiny and overall trust in the effectiveness of a tax system/policy and other decision-making. However, having transparent and open data limits the commercial viability of the system, which is then needed to be supported by increased public money. Although not investigated in this project, it could also improve the efficiency of the land market, by providing both buying and selling agents with more comparables. Considering Scotland's land reform goals of improving transparency on land ownership, a cadastral system which is completely free to access and analyse data could help achieve these policy goals. Open data was also found to increase entrepreneurship/economic development in Finland and could be used for a range of commercial purposes (e.g. Netherlands).

Spillover benefits can arise from a multifunctional and transparent cadastral system.

Additional benefits can arise from a complete and multifunctional cadastral system. Improving Scotland's cadastral system will require political will and, vitally, more funds.

These could include, aiding in designing and implementing new agricultural subsidies/grants, land reform (Estonia), creating a coherent land use/environmental policy suite, better and more efficient planning processes (i.e. planning permissions - Finland), and infrastructure development (Belgium, Finland and Netherlands).

A multifunctional cadastral system can justify this increased budget through a range of commercial opportunities to balance or subsidise the increased budget (like in the Netherlands). There are also a range of growth opportunities within the private sector (cited by Finland), where digitised cadastral systems can be used for technology and specifically software innovation. The Netherlands could be seen as an example of best practice where the Kadaster Knowledge Graph offers a wide range of further analysis and generates extra revenue.

6. Conclusion

This research aimed to compare the cadastral system of Scotland with a range of European examples (Estonia, Belgium, the Netherlands and Finland). It considered the core functions, data and users of each. The main conclusion is that a complete, digital, and interoperable cadastral systems are key administrative infrastructure for effective land policy. Where systems are comprehensive and data-rich, governments are better able to deliver fair taxation, improve land market transparency, and support strategic decision-making across planning, environmental policy, and economic development.

In Scotland, the current system has an incomplete Land Register, inconsistencies in data, and limited integration with other public datasets which constrain the ability to design and implement policies such as a potential future land tax.

From the international comparison, five key lessons were drawn and progress towards achieving these depends on completing the land register, strengthening mandatory data requirements (particularly around land value and land use), and improving interoperability between systems. These changes are achievable within existing institutional structures, provided there is sufficient political commitment. Financial investment would also be needed, though the examples demonstrate that there may be opportunities to balance this through commercial uses of the data.

Appendix

Interview schedule for participants.

Regarding Q3 (Please state which organisation maintains the cadastre?)

What are the advantages or disadvantages of this institutional home?

Regarding Q5 (Are the cadastral system and land register managed by the same organisation/department?)

If integrated, in what way?

What are the advantages or disadvantages of this arrangement?

Are there procedures or institutions in place to deal with conflicts around ownership?

Regarding Q9 (Which of these legal or administrative data are collected?)

Why is this? What are the advantages or disadvantages? Are there ways in which you would improve this?

Regarding Q11 (How often is data updated? Tick all that apply)

Are there any legal requirements or other nuance to this process?

Regarding Q13 and 14

Do you receive feedback on the registration process? If so, what are common complaints/issues/barriers or compliments/advantages?

Regarding Q16 (As accurately as you can, please provide a figure for how much the system costs to operate/maintain on an annual basis.)

Do you feel this figure is sufficient? What could you achieve with a higher budget? Are you facing financial uncertainty or cuts to budgets?

Regarding Q17 (How much does it cost the user to register a deed/title?)

Are there any other fees charged?

Beyond registration fees, in what other ways do you generate money from customers/clients/users? How much do these total compared to registration fees?

Regarding Q18 and 19 (public organisations and private businesses using the system)

What are the main reasons these public sector organisations use the system?

What are the main reasons these private sector businesses use the system?

Regarding Q20 (Is data publicly available?)

What are the reasons for this decision? What are the advantages/ disadvantages of this approach? If “Yes, partially available”, please explain this further.

Regarding Q22 (Which other public/municipal/local government systems interact with your cadastral system/land registry?)

What are the advantages/disadvantages of this in practice? Are there operational issues this interoperability causes?

Regarding Q23 (Which new technological innovations have you implemented or explored?)

Can you discuss further why these innovations were adopted or ignored?

Regarding Q24 (Who assures that data is accurate? What is the process for this?)

Who is accountable for the accuracy of data?

Regarding Q25 (Do you have policies or procedures in place to ensure security of personal data?)

Please expand on this further if needed.

Further questions regarding data availability:

Are there issues that arise from having publicly available data?

What are the operational costs and considerations for storing data securely?

Regarding Q26 (As accurately as you can, how complete is the register/ cadastral system)

Is this considered functionally complete, or complete?

Further questions about performance:

How do you judge or evaluate performance? What are the key performance indicators you use/track?

How accurate/reliable is the system? What are your error rates like?

Regarding Q27 (Can you point us towards a document/website that explains the history of the system? (URL))

If not, can you provide a brief overview now? What was the system that pre-dated the current cadastre? Are there common or customary land practices which predate the title system?

Further questions regarding historical development:

Can you outline the key pieces of legislation which helped to conceive or improve the system? What types of things needed to be reformed?

Further questions regarding the future:

What current challenges do you face?

Are there planned upgrades or expansions to the system? What is driving these changes?

Ma tha sibh ag iarraidh lethbhreac den sgrìobhainn seo sa Ghàidhlig, cuiribh post-d gu **commsteam@landcommission.gov.scot** no cuiribh fòn gu **01463 423 300**.

If you would like to request a copy of this document in Gaelic, please email **commsteam@landcommission.gov.scot** or call **01463 423 300**.

Scottish Land Commission
Coimisean Fearainn na h-Alba

Scottish Land Commission
An Lòchran
10 Inverness Campus
Inverness
IV2 5NA
info@landcommission.gov.scot
01463 423 300
www.landcommission.gov.scot

July 2026