# Return on Investment Analysis

## Assessing the Socio-economic Value of Address and Street Data to Nottingham City Council


## Final Report

September 2023

Nottingham City Council

geoplace®

ConsultingWhere

Maximising the value of location information

# Contents



For a comprehensive glossary of terms included in this report, please visit:

https://www.geoplace.co.uk/addresses-streets/data-in-use/glossary

# Preface

GeoPlace, the national coordinating body for official Address and Street data for England and Wales, welcomes this report which it has commissioned jointly with Nottingham City Council.

There are a growing number of examples in local authorities of the streamlining and simplifying of processes, from school admissions to planning applications through the use of such datasets[1]. However, convincing decision-makers that investment in their management and updating is important and will deliver a robust Return on Investment (RoI) is often challenging. At the current time when resources are tight, this report demonstrates invaluable insight into the quantifiable benefits of the council's address and street gazetteers and evidence of delivery of a best-value service.

This report, produced as a joint effort by staff from a range of different functions within Nottingham Council, GeoPlace and specialist management consultants, ConsultingWhere, demonstrates that over the past four years, use of these datasets within the council has delivered a RoI of nearly 5:1 – that is for every £1 spent by the council, savings and increased revenue of £5 have been realised.

Looking forward, if the same level of investment in staff and resources is maintained, the research predicts this could increase to 8:1. This will be achieved by integration with further council systems, but equally significant are insights supporting decision making in key council strategic initiatives including climate change adaptation and social care delivery.

I encourage you to use it to convince senior decision-makers of the importance of Unique Property Reference Numbers (UPRNs) and Unique Street Reference Numbers (USRNs) in reducing costs, stimulating better decision making, driving innovation, and improving outcomes for citizens and local economies.

[1] GeoPlace manage the national hub of address and street data comprised from subsets of Local Land and Property Gazetteers (LLPGs) and Local Street Gazetteers (LSGs) from local authorities along with other third-party sources. This data is then made available as a national data set through Ordnance Survey in the form of the AddressBase range of products. The National Street Gazetteer (NSG) is available from GeoPlace.

# Executive Summary

Investment in creating comprehensive and up to date, geocoded[2] address and street data by Nottingham City Council is yielding impressive returns and demonstrating best-value. These returns can be increased over the period 2023-6 by continuing with the proactive approach to maintaining and upgrading such data and creating integrations to a wider range of functions.

The consultants employed had recently finished a national study of Return on Investment (RoI) and were able to apply the experience gained from that work to Nottingham and more robustly validate the results.

This was accomplished by applying the well-established economic approach of cost-benefit analysis to quantify a small but representative set of use cases of such geospatial data within the council.

With the support from key subject matter experts within the council, making this study possible in the first place, the study first looked at the value of data integration in reducing duplicate effort of data maintenance. It then focused on estimating the value realised by functional areas including business rate collection, social care, waste management, safer housing, and the workplace parking levy scheme.

The results show that during financial years 2018-22, the council generated an estimated RoI of 4.8 : 1 and Net Present Value[3] (NPV) of £4.1 million.

The major contributing factors to efficiency gains and increased revenues being reduced data duplication, improved tax revenues and improved waste management.

Looking forward, the existing gains are expected to be supplemented by added value from social care data management, improved energy conservation and further new revenue from identifying properties where business rates are not being collected.

It is estimated that the benefits will generate a NPV of £5.7 million over the period 2023-2026. This would represent an enhanced RoI of approximately 8.5 : 1.

Over the whole period from 2018-26, the total net benefits after applying the Treasury Discount Rate are expected to be £9.8 million representing an overall RoI of just over 6.3 : 1.

As only a sample of use cases were quantified these figures represent a conservative estimate of the Return on Investment.

[2] Geocoding is the process by which data is enhanced by providing a precise position allowing it to be visualised and analysed to support spatial decision making.

[3] Net Present Value is the standard terms used to measure difference between the present value of cash inflows and the present value of cash outflows over a period of time.


# Study Approach

# Context

## Why geocoded addresses and street data is important?

Whether it is managing school admissions, planning street works, routing emergency services or online identity verification via the Customer Relationship Management (CRM) system – the majority of service delivery has a location. Using a standard location reference base of streets and addresses with unique identifiers provides the intelligence needed to understand what is happening at a particular place – at property level.

## Local authority role

Local authorities in Great Britain create local address and local street databases for their administrative areas, which are maintained by the authority through local government's statutory responsibility to name and number streets. The street data maintained by local authorities via their LSG is underpinned by legislation and used by all organisations with a remit to undertake street and road works, to ensure coordination and appropriate permissions are given for street works.

These are authoritative datasets, complete and regularly updated, so can act as an integrator of disparate datasets and facilitate joined-up decision-making within and between different public sector entities.

## GeoPlace

GeoPlace is a partnership owned equally by Local Government Association and Ordnance Survey and is responsible for collating, managing and maintaining the primary UK authoritative geospatial address and street data.

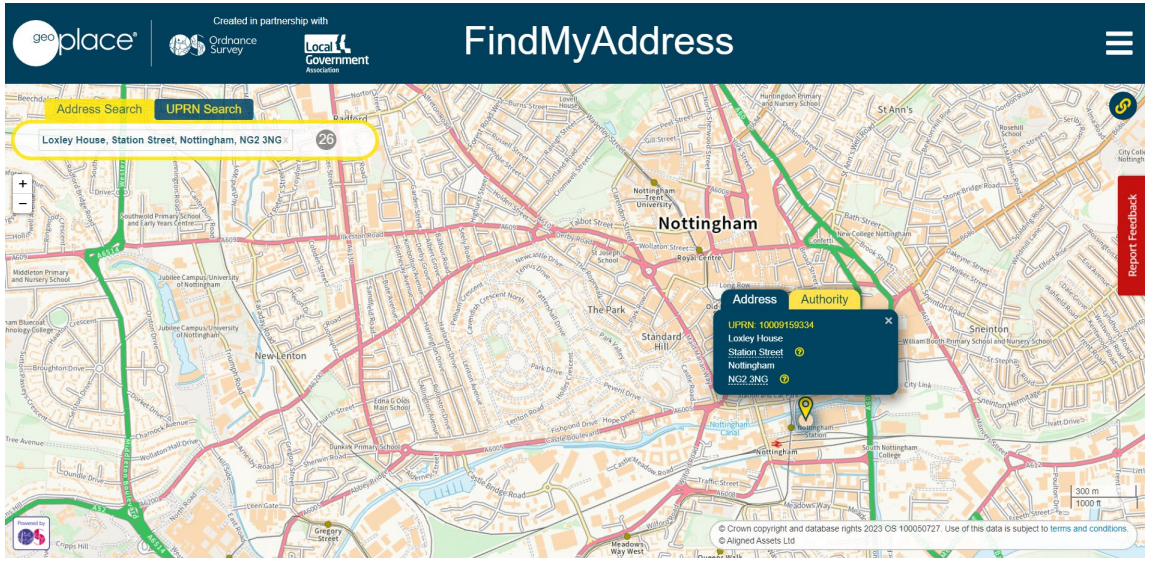
GeoPlace manage the national hub of address and street data comprised from subsets of LLPGs and LSGs from local authorities along with other third-party sources. This data is then made available as a national data set through Ordnance Survey in the form of the AddressBase range of products. The NSG is available from GeoPlace.

Within the data, are the two identifiers –UPRNs and USRNs – which have also been released under Open Government Licence. The Open Standards Board has mandated the use of these identifiers across government, for referencing and sharing all property and street information. This means all new public sector systems and projects that include address and/or street data should include these identifiers. The Local Government Association states that UPRNs are key to "almost everything that's delivered or achieved by councils." More detail is provided in Everything Happens Somewhere.

## Ordnance Survey

Ordnance Survey provides the sales and distribution of the AddressBase range of products.

AddressBase is available to the public sector without charge through the Public Sector Geospatial Agreement (PSGA), and at a commercial rate to private sector users.




Publicly available viewer for Address and Street Gazetteer.
FindMyAddress

# Purpose and Scope of the Study

Nottingham City Council has made extensive use of the LLPG and LSG databases across a wide range of functions over an extended period.

However, the consequent value derived by the council from these datasets has never been assessed.

A recent RoI study covering all local authorities in England and Wales, was published in 2022.

GeoPlace recognised that it would be useful to the wide local authority community to apply the same methodology to an individual authority. An agreement was reached early in 2023 for Nottingham City Council and GeoPlace to collaborate on the study. The independent strategy advisors, ConsultingWhere, who undertook the national study were contracted to complete the study.

A standard economic appraisal technique, Cost-Benefit Analysis (CBA) was adopted to perform this analysis. The appraisal examines two periods:

i) Benefits already realised by the council in the 5-year financial year period between 2018-22, what economists refer to as an "ex-post" calculation i.e., after the event.

ii) Predictions "ex-ante" of future benefits during the 4-year period 2023-6.

The costs incurred by both GeoPlace and the council are derived from public statistics largely supplied by the Local Government Association and data supplied directly by the council.

The benefits are estimated from a series of case studies conducted with input from council staff.

Only a limited sample of the use cases for these datasets were quantified because of limitations of time and available data.

A few of those that were identified as important to the social and environmental agenda but could not be readily quantified are also included in the report for completeness.

For further details on the approach to this study, please see the appendix.

# Nottingham City: Current Status

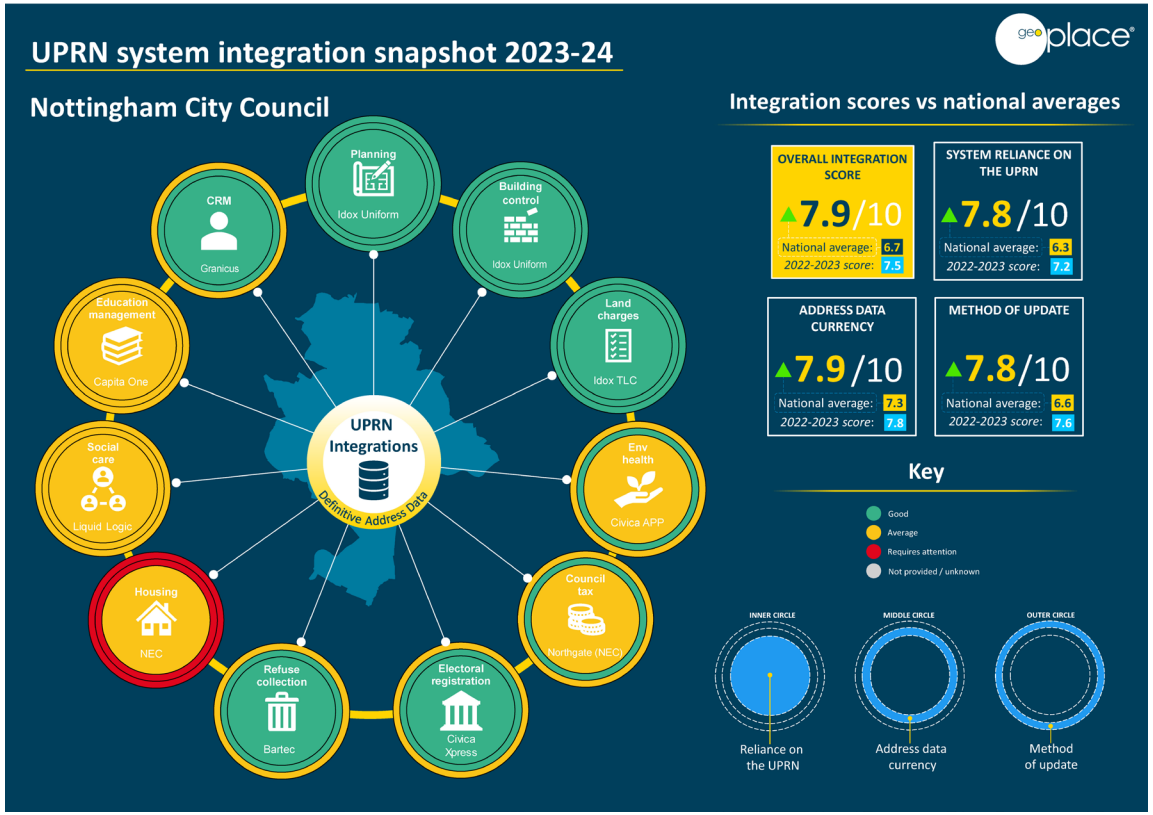
GeoPlace has collaborated with local authorities through the DCA governance framework to mutually develop a well-established framework called the Improvement Schedule that "benchmarks" local authorities. This schedule provides a baseline of data quality for each local authority. The benchmark assists local authorities in planning improvements to their address and street data year on year.

To track improvements, the scheme has a standardised structure of Gold, Silver, Bronze and Achieved National Standard levels defined by an agreed set of criteria.

The Nottingham City address gazetteer is ranked the third largest out of 35 in the East Midlands and ranked fourth for new UPRNs created (2022/23). This underscores the effort that is necessary to keep up these datasets up to date.

It also speaks to the achievement of Nottingham City in consistently reaching an overall gold standard for its address gazetteer. The infographic to the right indicates the above average number of integrations (in green) with key business systems, the high-level of currency of the data and the rapidity with which it is made available to users.

As the report makes clear these integrations are significant contributors to the impressive RoI already achieved and the source of much of the improvement predicted over the next 4 years.

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# Data Integration

## Reduced duplication of effort

The ability to integrate datasets using the UPRN and USRN adds significant value since sharing data removes the need to maintain multiple sets of addresses in different functions.

## Benefits quantification

The basis of quantification of the benefits realised is derived from combining several recent surveys undertaken by GeoPlace, combined with a range of council and public local government statistics:

1. Volumes of integrations – the GeoPlace Improvement Schedule (see page 8) provides information regarding the number of system integrations already in place within Nottingham City. Those regarded as having achieved full integration met the following criteria:

i. Use of LLPG or AddressBase

ii. An automated interface between the systems.

iii. Availability of real time or daily updates.

Such integrations for address data have been accessible during the study period (2018-22) for many core council business systems, including planning, building control, CON29 searches, education and environmental health. For streets data traffic highways management, traffic orders and parking integrations have been achieved.

2. Time savings – were evaluated from the average number of changes made per annum over a four-year period from 2016-19. The figures are captured by the GeoPlace hub daily. An average time for manually incorporating each record change of 3.5 minutes was used as a multiplier, based on expert opinion from custodians questioned during the national RoI study in 2022. This metric is consistent with Nottingham's own estimates.

3. Data maintenance effort – the GIS team estimated the hours spent per week updating the LLPG and LSG.

4. Salary plus on-costs – were calculated for the hourly cost of the grades of staff involved in the maintenance. The salary plus on-costs were uplifted by 30% to account for apportioned facility costs (office space rent), utilities (energy, water), ICT infrastructure (internet, hardware, IT support), software licenses and other sundry costs not covered elsewhere.

5. Trend Analysis – to predicted forward benefits, the accrued annual benefits were averaged based on costs over the period 2018-22.

## Value

Discounting the net benefits from a baseline in 2022, the total impact over the period 2018 – 2026 is estimated at £2.4 million.

This estimate covers only those integrations already operational, to avoid "double counting" where other integrations form part of subsequent case studies.

# Business Rates

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## Business Rates revenue

The use of UPRNs to link different authority systems brings with it the ability to increase and improve revenue collection of business rates.

## Regular matching

In 2016 the GIS team ran an analytical project to identify missing business rates through data matching and spatial data analysis of organisation data entitled 'Maximising local taxation revenues in Nottingham'. The data held in this report was passed to the Corporate Counter Fraud Team (CCFT) to investigate potential 'unbilled' properties within the City. As a result, NDR revenue was increased by £148k. The project was repeated in 2018 and resulted in extra liability of around £202k from previously unrated properties.

## Updated process

After a gap during COVID, a further report was obtained from the GIS team in 2022 that contained details of address that appear on other datasets within the authority (namely commercial waste, food licencing, alcohol licencing and the workplace parking levy) but that appeared to have no corresponding NNDR (National Non-Domestic Rates) account for the assigned UPRN.

As a result, a total of 799 matches were identified but this was narrowed down to 483 once previously checked records had been discounted. The data was then checked against existing NNDR records to ensure that the property did not exist under a different UPRN and this accounted for the vast majority of cases (this is based on initial UPRN allocated before a property is potentially subdivided or adopting a slightly different address).

Where NNDR records did not show an alternative UPRN, further desktop enquiries were made, largely based around open intelligence e.g., web trace, local media, social media, local planning records. Following this, properties were subsequently visited by CCFT and the occupants spoken to.

25 matches were flagged for further investigation by CCFT and have been visited. This has resulted in 6 properties being referred to the Valuation Office Agency (VOA) for rating.

## Analysis

Five properties have been brought back into rating and have been billed a total of £574,913.23 to end of 2023.

The CCTF team are awaiting the VOA rating for last referral. This project has again proved fruitful in securing extra current and future NNDR revenue for the authority. CCFT plan to undertake repeat exercises biennially.

## Future matching

To calculate benefits previous additional revenues were averaged to provide an estimate of future expectations. The estimated costs incurred included the GIS team effort, validation by CCTF and the collection (conservatively estimated at 50% of the revenue). This calculation provided the estimate of net benefits.

## Value

Discounting the net benefits from a baseline in 2022, the total impact over the period 2018 – 2026 was estimated at £6.2 million.

As a sensitivity test on the robustness of the estimates, the study has calculated the effect of no further uncollected revenue being identified. The total discounted impact would be reduced to £5.4 million – still a substantial positive impact.

# Children's Social Care and Early Help Services

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## Evidence-driven decisions

Nottingham City's Children's Integrated Services (CIS, including Social Care and Early Help) are responsible for the data capture of family information where there is the need or potential need for intervention or support. Within CIS, the Supporting Families Programme helps identify those families most at need. In providing these families subsequent effective, whole family support at the earliest possible opportunity, escalation into statutory services can be prevented.

## Data validation

One of the requirements of the Supporting Families Programme is a data return to the Department of Work and Pensions (DWP) which is address based and requires a UPRN. Data sent to the DWP missing a UPRN will not be processed.

In addition to the Supporting Families Programme the Social Care team maintains a social care case management system containing data, including addresses, on families from a wide range of agencies including external care providers. The quality of address information in the system is variable, with around 88,000 records having unique addresses verified by UPRN and almost 17,500 missing the UPRN where they could not be matched during transfer from a previous case management system, as they fell outside of Nottingham.

## Importance of the UPRN

Matching data across partner systems is key to providing appropriate, whole family interventions and ensuring positive outcomes for children. Where the UPRN data is missing, a manual check is required which can take between 5 to 10 minutes per entry. The team also processes information for around 500 families per quarter for a payment by results. Without the UPRN there is a risk that the information required to make a claim would be missing, resulting in missed payments (£800 per family, totalling £456,000 in 2022/2023) or extensive manual checking.

The value of UPRN linking is twofold, it enables data to be instantaneously and accurately linked between different databases and in addition it ensures that payments and claims are submitted in a timely and accurate manner.

## Progress to date

Much of the initial address matching in the case management system was undertaken by the council GIS team to automatically match data and add UPRNs with around 160,000 addresses matched in this way. At this point, address updates were also integrated into the business system to ensure accurate addresses for any new records. Based on the time savings identified the estimated total efficiency gain already accrued to the council using the API matching (rather than a manual record check and match procedure) is between £267,000 to £554,000.

## Future matching

Records currently missing UPRNs are matched manually on a case-by-case basis but there are plans by the Social Care and GIS teams to undertake another address matching exercise to clean this data. We estimate that the efficiency gain to the council by undertaking this would be in the region of £33,000 to £68,000.

## Value

Discounting the net benefits from a baseline in 2022, the total impact over the period 2018 – 2026 is estimated at £0.4 million.

# Safer Housing

## Private rented property

The Safer Housing team is responsible for the licensing of privately rented accommodation within Nottingham, running three different licensing schemes: mandatory, additional, and selective.

Properties will fall under different schemes depending on various criteria, with the aim to ensure that privately rented accommodation within Nottingham is safe and secure and that landlords are fit and proper persons to rent out a property. A failure to license a property can result in a landlord facing a financial penalty notice of up to £30,000, an unlimited court imposed fine, repayment of 12 months rental income to either the council or tenants, and potential loss of control over the rental property.

## Licensing revenue

The licensing scheme is a source of revenue for the council with, for example, a selective licence costing £890 per property remaining valid for five years. Over the period 2020/22 there were on average 3,472 licence applications made per year (2,435 selective, 521 additional and 517 mandatory) with an annual income to the council of £4.6 million.

In addition to the general licensing of privately rented accommodation, the team is also tasked to undertake proactive enforcement where either licence conditions have been broken, or a rented property that requires a licence is currently unlicensed.

## Information management

Much of the data required to check licence applications or undertake enforcement checks is held in external databases, and in addition the team will also search records of property sales within the boundaries of Nottingham City.

## The role of the UPRN

Using the UPRN as a unique identifier for a property ties all the various datasets together and makes both the licensing team and the enforcement team more efficient in their work. For the licensing team, the licence application process and issue could be undertaken without the UPRN linkage; however, we estimate that this would increase the time taken to process a single application by around 15% (from 4.78 hours to 5.5 hours).

## Value

Over a year this efficiency gain equates to savings of around £125,000 to £130,000 for the council. For the enforcement team the efficiency gains come from two sources: the time saved in pre-enforcement investigations and the search and record creation time saved during actual enforcement investigations.

The estimate of the savings is around £50,000 per year for pre-enforcement investigations and £37,000 to £40,000 per year for enforcement investigations.

The overall efficiency gain to the council for licensing and enforcement is in the range of £212,000 to £220,000 per year.

# Waste Management

## High visibility service

Waste management is a one of the most visible of functions that the council delivers. It is also labour intensive. Small amounts of time saved and reducing the number of repeat visit required has significant impact on costs.

The council is not only responsible for residential waste collection but also from commercial premises. Further, it offers various services to collect bulky waste and manages strategies for minimising fly tipping.

## Location critical

Collection is inherently reliant on location, with accurate street and address data offering advantages from better planning, monitoring, decision making, and workforce optimisation.

## Route optimisation

The collection routes in Nottingham were last optimised in 2011 using geospatial data. However, in the intervening period large number of new properties have been built and significant changes made to the existing stock. Large numbers of new properties have been added to the rounds on an ad-hoc basis resulting in inefficiencies.

## Use of tablets

Crews now work with handheld tablets containing route and address information which are used for regular rounds, missed bin collections and bulky waste collections. The waste management team estimate that without the tablets (and associated data) the efficiency of the crews is reduced by some 15%, equating to around £300,000 per year.

## Attribution

These efficiencies cannot be wholly attributed to the address and street data. Based on the assessment undertaken as part of the National ROI study, the team estimated that 20% would be a conservative assumption.

## Calculation

This gives an estimated annual saving of just under £50,000 per annum for standard waste collection.

In addition, the study considered the revenue gain to the council from bulky waste collections where crews had access to UPRN enabled addressing data.

Using a similar methodology for efficiency gains and proportion attributable to the UPRN, we estimate that additional revenue to the council of £8,000 per annum can be directly attributed to the UPRN data.

## Value

Discounting the net benefits from a baseline in 2022, the total impact over the period 2018 – 2026 is estimated at £0.6 million.

## Future

Although not calculated here, more savings can be generated by undertaking regular route optimisation, using new street and address data.

# Workplace Parking Levy


## Ground-breaking initiative

The Workplace Parking Levy (WPL) – the first of its kind in Europe – has raised almost £90 million over the 10 years since its introduction. This has been re-invested into sustainable transport across the city. As a result, it is estimated that Nottingham has secured inward investment of over £1 billion in transport, including £570 million for the tram network, £120 million for low and zero emission buses and £60 million to transform Nottingham Station into a 21st century multi-modal interchange.

## Supporting carbon reduction

Through significant investment from local businesses, transport providers, Nottingham City Council, central government and European funding, the council have implemented innovative solutions such as a wide range of electric vehicles, a biogas bus fleet and a zero-emission vehicle lane. Together these are assessed to have reduced CO2 emissions by 58% since 2005.

## Process

All businesses with 10 or more parking spaces attached to the premises are liable to pay the levy.

The availability of the address gazetteer gives the WPL team a greater understanding of the parking spaces that are available, used and not registered.

## Information system

The WPL team have an in-house developed licensing system with a front end for customers to use, so they can obtain varying licences and manage them throughout the year, it has a financial element to it, it also has the relevant communication channels etc. The back end is all the compliance information regime, every phone call made, every meeting had, every invoice chased, and every site visited.

The licensing system involves issuing an employer with a unique WPL ID (which is unique to that employer, not the individual). The employer goes through a process to establish whether they need a licence and under what circumstances. Once this is completed, they can obtain their WPL ID. The UPRN is automatically linked to the WPL ID.

## Value

The impact of not having authoritative address data is difficult to assess with certainty as there are many aspects of their operations that would be affected. After consultation with the team, it was agreed that a conservative estimate would be that the direct savings would be at least £5,000 per annum.

Although a relatively small amount in cash terms, the credibility of the scheme and the relationship of the WPL team to local businesses hinges upon them being credible and knowledgeable. This is supported by the quality of address and street gazetteers, particularly their comprehensive coverage and currency.

# Qualitative Use Cases

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There were many other social and environmental benefits identified during the study that we were unable to quantify in the time available. Here we present some key examples.

## Electoral registration

Electoral Services currently use the LLPG extensively for electoral register management. An interface has been setup which enables automatic background exchanges of information between the electoral system and address gazetteer. As access to electoral data is restricted, data cannot be directly cross-matched with other systems within the council, so this link is particularly important in checking eligibility.

A significant problem for the department is receiving online registrations to vote that have incomplete or unknown addresses. This is a frequent issue for students, which form a large and constantly changing cohort of electors. Cost and time savings are made by using UPRN data in the matching process. Over 100 hours of staff time is currently spent trying to fix and correct this problem each year. A future enhancement is to work with the universities' data systems to embed the UPRN.

Another significant benefit of having geocoded addresses is being able to allocate voters to their nearest polling stations. A lookup tool has also been developed by the GIS team to assist people in finding their polling stations using address data, reducing the need for frontline contact through enabling citizens to self-serve

## Planning

The maintenance of the LLPG directly within the planning system ensures the UPRN acts as a comprehensive, complete and consistent identifier throughout the planning lifecycle. It is intrinsic in ensuring a comprehensive view of a property to underpin development management, building control, searches and street naming and numbering, with all relevant documentation and planning status information linked via the UPRN and available to relevant officers.

Fundamentally, this removes errors in data exchange and communication, and delivers efficiency gains in operational processes.

For example, for Street Naming and Numbering, the link via the UPRN to planning and building control ensures accurate information in the early lifecycle stages of development to facilitate property numbers and street names being issued in a timely fashion, with links to planning permissions ensuring any new or changes in permission are easily picked up by officers, and links to building control providing a trigger that development has commenced to prioritise caseload.

## Climate change

Climate change projections predict substantial impacts on cities and human development in future. Cities account for nearly 60 to 80 per cent of energy use and produce some 70 per cent of human-generated greenhouse gases in the world.

In the United Kingdom, most of the energy consumed in the buildings is used for heating, which is directly linked with their energy efficiency. Energy Performance Certificates (EPC) are the only information available publicly to analyse and compare the energy efficiency of buildings and can be used to drive efforts towards energy efficiency and decarbonisation. However, EPCs are not available for all properties and the EPC databases have inconsistencies.

In Nottingham, work has been undertaken between the Carbon Neutral Policy Team and the GIS Team to look at how the use of the UPRN, as an essential link in bringing disparate datasets together, can aid the decarbonisation agenda and help to meet the 2028 carbon neutral target.

This has resulted in the production of an EPC model, linking to other property datasets, such as council housing stock, housing licensing, Ordnance Survey building heights data and residential classifications within the LLPG. The Carbon Neutral Policy team is also building advanced machine learning models using UPRN-linked property datasets to predict a buildings EPC score in the absence of a formal evaluation.

The use of these EPC property models has wide-ranging use cases for insight and project development and has been integral in allowing for the identification of spatial clusters of domestic properties that have similar retrofit needs and criteria for grant funding, informing bids submitted to central government.

Specific use cases include:

- **Net Zero Neighbourhood proposal** – a dataset used to identify a long list of neighbourhoods in the city that meet funding criteria, and as evidence-base to complete funding proposals. Without this dataset, this analysis would be constrained, and it is more challenging to put together an evidence-based proposal focused on a neighbourhood retrofit approach.

- **Use by Retrofit and Energy Assessor colleagues** – future use to help identify the likelihood of whether properties without an EPC would fall within the retrofit criteria for funded projects and prioritise EPC assessments accordingly.

- **Use by Housing Strategy, Selective Licensing, Safer Housing colleagues** – future use of estimated EPC ratings to prioritise inspections at HMOs and Almshouses that may be incorrectly claiming EPC exemptions. Future use of estimated EPC ratings to use the data to help with identifying and targeting those properties with predicted low EPC scores for intervention in the private rented sector and seek, and if appropriate enforce, improvements to the property to ensure a warmer, safer property for the tenants.

# Results

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# Key Findings

## Strong current state

Nottingham City Council have achieved a very positive position with respect to managing the completeness, accuracy and currency of the address and street data for their administrative area.

As a result, they have met the national key performance targets at the Gold-level for the last several years. This has been possible by the dedication of a small but highly skilled team that has built excellent relationships with a wide range of internal users. In turn, this has resulted in service efficiencies, increased revenue and better decision making.

However, the staff who maintain these datasets are under immense pressure. Changes in structure and reductions in staffing can often adversely affect team capacity; it is therefore critical that resource levels are maintained to realise the predicted future benefits and maintain a business-critical resource for the council in their address and street data.

The study has observed that many different functions inherently understand the value of the data they produce and maintain and can see the benefits of using it in a broader context across the authority. However, beyond a qualitative knowledge of the value of the data, there is often a lack of understanding on how to quantify this value. Senior management lacks understanding in either the value of the service or the benefits it can bring to the authority. It is hoped that quantifying the RoI will help to overcome this issue.

## Positive RoI

The results of the study show that during financial years 2018-22, Nottingham City Council generated an estimated RoI of 4.8 : 1 and an NPV of £4.1 million.

The major contributing factors to efficiency gains and increased revenues being reduced data duplication, improved tax revenues and improved waste management.

In future, the existing gains are expected to be supplemented by added value from social care data management, improved energy conservation and the workplace parking levy scheme.

It is estimated that the benefits will generate an NPV of £5.7 million over the period 2023-2026. This would represent an enhanced RoI of approximately 8.5 : 1.

Over the whole period from 2018-26, the total net benefits after applying the Treasury Discount Rate are expected to be £9.8 million representing an overall RoI of just over 6.3 : 1.

## Barriers to adoption

There are a number of barriers that are hampering further effective use of these key data resources within the council.

- Instances of erroneously treating address data as personal data resulting in restrictions to integration
- UPRNs are in many cases seen as an afterthought and are added towards the end of a process. The addition of this data earlier in the process would assist in realising its potential and value to the authority.
- The lack of understanding of the value of the data results in both a lack of investment and resources to integrate systems and use the data effectively.
- Software suppliers are reluctant to add facilities to enable more effective integration of address and street data.
- Procurement of new software systems frequently fails to specify the need to support address and street data.

Overcoming these barriers, both nationally and locally will further add to the value of address and street data at Nottingham.

# Cost Analysis

## GeoPlace

GeoPlace provides the coordination, quality assessment and improvement services for national address and street data.

It is jointly owned and funded by the Ordnance Survey and Local Government Association (LGA).

Not all of the organisation's costs are directly related to the activities of local authorities. It undertakes commercial and other activities in connection with its sales of Ordnance Survey AddressBase products and consultancy work.

In conjunction with the financial management team at GeoPlace the following has been assessed as applicable capital and recurrent costs over the period of the study. These include wages and salaries, social security, pension, temporary contracts, leases, rentals and other overheads.

For this study, a proportion has been allocated to Nottingham based on the expenditure of services as a percentage of the sum of overall expenditure across England and Wales, the extent of services they provide to local authorities.

## Local authority

The costs of the address and street management functions within the council have been derived from information provided by the GIS team.

The salary plus on-costs hourly values for 2022-23 of these levels of commitment has been based on an assumed availability after holidays and other down time.

A flat rate overhead 30% has been added to salary plus on-costs as appropriate. This is to account for facility costs (office space rent), utilities (energy, water), ICT infrastructure (internet, hardware, IT support), software licenses and other sundry costs not covered elsewhere.

# Benefits Summary

The table presented here summarises in financial terms the quantified use cases described earlier.

The net benefits have been discounted using the Treasury guidance rate of 3.5% per annum and represent the estimated mean case estimate over the period of financial years from 2018-26.

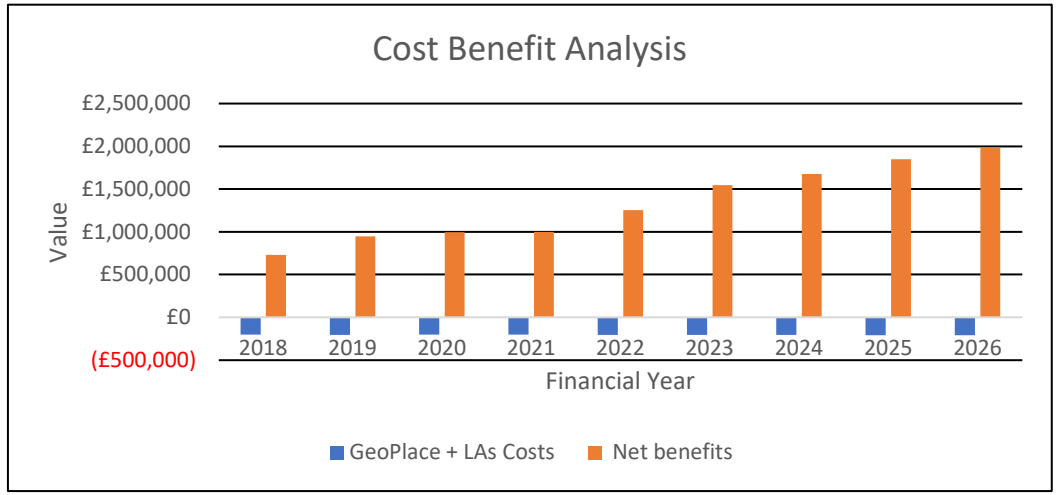
The value to Additional Business Rates, Data Sharing and Integration, Safer Housing and Waste Management Efficiency Savings represent the largest components in financial terms.

Data Sharing and Integration has ongoing growth potential as more functions see the benefits of having a single source of the truth for address and street data.

| **Discounted Benefits (per Case Study)** | |
|---|---|
| **Case Study** | **Million** |
| Data Sharing and Integration | £2.4 |
| Additional Business Rates | £6.2 |
| Waste Management Efficiency Savings | £0.6 |
| Improved Social Care Management System | £0.4 |
| Safer Housing | £2.0 |
| Workplace Parking Levy | £0.0 |
| **TOTAL** | **£11.7** |

# Return on Investment

| 2018-22 (ex-post) | Million |
|---|---|
| Discounted Costs | -£1.08 |
| Discounted Benefits | £5.24 |
| Estimated Cumulative NPV | £4.12 |
| **Return on Investment** | **4.85 : 1** |
| **2023-26 (ex-ante)** | |
| Discounted Costs | -£0.76 |
| Discounted Benefits | £6.42 |
| Estimated Cumulative NPV | £5.66 |
| **Return on Investment** | **8.44 : 1** |
| **Total Project (2018-26)** | |
| Discounted Costs | -£1.84 |
| Discounted Benefits | £11.66 |
| Estimated Cumulative NPV | £9.78 |
| **Return on Investment** | **6.33 : 1** |



# Recommendations

## Maintaining staff resources

Maintaining of current staffing levels for retaining currency and analysis of new opportunities is essential to realise the greater potential benefits in the next 4 years and maintain the current level of service. It is also critical that the integration and strong ties with Planning and Transport functions are retained, where added value and efficiencies of being positioned within this business area have been strongly evidenced in this report.

## Sustained marketing of the value proposition

We recommend a sustained, multi-faceted, marketing campaign based on the results of this study. This should include:

- Video presentations suitable for sharing with senior decision makers explaining the value of address and street data and the role of their GIS team.
- Publication of the case studies that have been produced as a result of the study.
- Socialise guides to aid procurement of systems that facilitate the integration of these data into a wider range of corporate systems.

## GeoPlace strategy

As a lead local authority support GeoPlace in its efforts to:

- Work more closely at a national level with bodies such as the Valuation Office, Land Registry and the Department for Levelling Up, Housing and Communities (DLUHC) in government and Socitm and Solace as pinnacle representative bodies.
- Complete plans to incorporate the accurate coordination of UPRNs at an earlier stage in the planning process.
- Advance the concept of improved integration of authoritative key registers within government to provide more consistent and up to date information for users across all sectors.
- Work more closely with the private organisations particularly in land and property, transport and finance sectors to ensure national address and street data meets their digital transformation objectives.

## Monitoring success

Success should be monitored by establishing key performance indicators (KPIs) that allow realised benefits to be continuously quantified. To support this the Improvement Schedules process should be extended to ask additional questions concerning realised benefits.


# Appendix: Economic Principles

# Assessment Process: Cost Benefit Analysis

## Choice of method

CBA is the most commonly used technique for deriving an estimate of RoI. The concept can be thought of simply as for each £1 of investment, how much will be returned by the end of the project.

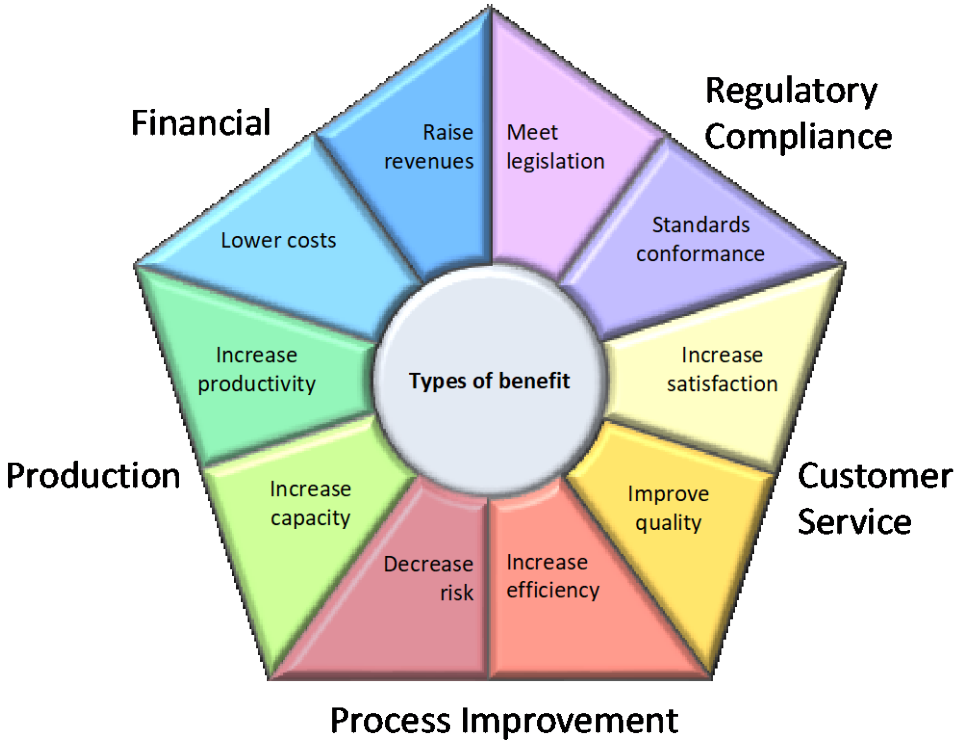
UK Treasury Green Book advice is that CBA is the most robust approach for projects where results are real and tangible, as is the case here.

CBA attempts to collate the direct costs and the most significant quantifiable benefits, adjusted for the time value of money i.e., returns achieved at some future date are discounted to take into account the opportunity cost of having made an alternative investment.

The CBA is expressed in financial terms. However, further qualitative benefits discovered during the study are also reported. These qualitative benefits, although not expressed in financial terms, may be politically, socially or environmentally significant.

## Types of benefit

We have developed a structured segmentation of benefit types that recognises a number of generic sources, as illustrated below.



# Construction of the CBA Model

From the information gathered through the preceding steps we have created a financial model. The model is essentially a set of spreadsheets that build up a picture of the Return on Investment (RoI).

## Principles

It was not feasible to conduct a survey of all functions across the council to derive returns. Constraints of time and budget did not permit such a comprehensive assessment. Further, in many cases the functions do not collect the financial performance data to directly evaluate the return on investment. To overcome these limitations, we have calculated a range of values for the RoI by including sensitivity analysis, which has varied parameters for best and worst case scenarios.

By using only a limited set of case studies and identifying some that could be quantified if time had allowed, we are presenting a conservative assessment.

In order to bring the values to a common baseline, described as Net Present Value (NPV), discount rates are applied to past and future benefits (and costs). It is conventional to ignore the effects of inflation since they generally apply equally to costs and benefits so cancel each other out.

$$\mathrm{NPV} = \frac{R_t}{(1+i)^t}$$

$\mathrm{NPV}$ = net present value
$R_t$ = net cash flow at time t
$i$ = discount rate
$t$ = time of the cash flow

Establishing the proportion of the benefits directly attributable to GeoPlace information, as opposed to the application itself has been assessed for each use case quantified.

We also considered the counterfactual – what would have been used if the gazetteers were not available. The financial model is designed to be modifiable so that it might be maintained and updated by council officers as more information becomes available in the future. This has been supplied to Nottingham City, along with a tutorial (with accompanying Microsoft PowerPoint Presentation) on how it can be best used going forward.

## Process

The study undertaken has gone through the following steps:

Each case study has been corroborated against normal industry behaviour in order to validate that it reflects the extent to which it is likely to be implementable by other local authorities across England and Wales.

The optimism bias prevalent in all case study-based calculations has been taken into account by being conservative in the value of relevant benefits.

The benefits identified by the council from their case studies has been validated against national impact based either total council revenue / expenditure or other possible metrics depending on applicability.

The flows of net benefits over time have been estimated to enable the team to calculate both the level of current cost-benefit achieved and predicted position over the next 4 years (to 2026). This horizon is considered to be sufficient to give assurance that further change is realistic but recognises that the fast pace of change of technology makes looking further insufficiently credible.

The costs for building and maintaining the address and street data is offset against the benefits. Specific costs associated with particular use cases are applied to ensure only net benefits are calculated.

The assumption has been made that investments made before 2018, in terms of both costs and benefits can be regarded as amortised.

# Study stages

The approach to the study is shown as a flow chart on the right. The approach to the tasks is detailed below.

## Use case selection

The selection process was carried out jointly between council staff and the study team. The objective was to ensure, as far as possible, a range of benefits accruing to the council, businesses and citizens were represented.

## Existing case studies

GeoPlace has a breadth of existing case studies that highlight the work of custodians and local authorities and give insights into the qualitative and quantitative value of street and address data. These are drawn from a wide range of different authorities and are found to be useful in promoting confidence by showing the success of peers.

In addition, we analysed ConsultingWhere's own database of case studies drawn from work with local authorities in the UK and international sources to supplement this information.

## Skills transfer

An online skills transfer workshop was conducted for council staff. The course materials were based on a customized version of ConsultingWhere training designed to assist practitioners in Assessing the Business Case for Investment in Geospatial Projects.

## Interviews

The research interviews were conducted over a period of two months during the spring and summer of 2023. All initial interviews were conducted face to face in Nottingham. The interviews took a structured approach that first invited interviewees to consider benefits in qualitative terms. From experience, interviewees usually find this the easiest way to explain their journey of improvement.

The interviewees were then asked to further consider the most significant benefits and how they might be expressed in financial terms. Feedback of that information to the research team was then delivered after collating relevant data and, where necessary, corroboration with colleagues.

In total, interviews were conducted with eight different functions.

## Financial model

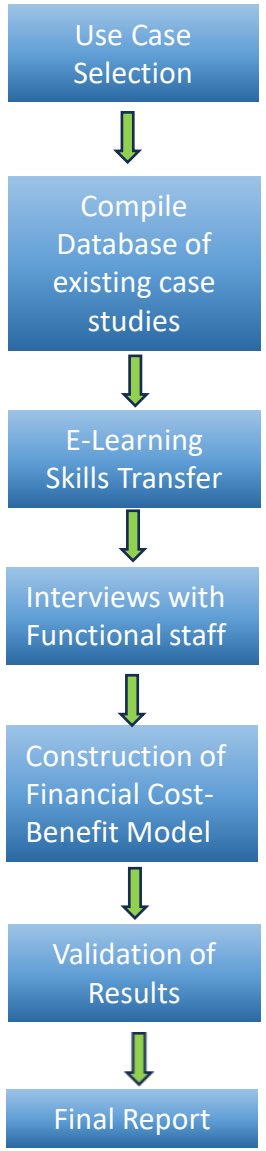
A Cost Benefit Analysis model was created (see page 26).

## Validation

Following completion of the research and analysis for the study the results were fed back to the functions contributing use cases to validate our understanding and the financial estimates.

## Final report

This is the final report. Marketing of the results will be undertaken by GeoPlace and Nottingham.



# The Value of Information

Assessing the value of information is a complex task.

The starting point is to clarify what is meant by value in the context of economic appraisal.

In economic terms fundamental geospatial data is an intermediate good. It does not of itself generate value until applied to processes or is used as an enabler in the production of goods or services. So, to understand its value, we need to explore how suppliers and users draw from the data.

For a government agency, it could be as narrow as the direct financial benefit (for example realised future savings) less the cost of the investment in acquiring the data.

For a policy decision maker, it could be as wide as the expected benefits that would accrue to society as whole from the use of the data, less its costs.

This underscored one of the important lessons in undertaking such studies, that we must not confuse the value of information with the value of benefits from policies and/or systems that use it in decision making. So, we are looking to attribute the appropriate proportion of the benefits to the information component of the application. This is often described as the "apportionment or attribution problem" by economists.

Where this was revealed in use cases, we used expert opinion to derive a conservative assessment of a suitable percentage attribution to the address information component.

The other important concept relevant to return on investment is to understand the concept of the "counterfactual". This involves evaluating alternative evidence to support decisions:

- other data sources (increasing in a world of data abundance)
- different evidence bases (often from social science)

It follows that an information source is only worth the "delta" in value between it and the next best alternative.

Value is determined by four key factors:

1. The degree of uncertainty faced by decision makers.
2. What is at stake as an outcome of a decision.
3. The cost of using the information to make decisions.
4. The cost/price of the next-best information substitute.

We must also factor-in the ability and willingness of individuals to act on the information they receive.

# Commentary

## Consistency with national study results

The estimated levels of return are commensurate with those observed in other value studies of geospatial information. The levels of return on investment over the last 5 years, also reflects those observed in the national study (2022), which adds credence to the methodology followed and rigour of analysis.

## Limitations of the financial analysis

- A limited set of use cases was included in the quantification – these were chosen because of the attributes of being easily understood and validated.
- Only a small number of benefit types, such as time savings, were evaluated.
- The innate positive bias of extrapolating from case studies has been accounted for by writing down the value of the benefits, however, this is based upon expert opinion.

## Benefits realisation

It is critical that a plan is put in place, commencing now, that allows the predicted benefits to be measured easily and reliably to facilitate future auditing.

The Improvement Schedule represents the most easily adapted vehicle for measuring KPIs.

# Comparative Studies

## Return on Investment: Assessing the value of Address and Street data to local authorities in England and Wales

GeoPlace wanted to quantify this benefit for local authorities in England and Wales, to understand what the financial return can be from maintaining that location data. Knowing the potential for a return on investment is vital, as it helps decision makers to support the business case for maintaining and using that location data authority-wide.

In 2022, GeoPlace commissioned ConsultingWhere to undertake a Cost Benefit Analysis (CBA) to determine the Return on Investment (ROI) to Local Authorities.

This study showed that more widespread adoption and use of the LLPG and LSG in each local authority is predicted to generate £384m savings over the period 2022-2026 – particularly through benefits derived in adult social care, education, planning, and environmental health. This represents an enhanced ROI of approximately 6:1. After applying HM Treasury Discount Rate, the total net benefits over the 10-year period from 2017–26 are expected to be £636m, representing an overall ROI of 5:1.

## The Economic Impact of Geospatial Services (2017)

A report commissioned by Google[14] clearly demonstrates that the application of geospatial information has significant benefits outside of the traditional geospatial domain. It estimates worldwide and regional benefits for consumers (commuting and fuel efficiency, personal safety and purchasing efficiency), private industry (new products and services, productivity benefits, sales growth particularly for small businesses and tourism spend) and wider societal benefits (job creation, traffic congestion, urban planning, civic engagement, public health, safety and emergency response, disaster preparation and responsiveness, environment and wildlife preservation, knowledge creation and human capital development).

## An Initial Analysis of the Potential Geospatial Economic Opportunity (2018)

This report was produced for the Geospatial Commission by Boston Consulting Group to examine what they describe as “unlocks of economic potential” from better use of Geospatial information.

The geospatial data landscape is changing. Increasing amounts of geospatial data, coupled with a better understanding of how it can be used, present opportunities to drive economic growth. This work has examined the issue through two lenses – the potential to create value from known private sector and public sector use cases and the potential to enable an innovative geospatial ecosystem that unlocks further growth. Analysis of private sector use cases suggests government could unlock up to £6-11 billion per year of economic value.

Better use of geospatial data in the public sector (for example through better routing of Emergency Services) will create additional economic and social value, though this has not yet been sized.

Beyond today’s use cases, enabling a more innovative geospatial data ecosystem could unlock substantial value, though the exact size is harder to quantify. This initial analysis suggests there is very significant opportunity to generate economic growth from geospatial data.

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