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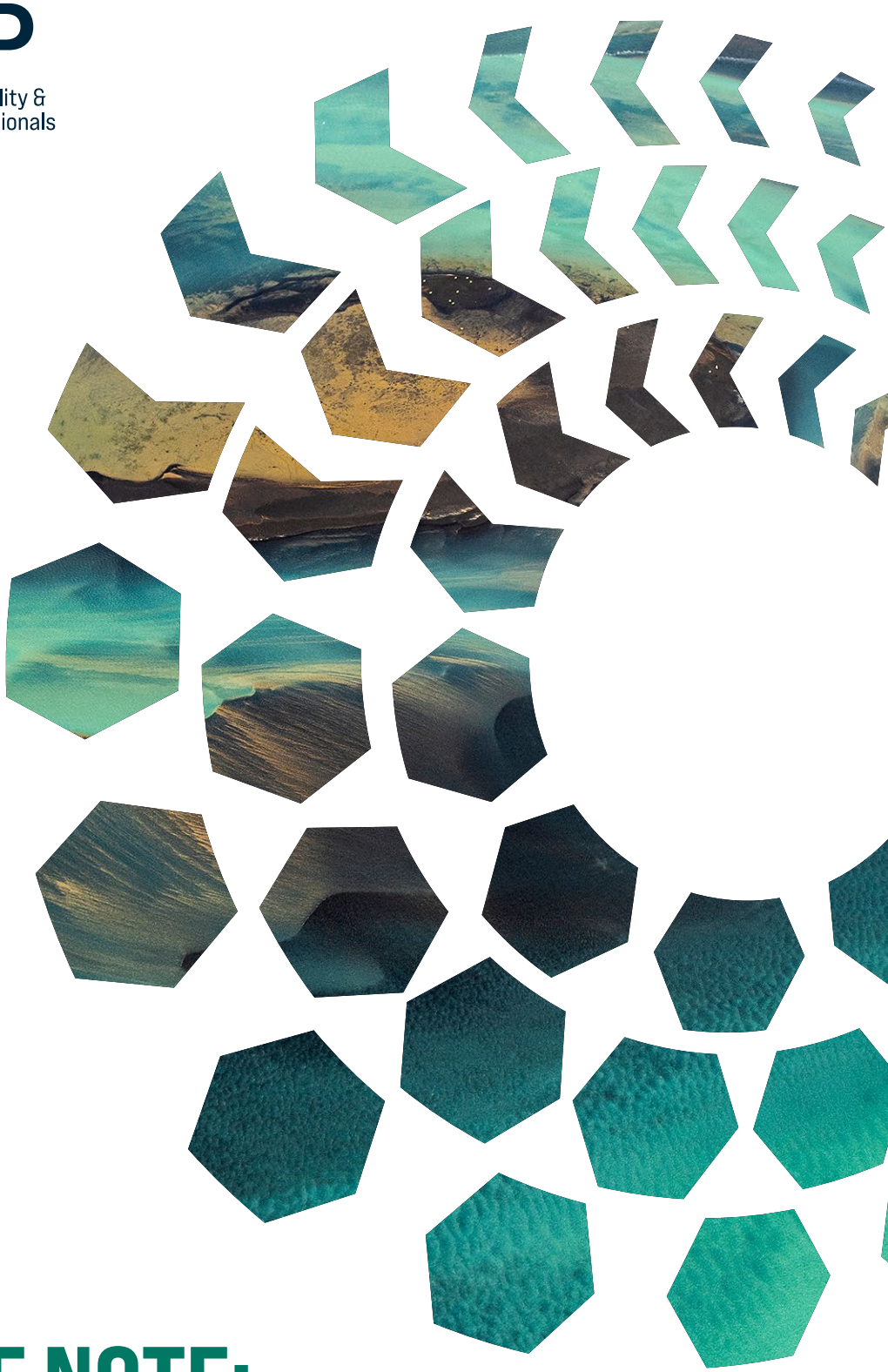

ISEP ADVICE NOTE: USING AI IN EIA

The use of Artificial Intelligence in Environmental Impact Assessment

November 2025

Introduction

With the advancement of Artificial Intelligence (AI) in the last few years, it is important that the application of AI in the field of Impact Assessment (IA) is closely regulated, and the implications of its use are understood. This Institute of Sustainability and Environmental Professionals (ISEP) Advice Note provides an overview of AI and key principles for its use in Environmental Impact Assessment (EIA) and other considerations of IA that professionals should be aware of in the application of AI. It also sets out summaries of the benefits and limitations faced in applying AI in practice, and recommended strategies for resolution.

This guidance has been prepared by a working group of IA practitioners for the benefit of stakeholders in the EIA sector. This document could be also used to help provide an opportunity for AI experts to understand the underlying issues that IA practitioners face.

It should be recognised that the authoring group of IA practitioners are not technical experts in AI but have been working together in a collaborative manner to develop ideas, share knowledge in the areas of IA and Digital EIA since the ISEP (previously IEMA) Impact Assessment Digital Working Group's inception in 2017. Input has been provided by individuals with a range of experience in the utilisation of AI tools. As such, it has been developed with a reasonable level of knowledge for this point in time in the interaction of AI and EIA.

What is AI?

AI is a broad term but can be narrowed down for the purposes of our sector. Fundamentally, it is a tool or set of tools that can be utilised for a wide range of benefits in the EIA process.

The *Oxford English Dictionary* defines AI as 'the capacity of computers or other machines to exhibit or simulate intelligent behaviour; the field of study concerned with this'.

A better definition may come from an AI model. Google AI provides the definition as 'the ability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making. It encompasses a broad range of technologies and applications, from simple rule-based systems to complex machine learning models'.

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Benefits of AI Use in IA

There are a multitude of potential benefits to applying AI tools in varying aspects of the IA process. These include:

- Efficiencies in baseline data gathering, including remote survey techniques
- Advanced search functions, including finding, reviewing and summarising case materials
- Advanced automated geospatial analysis
- Automated assessment of alternatives and scenarios and risk identification
- Streamlining document management
- Identifying cumulative schemes, especially for the DCO process where a 'long list' is necessary in the first instance
- Consultation/review summaries
- Synthesising data and predictive modelling
- Improved IA forecasting (e.g. noise, air quality, carbon footprint) to support more robust decision-making
- Assisting in drafting of Non-Technical Summaries (NTS)
- Proofreading documents, formatting, and multilingual translation
- Monitoring processes.

However, AI should be used with caution and this document aims to provide guidance to practitioners on its application. AI's application in the above aspects of the EIA process should seek to ensure it aligns with good practice guidance and advice already published by ISEP and other professional bodies, in relation to quality approaches to EIA and environmental topic assessments.

Principles of AI Use

Here, we outline six general principles for good application of AI in EIA below. They do not seek to replicate other general principles such as the IAIA's *Principles for use of Artificial Intelligence in Impact Assessment* (see reference at the end of this document) but to provide a focus on usage in general practice.

Principle 1: Understanding, Competence and Responsibility of Use

All users must bear full responsibility and accountability for the application of AI in EIA processes. As such, they need to understand the risks and benefits of use. Most critically, they must understand the intellectual property (IP) rights of information provided to a third-party AI tool and confidentiality of use in respect of the user company policies. This needs to be considered in respect of companies ensuring they meet the General Data Protection Regulations (GDPR)[1]. AI tools should only be used when their application complies with legal requirements and when users have a clear understanding of how to use them effectively, efficiently and ethically.

Principle 2: Alignment to Regulatory Frameworks, Standards and Protocols

AI applications in EIA must align with applicable national and international IA standards, regulatory frameworks and scientific protocols. This ensures that AI-generated outputs are valid, legally defensible and consistent with accepted methodologies.

Principle 3: Transparency

For reporting, full and open statements should be provided stating what type and extent to which an AI tool has been used in assessment and creating an IA report to clearly inform the decision-making. This is especially important if any Generative AI ('GenAI')[2] tool has been used. Although not yet required in UK planning law, early guidance is available for the Nationally Significant Infrastructure Project (NSIP) sector, with the Planning Inspectorate providing some high-level guidance on, 'Use of artificial intelligence in casework evidence'. Discretion should

1 www.legislation.gov.uk/eur/2016/679/contents and www.legislation.gov.uk/ukpga/2018/12/contents/enacted
2 GenAI systems combine a powerful, large language model with a user interface application layer to generate text, images, video or code outputs (completions or responses) in response to a user's prompt (input, questions or instructions).

be used in selecting the AI tool(s) to be used and ISEP recommends that, as a minimum, the name of the tool or system, date, manner of use and location in document of outputs should be stated. Equally, any third-party soliciting comments on an IA report must disclose their use of AI tools, if applied.

It is recommended that a Quality Assurance (QA) checklist is provided at the start of all reports listing AI software or tools(s) used, location(s) in the document, and make clear that this information has been checked by a subject matter expert to provide trust for stakeholders and decision-makers.

All human participants who are providing opinions, information or advice, or are involved in any form of consultation or engagement, must be advised if AI will be used to analyse their input and be offered the opportunity to withdraw their participation following standard ethical engagement protocols.

Principle 4: Accuracy and Verification

All users need to understand that AI tools/models are not likely to be perfect and errors will occur, since these tools/models are developed based on certain parameters. AI tools and systems can potentially replace, supplement, or improve field collection studies, data and impact analyses, and monitoring, or reduce time and costs. However, all users should apply oversight to AI outputs to prevent errors and ensure accurate representation. Expert peer review or independent validation of AI outputs used in critical decision-making stages or interpretation of environmental data should be carried out by all users. When AI processes are involved in consultation or reporting, all users must ensure that they clearly define the limitations of AI tools and systems, such as bias, incomplete data, or ambiguous input criteria, before using the outputs for IAs.

Principle 5: Garbage In; Garbage Out (GIGO)

AI models are defined by the input data. The better quality the input data is, the better the output. Users should ensure the best-quality information and/or details are inputted to help with supply of higher-quality outputs. Providing more details into the AI tool will lead to more reliable, accurate outputs, reducing likelihood of bias.

Principle 6: Utility not Reliance

In general use, users need ensure they do not simply rely on the AI outputs for reporting as the outputs are based on certain parameters/scenarios and therefore there are limitations of the outcome. Using the outcomes without necessary checks in place will hinder professional development in understanding of process, critical thinking and development of solutions. Organisations should look to offer ongoing training and capacity building for users of AI tools to ensure they adopt in the most effective manner since AI evolves so rapidly.

Environmental Impact Assessment Regulations require Environmental Statements to be 'prepared by competent experts', and a clear distinction should be made to ensure that AI tools used in the EIA process support these individuals in their workings and decision-making, not replace these processes.

Other Considerations

Barriers to AI

There are several barriers to the effective and ethical development, deployment, and adoption of AI within the IA process. These can be grouped into technical, legal, cultural and ethical categories.

This summary of barriers is not a complete or comprehensive list, but includes barriers commonly experienced by IA practitioners and stakeholders while working with fully developed 'off the shelf' AI tools:

Technical Barriers:

- **Data Quality and Availability:** AI systems require large, high-quality datasets as part of the machine learning/training process. In many domains, such data may be scarce, biased, or difficult to access. For some applications, AI may also provide a solution to this issue, by creating and running data ETL (extract, transform, load) processes to cleanse and cohere data either centrally or as 'single slice of truth' insights in which data can remain in multiple native platforms but analytics results are visualised for users based on the combination of input data which is of interest to their individual queries.

- **Model Interpretability:** Many AI models, especially deep learning systems, operate as 'black boxes', making it difficult to understand how decisions are made. Information, i.e. parameters for AI models, also varies from project to project. Working with AI, digital or GIS experts to develop or utilise bespoke tools for use in IA requires the sharing of knowledge, language, and understanding from different sectors. To overcome this barrier, AI transparency standards are progressing at pace, notably ISO/IEC 42001 and BS EN ISO/IEC 12792, which stress the importance and best practice around governance.

- **Scalability and Infrastructure:** Training and deploying AI models at scale requires significant computational resources and IA experts, which may not be accessible to all organisations. While this challenge may be mitigated as the technology advances, larger organisations and developers working with multiple EIA suppliers should prioritise knowledge transfer and shared resources across large programmes.

- **Robustness and Reliability:** AI systems can be sensitive to small changes in input data and may fail in unpredictable ways. Some assessments in the EIA process are quantitative, and some are qualitative; AI can support both; however, twinning AI with human expertise will produce the best results in ensuring outputs are reviewed and well understood.

- **Cybersecurity:** AI models have cyber vulnerabilities like any digital component, with potential for model drift or 'poisoning', which can affect the integrity of model outputs and alter the results to favour one party over another when using them to make environmental decisions. Secure by Design and appropriate governance such as ISO/IEC 42001 should be used to ensure the model continues to work as intended.

Legal and Regulatory Barriers

- **Lack of Regulation and Fast-paced Change:** Many jurisdictions – including the UK – lack comprehensive legal frameworks for AI, leading to uncertainty and inconsistent practices. However, emerging regulation includes the EU AI Act[3], and the UK's proposed AI Bill[4]. Fast-paced regulatory change will require AI practitioners to react, be agile, and refine their activities and foresee potential legal issues where the roles of human beings could be replaced by AI for robust integration into EIA processes.

- **Cross-border Data Governance:** AI systems retain the same challenge as wider data analysis, often operating across national boundaries, complicating issues of data protection and legal jurisdiction.

- **Safeguarding and Intellectual Property:** In addition to technical understanding and results interpretation, organisations wishing to exploit AI must also put in place safeguards around IP of data input, and output when utilising third-party AI tools.

Organisational and Cultural Barriers

- **Clarity from Consenting Authorities**: Government and consenting authorities have not provided clarity to date of how AI could benefit the IA process and what standards and/or processes should be followed. As such, organisations may be hesitant in embedding certain AI tools or processes into their company, particularly on long-duration IA projects which could see multiple changes in the regulatory approach to AI over the lifecycle.

- **Resistance to Change:** Cultural resistance within organisations can slow down AI adoption, partially linked to a fear of job displacement or lack of knowledge that can lead to resistance or disengagement. A cultural shift is required across all levels of an organisation, including information sharing and training. Human (competent expert) led QA processes should remain in place and be trusted to ensure accuracy.

3 artificialintelligenceact.eu/ai-act-explore
4 bills.parliament.uk/bills/3942

- **Lack of Expertise:** Many organisations lack the technical skills and knowledge to implement AI effectively. Training is essential, with champions/leaders in companies and the consenting and compliance authorities (e.g. Local Planning Authorities, Secretary of State, statutory consultees). There is potential that, as AI becomes more inherent, the market and competition could be affected when some companies lean more on AI than others, especially when bidding for, and implementing work.

- **Public Understanding and Use:** Public stakeholders of IA should understand how analysis results have been obtained to make an informed response to consultation. Given AI processes are newer, care should be taken to interpret results with additional clarity to reassure public stakeholders where incorrect perceptions exist based on lack of knowledge of AI. Where AI is used by third parties in consultation, such as members of the public, protest groups, statutory or non-statutory consultees etc., consideration should be given on the need and/or methods of response to consultation comments that are AI generated (i.e. that have not come from a human being).

- **Ethical Culture:** The ethical challenges posed by AI are among the most difficult to address, as they arise from the interplay between sophisticated technologies, factual realities, and deeply rooted human moral values. These dilemmas can emerge when AI systems provide outputs for decision-makers with the potential to significantly impact individuals or entire communities. It is essential to ensure that all possible choices align with fundamental moral principles such as fairness, accountability, and transparency. Without a strong ethical foundation, some organisations may prioritise performance over responsible AI use.

Ethical Barriers

- **Bias:** Bias in AI algorithms constitutes a significant ethical concern. These systems are trained on data, and when that data contains biases – whether stemming from historical injustices, entrenched societal prejudices, or the subjective perspectives of developers – the resulting outputs may perpetuate or even amplify those biases. Consequently, the integrity and fairness of AI-driven decisions can be compromised, raising critical questions about accountability and justice in algorithmic design. Bias can be partially overcome by methods outlined earlier in this Advice Note, ensuring the inputs/requests to the AI tool are as detailed as possible.

- **Privacy:** AI systems frequently require extensive volumes of personal data to function effectively, often sourced from digital footprints such as online behaviour, social media interactions, and physical surveillance mechanisms. The vast scale and pervasive nature of this data collection have raised significant concerns regarding individual privacy and the security of sensitive information.

- **Environmental Impact:** The environmental ethics of AI use primarily concern the significant energy consumption and carbon footprint associated with training and deploying large-scale AI models. These systems often require vast computational resources, leading to high electricity usage, much of which may be sourced from non-renewable energy. This raises concerns about sustainability, especially as AI adoption accelerates across industries. Ethical deployment of AI thus necessitates a balance between technological advancement and environmental stewardship, including efforts to optimise algorithms for energy efficiency, invest in green computing infrastructure, and ensure transparency in reporting environmental costs. Companies should consider the use of AI within their Environment Management Systems (EMS), notably carbon management and reporting, and ethical frameworks to overcome this barrier.

- **Accountability and Responsibility:** Another significant ethical dilemma in AI concerns the attribution of responsibility. When AI systems produce outcomes that lead to harm or have substantial consequences, determining who should be held accountable becomes complex. Should responsibility lie with the developers who designed the system, the users who deployed it, or can it be attributed to the AI itself? This question is further complicated by the increasing autonomy of AI systems, which often operate with minimal human oversight, thereby blurring traditional lines of accountability. Adherence to company policies and regular audits can overcome this barrier to a degree.

- **Utilisation:** It is important to ensure that the early career/graduate tasks are not replaced by AI. Avenues need to remain and be attractive to new starters entering the industry. Phased adoption, diverse training programmes, pilot projects, and sharing of knowledge can hopefully help overcome this barrier.

Further Reading

Other documents related to the use of AI and digital tools in IA are available from ISEP and other bodies. A selection of related further reading is set out below:

ISEP Publications

- A Roadmap to Digital Environmental Assessment (ISEP, 2024).
- Digital Impact Assessment – A Primer for Embracing Innovation and Digital Working (ISEP, 2020).
- ISEP Impact Assessment Outlook Journals, notably Volume 6 – Digital IA Practice (May 2020) and Digital IA practice and competency articles in Volumes 20 (April, 2024) and 22 (Sept 2024).

Other Publications

- Principles for Use of Artificial Intelligence in Impact Assessment (IAIA, 2025).
- Use of Artificial Intelligence in Casework Evidence (PINS, 2024).
- The State of Digital Impact Assessment Practice (FothergillTC & IAIA, 2021).

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FURTHER INFORMATION

For more information please contact:

Dr Rufus Howard
Policy and Engagement Lead, Impact Assessment, ISEP

POLICY@ISEPGLOBAL.ORG

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