

Beyond The AI Buzz

Practical Application of AI in Contaminated Land

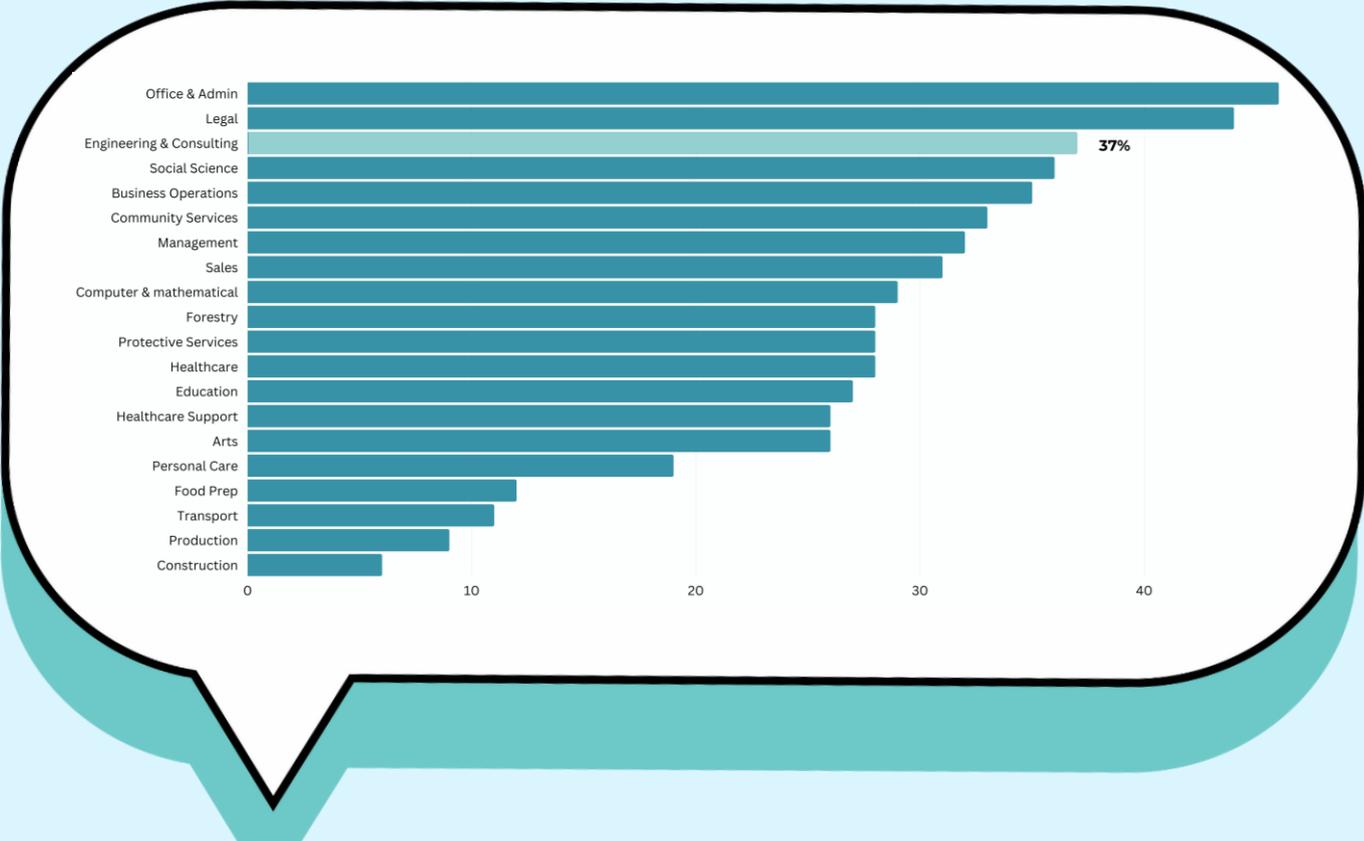
The AI Explosion

Time taken to reach 1 million users/downloads



Industry Outlook: Goldman Sachs

“AI could boost aggregate labour productivity growth by roughly **1.5 percentage points** in the U.S. over a decade”

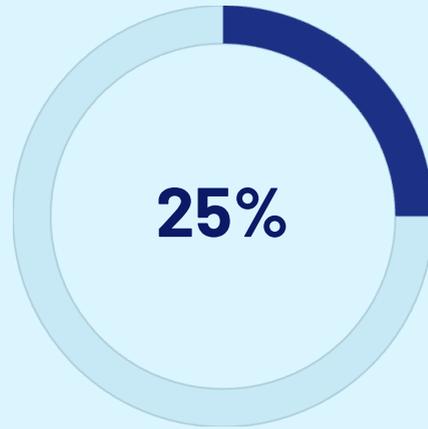


Goldman Sachs

Software + Consulting

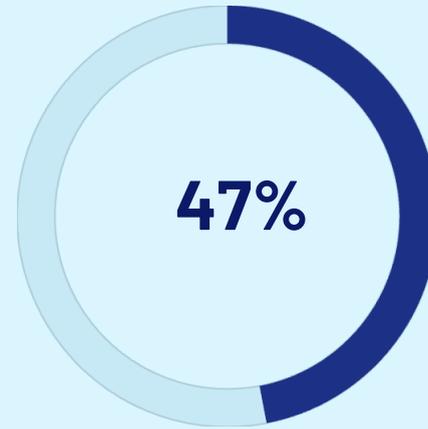


ALGA's AI Survey Results



AI Policy

Organizations that already had an AI policy in place



In Development

Organizations exploring or developing an AI policy



Report Writing

Professionals who believe report writing will see the biggest disruption



Australasian Land & Groundwater Association

Top Opportunities & Barriers



Where AI Will Help Most?



PSI/Phase 1 Reporting



Data Analysis



Modelling

Biggest Barriers to using AI



Lack of Expertise



System Integration



Data Security



ALGA

“AI is going to be great one day. But we seem to be **many, many years away from it being usable for small-scale or low margin work.”**

So We Asked: Can We Change That?



1. Introduction

HELIA EHS Limited (Helia) was engaged by **Lend Lease** (the Client) to conduct a **Detailed Site Assessment** (PSI or the Assessment) for the property located at **Mossman Park Community Ground, Freemantle, Perth, Western Australia** (the Site).

The Site is approximately **170 Hectares** and is surrounded by **Native Woodland along the north and western boundary of the site, a service station runs along the eastern boundary with retail stores, south of the site is a main road and opposite is a park with a pond.** The location of the Site and the surrounding area is presented in **Appended Figure 1**.

1.1 Project Appreciation

Helia understands that the Client is seeking contaminated land advice for the Site where the intention is to construct a commercial building to be leased. It is understood the intended lessee has concerns with environmental risks associated with the subject Site and surrounding properties. The Client has requested that Helia assess publicly available information to determine the suitability of the Site for commercial use.

1.2 Purpose and Objectives

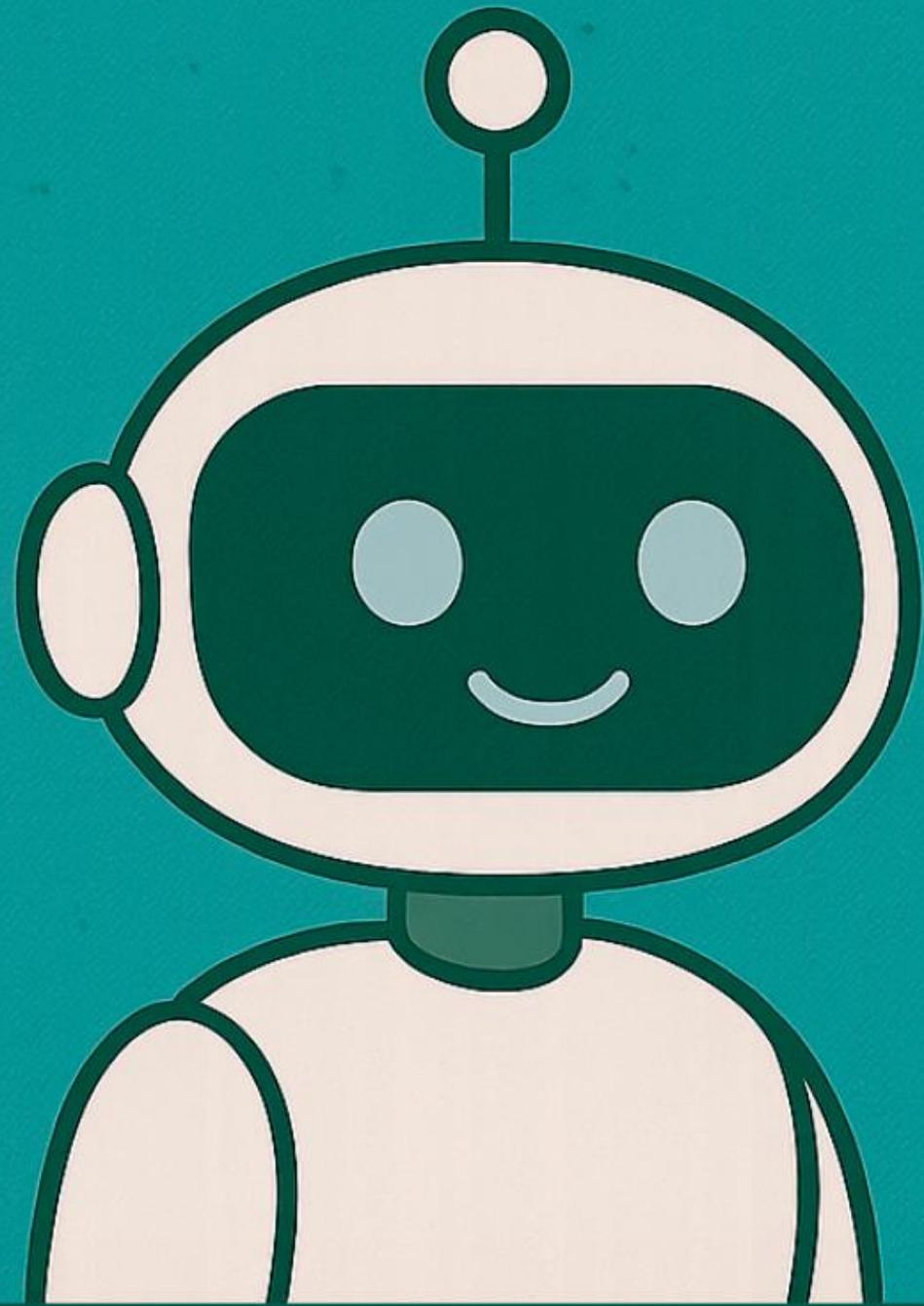
The purpose is to conduct an assessment in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (National Environment Protection Council, 1999). The Assessment will address the following key objectives:

- Assess the potential for Site contamination with respect to the current and future commercial and industrial land use.
- Provide a preliminary desktop review to identify any potential sources of soil



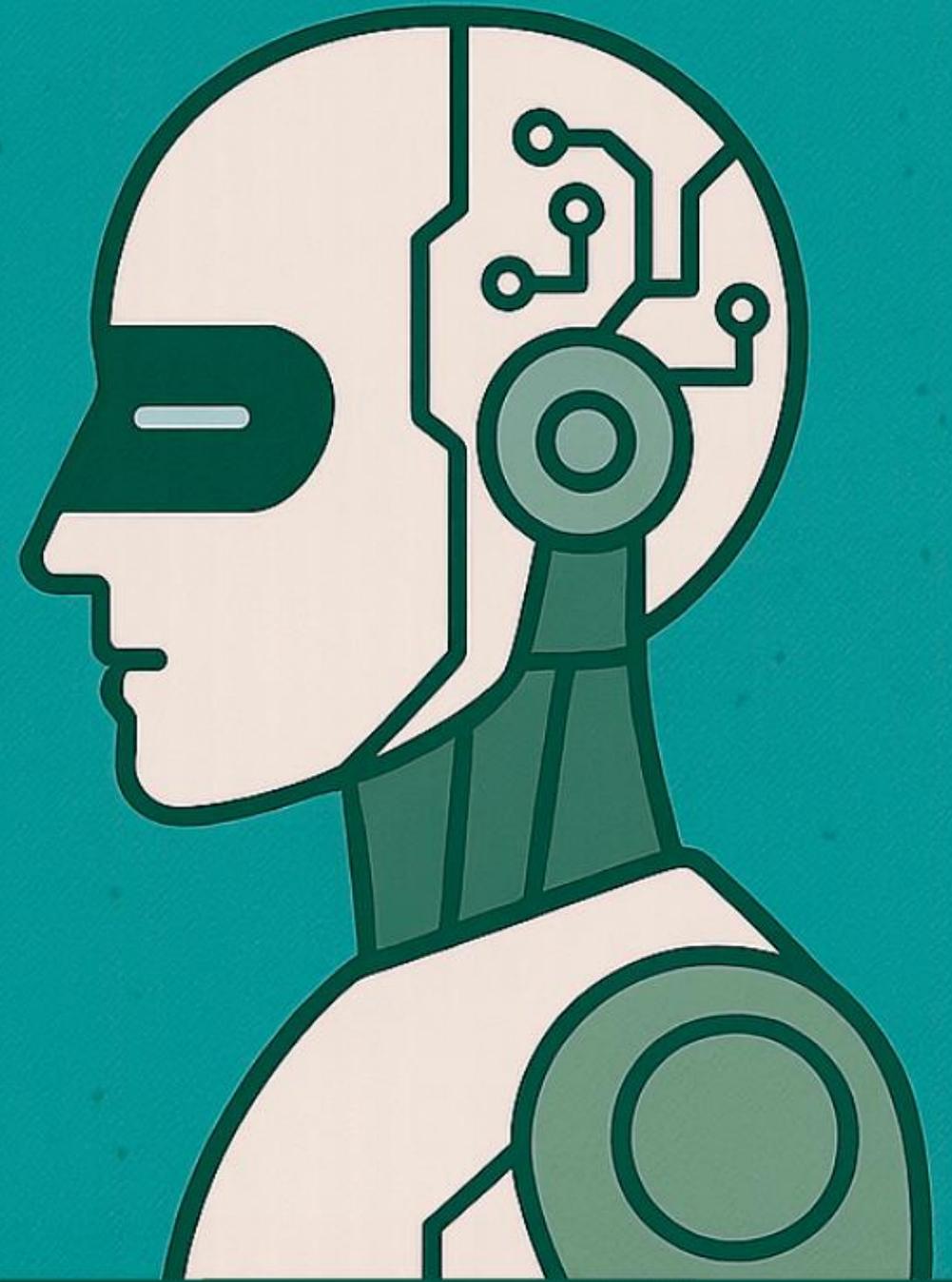
Map Data Related to Site

Site Boundary	
Length	
Title	
Centroid	
Area	
PCA _ potentially Contaminated Ac..	
Title	
Length	
Centroid	
Area	



**AI
ASSISTANT**

VS



**AI
AGENT**

Assistant & Agents

The geology at 849 Richmond Road Marsden Park is primarily underlain by Bringelly Shale, characterised by dominant claystone deposits. This geological unit consists mainly of carbonaceous claystone interbedded with layers of fine sandstone, siltstone and occasional thin coal seams forming the sub-surface foundation across the site. Overlying the bedrock are Alluvial Floodplain deposits made up of silt, sand rich in quartz and lithic fragments and clay, reflecting the area's history as part of an active floodplain system.

Location: Pr...

2. Bringelly Shale

terrain. These soil

wet areas the

drainage patte

Location: Pr...

This summary

3. Saint M...

Location: Pr...

Agent using G...

Location: Pr...

Hydrogeology

- The area

- Several

Structural Fea

- No signifi

Naturally Occurr

- No naturally o

Chat GPT 5

“Provide a summary of the site geology as seen in the uploaded document to use in my report.”

...vium overlying sedimentary bedrock

How Does it work

 **Sentence**

 **Prompt**

 **Source**

 **Knowledge**

Internal Data

-  Project Data
-  Field Data
-  Chemical Data
-  Map Data

Internal Knowledge

-  Style Guides
-  Internal Wisdom
-  Examples

External Data

-  Former Reports
-  Third Party Docs
-  Proposals

External Knowledge

-  Documents
-  Website

Examples

Sentence

Prompt

Source

Knowledge

Contamination Sources

Draw upon information in the knowledge source to provide a list of potential contamination sources on the site

ADEC Land Insight

Style Guide **Examples**
 WA DWER guidelines
 WA.GOV.systemfiles/gui..

QA/QC summary Text

Summarise all samples that exceed the RPD exceedance criteria, if there is an exceedance justify why the sample could have exceeded it.

My RPD exceedance criteria is identified in Evalu8

QA/QC Data Table in Evalu8

Style Guide **Examples**
 Schedule B1
 Soil is not Homogenous....
 NSW.GOV/Contaminat...

Knowledge

The Holy Grail



Knowledge – Nothing added

Reviewing the provided soil contaminant data for the former bulk storage area, exceedances of Nickel, Arsenic, and Lead above Human Health Investigation Level A (HIL A – Residential with garden/access) were identified:

Nickel reached up to 1100 mg/kg at HA03. Arsenic levels up to 290 mg/kg were recorded in multiple locations (HA07, HA08, HA09, HA13, HA14, HA17, HA18, HA19, HA23). Lead concentrations as high as 489 mg/kg were recorded in HA18, with other samples (HA08, HA09, HA12, HA13, HA18, HA19, HA23) also exceeding HIL A.

Accordingly, based on these exceedances, the site presents potential health risks for uses requiring high protection for sensitive populations—such as an aged care facility. Without further assessment, remediation, or risk management, the site in its current condition is unsuitable for the proposed use.

Conceptual Site Model (CSM):

Source: Past storage operations leading to metal emissions (Nickel, Arsenic, Lead) into soil.

Pathways: Direct contact (dermal and ingestion), dust inhalation, possible leaching to groundwater.

Receptors: Future facility residents (elderly), staff, and visitors—all more susceptible to contaminant exposure.

Exposure: Likely through contact with surface soil in gardens, unsealed landscaping, or during construction/maintenance.

In conclusion, remediation or risk management will be required to ensure site suitability for an aged care facility, to prevent chronic exposure of future sensitive occupants.

Knowledge - Examples

Review of Soil Exceedances Relative to Human Health Guidelines and Site Suitability Assessment

Summary of Exceedances:

Nickel was detected in soil at concentrations ranging from 12 to 1100 mg/kg, with a significant exceedance for Human Health (HIL A: Residential with garden/access) at HA03 = 1100 mg/kg. Arsenic concentrations ranged from 56 to 290 mg/kg, exceeding HIL A in multiple locations, with the highest at HA13 = 290 mg/kg and exceedances at other samples (e.g. HA08 = 221 mg/kg, HA14 = 210 mg/kg). Lead ranged from 101 to 489 mg/kg, with multiple exceedances of HIL A, the highest being HA18 = 489 mg/kg and other significant values in HA19 and HA23.

Assessment of Suitability for Aged Care Facility:

The proposed end use is an aged care facility, which is considered a highly sensitive land use. Comparison with HIL A (Residential with garden/access) is appropriate and conservative for this setting. The identified exceedances for nickel, arsenic, and lead indicate there is a potential human health risk for future site users, particularly considering the increased susceptibility of elderly residents. Both arsenic and lead pose significant chronic health risks with known adverse effects, especially to vulnerable populations.

Based on the data, the former bulk storage area (in its current condition) is not suitable for use as an aged care facility without further remediation or management to mitigate the identified risks. Further assessment, including delineation of contamination extent and a remediation action plan, would be needed to make the site suitable for the proposed land use.

Conceptual Site Model (CSM):

- Source: Historical operations at the former bulk storage area resulting in elevated levels of arsenic, lead, and nickel in site soils.
- Pathways: Direct contact with soil (ingestion, dermal), incidental ingestion of soil/dust, inhalation of dust, possible uptake by plants grown onsite.
- Receptors: Residents and staff of the aged care facility (elderly and other sensitive individuals).

Conclusion:

Significant exceedances of key contaminants in soil currently represent a risk to human health. The site is not suitable for its proposed aged care use without remediation or management. Further detailed investigation and a remediation plan are recommended to address the exceedances, reduce risk, and ensure compliance with human health guidelines for sensitive land use.



Knowledge – Examples & Wisdom

Soil samples collected from the former bulk storage area have returned exceedances of Nickel, Arsenic, and Lead compared to the adopted Human Health Investigation Level A (HIL A) criteria (residential with garden/access), which is typically considered more conservative than commercial/industrial guidelines and protective for sensitive uses such as aged care facilities.

Nickel concentrations were elevated up to 1100 mg/kg (e.g., sample HA03), meeting or marginally exceeding the guideline for residential/aged care settings in at least one sample. Arsenic results ranged from 56 to 290 mg/kg, with several samples (HA07, HA08, HA09, HA13, HA14, HA17, HA18, HA19, HA23) exceeding the HIL A criterion. Lead concentrations ranged from 101 to 489 mg/kg, with frequent exceedances noted in samples HA08, HA09, HA12, HA13, HA18, HA19, and HA23.

Conceptual Site Model (CSM):

The key exposure pathways in an aged care setting are: dermal contact and incidental soil ingestion (given outdoor areas/access), and inhalation of dust. Residents in aged care facilities represent a sensitive population, though lifetime exposure duration is generally shorter than for primary schools. Nonetheless, the presence of contaminants above HIL A triggers further consideration for risk management, particularly for residents with potentially compromised health.

Recommendations, NEPM Guidance:

- Soil remediation or management will be required to bring concentrations of arsenic and lead below HIL A criteria in areas accessible to residents (e.g., top 0.5 m of soil in gardens, pathways, recreation areas).
- Where remediation is not feasible, implementation of clean fill capping or hardstand should be adopted to eliminate direct exposure risks.
- An assessment of the potential for contaminant migration (e.g., groundwater pathways) should be undertaken if not already completed.
- Site management plans must be developed to address residual contamination, including ongoing inspection and maintenance.



Knowledge – Examples, Wisdom, Docs & URL

Summary of Exceedances:

Laboratory analysis identified exceedances of Nickel (12–1100 mg/kg), Arsenic (56–290 mg/kg), and Lead (101–489 mg/kg) in soil samples from the former bulk storage area, compared to Human Health Investigation Level A (HIL A, Residential with garden/access). Multiple samples for each contaminant were above relevant guidelines, indicating widespread occurrence of these metals at concentrations of concern.

Conceptual Site Model (CSM):

For the proposed aged care facility, the CSM identifies:

- Primary sources: Historical activities at the bulk storage area leading to elevated concentrations of Nickel, Arsenic, and Lead in soil.
- Exposure pathways: Dermal contact, soil ingestion (incidental), and inhalation of dust/vapours. Since older adults may be less mobile and spend more continuous time indoors, inhalation and soil ingestion rates may differ compared to other land uses. However, their increased susceptibility to toxins also requires careful consideration.
- Receptors: Residents and staff of the aged care facility, the aged care context involves residents with lower life expectancy but heightened sensitivity to certain toxicants.

Risk Assessment and NEPM Management Recommendations:

Given the exceedances and the vulnerable receptor group, the site in its current state does not meet the NEPM health-based guidelines for aged care occupancy. NEPM recommends the following management/remediation approaches:

1. Delineate the precise extent of contaminated soil through targeted sampling, especially in key facility use areas (e.g., gardens, recreation zones).
2. Remove and appropriately dispose of soil exceeding NEPM guidelines, prioritizing areas with the highest contaminant loads and likely resident contact.
3. Cap or contain impacted soil in low-contact zones, implementing landscape barriers to prevent exposure.
4. Implement ongoing dust suppression and site management during remediation, with clear signage and access controls.
5. Confirm remediation success via validation sampling prior to occupation.

Recommendations:

- Engage environmental specialist to design and oversee soil removal/containment works, ensuring that all relevant NEPM protocols are followed.
- Develop a site management plan to address residual risks, including regular monitoring and maintenance of any engineered barriers.
- Clearly communicate contamination status and remediation outcomes to all stakeholders.



Models



Chat GPT

GPT 5
GPT oss 20b
GPT oss 120b
o4
o4 Mini

4.1 mini
4.1
4.5
o1-mini
o1



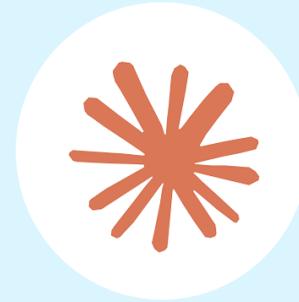
Grok

Grok 3 [beta]
Grok 4



Llama

3.3 70b
3.1 405b
4 Scout
4 Maverik
Behemoth



Claude

Sonnet
Sonnet [r]
3.5 Haiku
Opus 4.1
Opus 4

4 Sonnet
3.7 Sonnet
3.7 Sonnet [r]
3.5 Sonnet



Gemini

2.5 Flash
3 27b
2.5 Pro
2.0 Flash



Deepseek

R1
V3
V3 0324

Models

Best in Reasoning (GPQA Diamond) ⓘ



Best in High School Math (AIME 2025) ⓘ



Best in Agentic Coding (SWE Bench) ⓘ

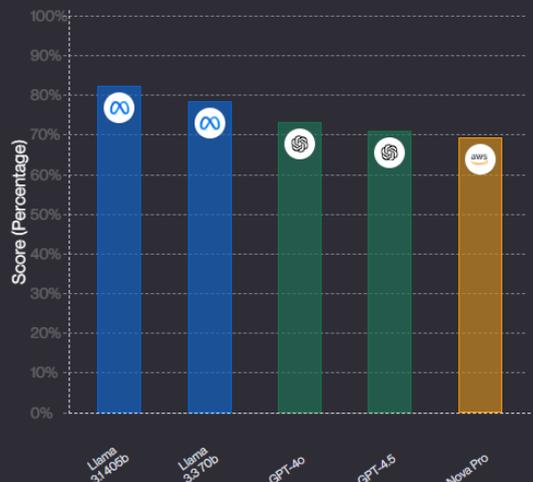


Model Comparison

Showing 37 out of 37 results

Models	GRIND ⓘ	AIME 2024 ⓘ	GPQA ⓘ	SWE Bench ⓘ	MATH 500 ⓘ	BFCL ⓘ
GPT-5	n/a	n/a	87.3%	74.9%	n/a	n/a
Claude Opus 4.1	n/a	n/a	80.9%	74.5%	n/a	n/a
GPT oss 20b	n/a	96%	71.5%	n/a	n/a	n/a
GPT oss 120b	n/a	96.6%	80.1%	n/a	n/a	n/a
Grok 4	n/a	94%	87.5%	75%	n/a	n/a
Claude 4 Opus	67.9%	n/a	79.6%	72.5%	n/a	n/a
Claude 4 Sonnet	75%	n/a	75.4%	72.7%	n/a	n/a
Gemini 2.5 Flash	n/a	88%	78.3%	n/a	n/a	n/a
OpenAI o3	n/a	91.6%	83.3%	69.1%	n/a	n/a
OpenAI o4-mini	50%	93.4%	81.4%	68.1%	n/a	n/a
Nemotron Ultra 253B	57.1%	80.08%	76%	n/a	n/a	n/a
GPT-41 nano	n/a	29.4%	50.3%	n/a	n/a	n/a
GPT-41 mini	n/a	49.6%	65%	23.6%	n/a	n/a
GPT-41	n/a	48.1%	66.3%	55%	n/a	n/a
Llama 4 Behemoth	n/a	n/a	73.7%	n/a	95%	n/a
Llama 4 Scout	n/a	n/a	57.2%	n/a	n/a	n/a
Llama 4 Maverick	53.6%	n/a	69.8%	n/a	n/a	n/a

Best in Tool Use (BFCL) ⓘ



Best in Adaptive Reasoning (GRIND) ⓘ



Best Overall (Humanity's Last Exam) ⓘ



Model – Test Info

“Summarize the RPD exceedances in no more than two paragraphs, and include a table showing exceedances ”

Analyte	Units	RPD Accept...	HA01	DUPI	RPD	Trip	RPD	HA10	Dup 2	RPD
Depth Deep			0.1m					0.2m	0.2m	
Datey McDateFace			02-01-0224	02-01-0224		02-01-0224		02-01-0224	02-01-0224	
Aldrin	mg/kg	30%	< 0.01	< 0.01	-	< 0.01	-	-	-	-
Arsenic	mg/kg	30%	78	24	105.88%	55	34.59%	76	12	145.45%
Cadmium	mg/kg	30%	0.17	0.12	34.48%	0.12	34.48%	0.17	0.17	0%
Chromium (hexavalent)	mg/kg	30%	< 0.4	< 0.4	-	< 0.4	-	< 0.4	< 0.4	-
Chromium (III+VI)	mg/kg	30%	124	19	146.85%	19	146.85%	124	124	0%
Copper	mg/kg	30%	162	10	176.74%	12	172.41%	162	162	0%
Dieldrin	mg/kg	30%	< 0.01	< 0.01	-	< 0.01	-	-	-	-
Dry Matter	g/100g as r...	30%	81	81	0%	94	14.86%	81	81	0%
Lead	mg/kg	30%	181	26	149.76%	120	40.53%	13	129	163.38%
Mercury	mg/kg	30%	3	-	-	-	-	3	3	0%
Nickel	mg/kg	30%	12	14	15.38%	14	15.38%	12	12	0%
Zinc	mg/kg	30%	179	92	64.21%	98	58.48%	179	179	0%

Models results

A review of the analytical data revealed RPD exceedances in 7 duplicate sample results and 6 triplicate sample results against the acceptance criterion of 30%. Specifically, duplicate RPDs for Arsenic (105.88% at HA01@0.1, 145.45% at HA10@0.2), Cadmium (34.48% at HA01@0.1), Chromium (146.85% at HA01@0.1), Copper (176.74% at HA01@0.1), Lead (149.76% at HA01@0.1, 163.38% at HA10@0.2), and Zinc (64.21% at HA01@0.1) exceeded this criterion. Triplicate RPD exceedances were observed for Arsenic (34.59% at HA01@0.1), Cadmium (34.48% at HA01@0.1), Chromium (146.85% at HA01@0.1), Copper (172.41% at HA01@0.1), Lead (40.53% at HA01@0.1), and Zinc (58.48% at HA01@0.1).

All exceedances occurred at sampling locations HA01 and HA10, at depths of 0.1m and 0.2m respectively. The elevated RPDs in the soil samples can be caused due to the inherently heterogeneous nature of the site soils. A review of the soil bores logs at the site confirms the soils are not homogenous. Limited mixing of the soils was completed during sampling to minimise the disturbance of the soils and the potential loss of volatile organic compounds.

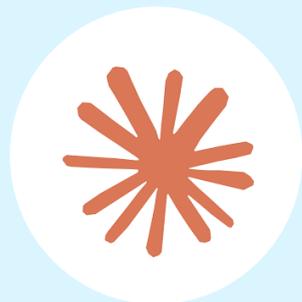


Gemini Flash 2.5

Models results

A total of two duplicate samples and one triplicate sample were collected from locations HA01 and HA10 for quality control purposes. Multiple chemicals exceeded the RPD acceptance criteria of 30% across these samples. At location HA01 (0.1m depth), exceedances were identified for Arsenic (DUP RPD: 105.88%, TRIP RPD: 34.59%), Cadmium (DUP RPD: 34.48%, TRIP RPD: 34.48%), Chromium (DUP RPD: 146.85%, TRIP RPD: 146.85%), Copper (DUP RPD: 176.74%, TRIP RPD: 172.41%), Lead (DUP RPD: 149.76%, TRIP RPD: 40.53%), and Zinc (DUP RPD: 64.21%, TRIP RPD: 58.48%). At location HA10 (0.2m depth), exceedances were noted for Arsenic (DUP RPD: 145.45%) and Lead (DUP RPD: 163.38%).

The elevated RPDs in the soil samples can be attributed to the inherently heterogeneous nature of the site soils. The significant variation in duplicate and triplicate results reflects the non-uniform distribution of contaminants within the soil matrix, which is characteristic of disturbed or heterogeneous soil environments. Limited mixing of the soils was completed during sampling to minimise the disturbance of the soils and the potential loss of volatile organic compounds, which may have contributed to the observed variability between duplicate samples.



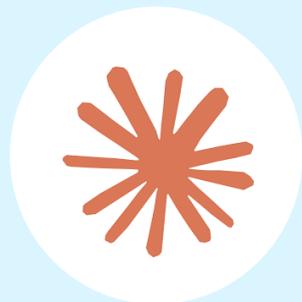
Claude Sonnet 4.0

Models results

Field duplicates were collected at two soil sample locations (HA01 at 0.1 and HA10 at 0.2), and field triplicates were collected at one location (HA01 at 0.1). Using an RPD acceptance criterion of 30%, exceedances were observed at HA01 (0.1) for arsenic, cadmium, chromium, copper, lead, and zinc, and at HA10 (0.2) for arsenic and lead. Reported duplicate RPDs and, where available, triplicate RPDs are summarized in the table below to identify the specific locations and analytes exceeding the acceptance criteria.

The elevated RPDs, particularly for the duplicate samples, are likely attributable to the inherently heterogeneous nature of soils. The collection of discrete samples from the exact same piece of soil is not feasible, which naturally introduces variability in the analytical results. This heterogeneity is particularly pronounced in disturbed or mixed soil matrices where metal concentrations can vary significantly over small spatial scales.

Location	Depth (m)	Chemical	RPD Acceptance (%)	Duplicate RPD (%)	Triplicate RPD (%)
HA01	0.1	Arsenic	30	105.88	34.59
HA01	0.1	Cadmium	30	34.48	34.48
HA01	0.1	Chromium	30	146.85	146.85
HA01	0.1	Copper	30	176.74	172.41
HA01	0.1	Lead	30	149.76	40.53
HA01	0.1	Zinc	30	64.21	58.48
HA10	0.2	Arsenic	30	145.45	-
HA10	0.2	Lead	30	163.38	-



Claude 4.1 Opus

Models results

A total of 8 duplicate and 6 triplicate RPD comparisons exceeded the acceptance criterion of 30% RPD. Exceedances were observed at two soil sampling locations: HA01 at 0.1 m and HA10 at 0.2 m. At HA01 (0.1 m), duplicate and triplicate RPD exceedances were recorded for arsenic, cadmium, chromium, copper, lead, and zinc. At HA10 (0.2 m), duplicate RPD exceedances were recorded for arsenic and lead. These results indicate that exceedances were concentrated at HA01 (0.1 m) across multiple analytes, with additional duplicate exceedances at HA10 (0.2 m) for two analytes. The acceptance criterion applied was $RPD \leq 30\%$ for both duplicate and triplicate comparisons.

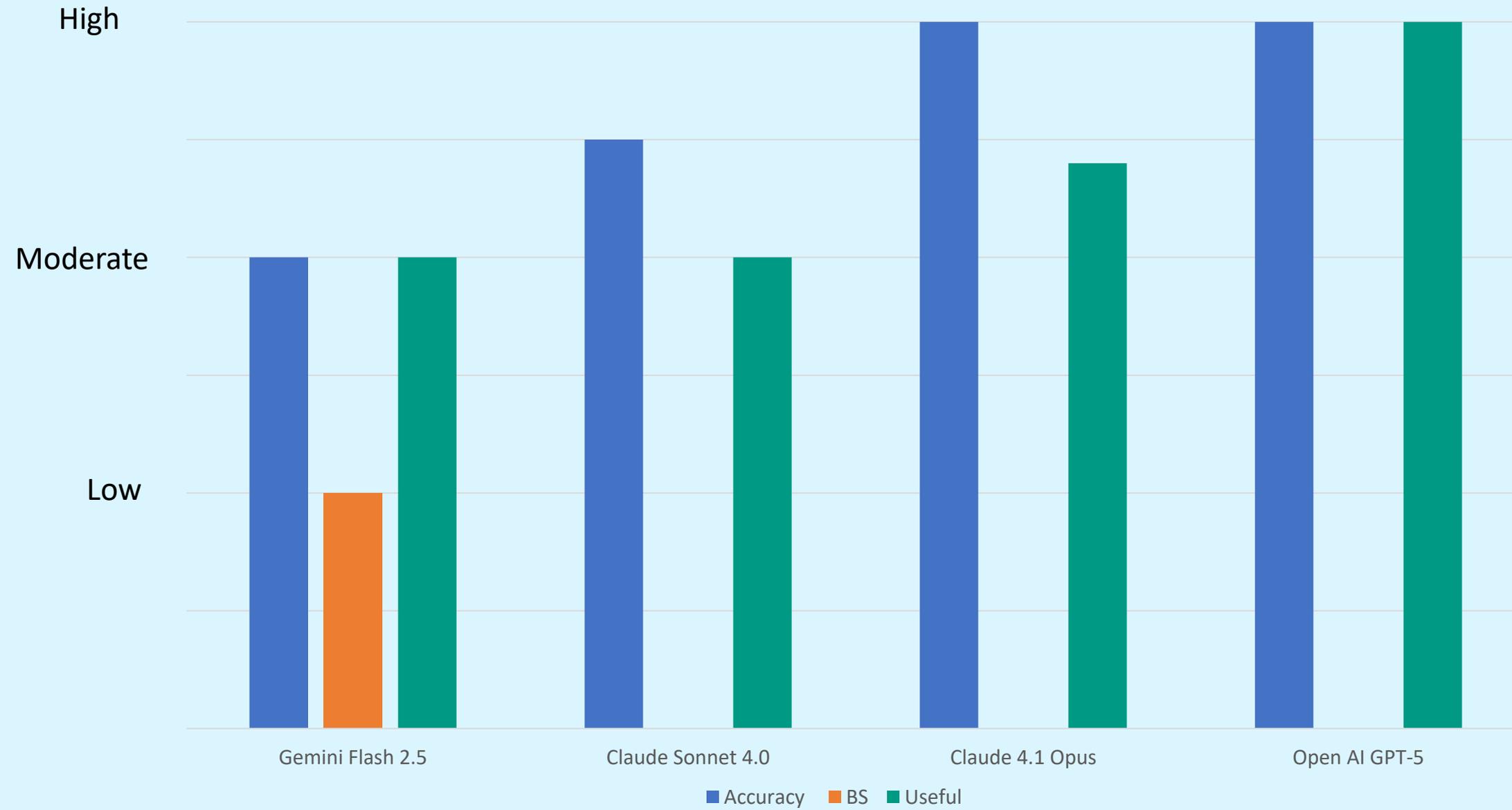
The elevated RPDs in the soil samples can be attributed to the inherently heterogeneous nature of the site soils; a review of the site soil bore logs confirms the soils are not homogeneous. Additionally, limited mixing of soils was undertaken during sampling to minimize disturbance and potential loss of volatile organic compounds, which can lead to increased variability between quality control samples and, consequently, higher RPDs.

Location	Depth (m)	Chemical	DUP RPD	TRIP RPD	Acceptance RPD
HA01	0.1	Arsenic	105.88	34.59	30
HA01	0.1	Cadmium	34.48	34.48	30
HA01	0.1	Chromium	146.85	146.85	30
HA01	0.1	Copper	176.74	172.41	30
HA01	0.1	Lead	149.76	40.53	30
HA01	0.1	Zinc	64.21	58.48	30
HA10	0.2	Arsenic	145.45		30
HA10	0.2	Lead	163.38		30



Open AI GPT-5

Models results



Temperature



0.3

0.6

0.9

Low
Temperature

Medium
Temperature

High
Temperature

Temperature results

Field duplicates were collected at two soil sample locations (HA01 at 0.1 and HA10 at 0.2), and field triplicates were collected at one location (HA01 at 0.1). Using an RPD acceptance criterion of 30%, exceedances were observed at HA01 (0.1) for arsenic, cadmium, chromium, copper, lead, and zinc, and at HA10 (0.2) for arsenic and lead. Reported duplicate RPDs and, where available, triplicate RPDs are summarized in the table below to identify the specific locations and analytes exceeding the acceptance criteria.

Elevated RPDs in the soil samples are plausibly attributable to the inherently heterogeneous nature of site soils. Limited mixing of soils was undertaken during sampling to minimize disturbance and the potential loss of volatile organic compounds, which can preserve small-scale heterogeneity between replicates and contribute to higher RPDs for certain analytes.

Claude 4.1 Opus – 0 creativity

Temperature results

A review of the quality control data indicates that duplicate and triplicate samples were collected from two locations (HA01 at 0.1m depth and HA10 at 0.2m depth) to assess analytical precision. The RPD acceptance criterion of 30% was exceeded for multiple analytes including Arsenic, Cadmium, Chromium, Copper, Lead, and Zinc. At location HA01@0.1, duplicate RPD values ranged from 34.48% for Cadmium to 176.74% for Copper, with triplicate samples also collected showing RPDs ranging from 34.48% to 172.41%. Location HA10@0.2 showed duplicate RPD exceedances for Arsenic (145.45%) and Lead (163.38%).

The elevated RPDs observed in these soil samples can be attributed to the inherently heterogeneous nature of the site soils. Limited mixing of the soils was completed during sampling to minimize the disturbance of the soils and the potential loss of volatile organic compounds. The significant variability in metal concentrations across duplicate samples, particularly for Copper (176.74% RPD), Chromium (146.85% RPD), and Lead (149.76% RPD) at HA01@0.1, reflects this natural heterogeneity rather than analytical error. Despite these elevated RPDs, the data quality remains adequate for assessment purposes as the exceedances are consistent with expected variability in heterogeneous soil matrices.

Claude 4.1 Opus – 0.3 creativity

Temperature results

The quality assurance and quality control (QA/QC) program for the soil sampling assessment included the collection of duplicate and triplicate samples to evaluate analytical precision. A total of 2 locations were sampled with duplicate analyses, with location HA01 at 0.1m depth having both duplicate and triplicate samples collected, and location HA10 at 0.2m depth having duplicate samples. The RPD acceptance criterion was set at 30% for all analyzed chemicals. Several exceedances of this acceptance criterion were identified across multiple analytes, particularly for heavy metals including arsenic, cadmium, chromium, copper, lead, and zinc.

The RPD exceedances ranged from marginally above the acceptance criterion to significantly elevated values. The most notable exceedances were observed for copper (DUP RPD: 176.74%, TRIP RPD: 172.41%), lead (DUP RPD: 149.76% at HA01@0.1, 163.38% at HA10@0.2), chromium (DUP RPD: 146.85%, TRIP RPD: 146.85%), and arsenic (DUP RPD: 105.88% at HA01@0.1, 145.45% at HA10@0.2). These elevated RPDs in the soil samples can be attributed to the inherently heterogeneous nature of the site soils. Limited mixing of the soils was completed during sampling to minimize the disturbance of the soils and the potential loss of volatile organic compounds, which may have contributed to the variability between duplicate and triplicate samples.

Claude 4.1 – 0.6 creativity

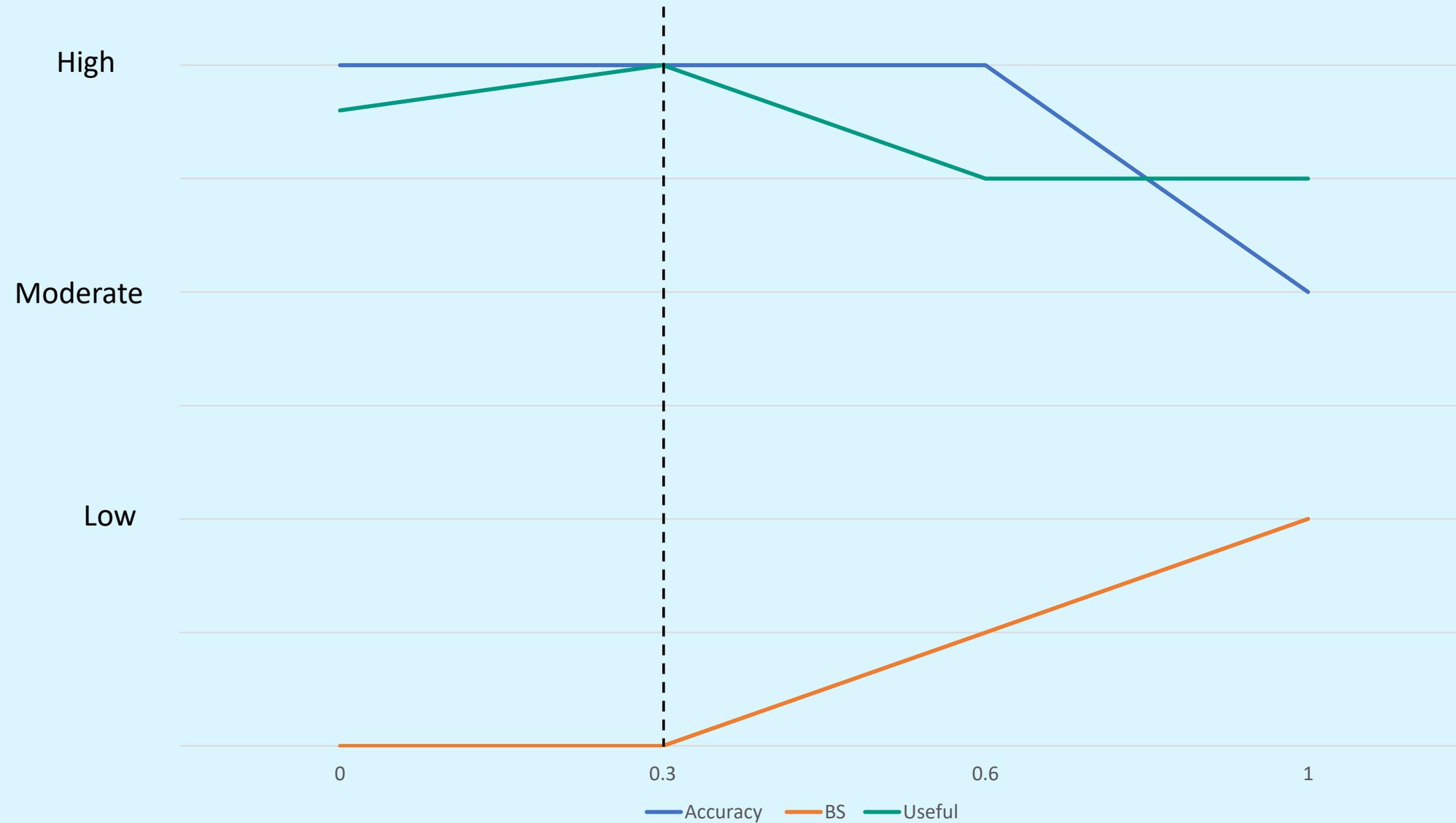
Temperature results

A total of 2 duplicate and 1 triplicate samples were collected from the soil sampling program. The duplicate and triplicate samples were collected at locations HA01 at 0.1m depth and HA10 at 0.2m depth. The relative percent difference (RPD) analysis revealed multiple exceedances against the predetermined acceptance criteria of 30% for all metals analyzed. Sample HA01@0.1 showed duplicate RPD exceedances for Arsenic (105.88%), Cadmium (34.48%), Chromium (146.85%), Copper (176.74%), Lead (149.76%), and Zinc (64.21%). Additionally, triplicate RPD values at this location exceeded the criteria for Arsenic (34.59%), Cadmium (34.48%), Chromium (146.85%), Copper (172.41%), Lead (40.53%), and Zinc (58.48%). Sample HA10@0.2 demonstrated elevated duplicate RPD values for Arsenic (145.45%) and Lead (163.38%).

The elevated RPDs observed in these soil samples can be attributed to the inherently heterogeneous nature of the site soils. Limited mixing of the soils was completed during sampling to minimize the disturbance of the soils and the potential loss of volatile organic compounds. The substantial RPD exceedances, particularly for metals such as Chromium, Copper, and Lead, which showed RPD values exceeding 140%, indicate significant variability in metal concentrations even within the same sampling location. This variability is characteristic of heterogeneous soil matrices where metals may be unevenly distributed due to historical deposition patterns, soil composition variations, or localized contamination sources.

Claude 4.1 – 1 creativity

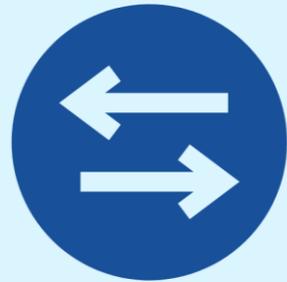
Temperature results



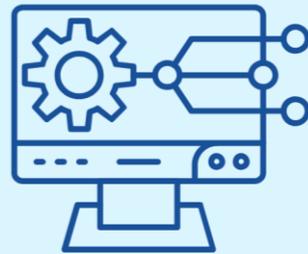
Security



Server Access



Transactions



Version Controls

Adding Prompts

@datanest
☰

Document2 - Word
🔍 Search

File Home Insert Draw Design Layout References Mailings Review View Help

Surface runoff at the Site is expected, based on the observed local topography, to be directed gently towards the north east towards Olinda Creek.

OR

The closest water body is an unnamed dam, located approximately 200m south, south east.

3.3 Geology

`{prompt('Geology')}`

HELIA EHS[Company] | [Project]Page 4 of 22

Snippets
AI Snippets

AI Prompts
+ New
📁 Template

Prompts

🔍 Search

- Scope of Works 📄
- Objectives 📄
- Hydrogeo 📄
- Condition of buildings 📄
- Cut & Fill evidence 📄
- Measurement groundwater tab... 📄
- Site interview 📄
- Surrounding land use 📄
- Geology 📄

3.4 Hydrogeology

The hydrogeology of the Site in its regional setting has been ascertained from the following references:

- Visualising Victoria's Groundwater (VVG) online database;
- Groundwater Resource Report – DEECA² (formerly DELWP), 2019 (Appendix D); and
- Lotsearch report (Appendix A) – [Date] [Month] [Year] (Reference: LS033621 EP).

Human-in-the-Loop Workflow



**Create
Prompt**



AI Generation



**Human
Review**



**Approve as a
company
Document**

Human Review Process

Supervised Generation

13 credits

- Background ✓
- Former report PSI ✓
- Site Identification ✓
- Site History ✓
- Geology ✓
- QA/QC data ✓
- Heavy metal exceedance ✓
- OCPs ✓
- Municipality ✓
- Planning zones ✓
- Aquifer ✓
- Groundwater Users ✓
- Groundwater users - number of boreholes ✓
- Groundwater Users - closest bore ✓
- Groundwater Users - Depth to water ✓
- UBD dates ✓
- UBD details ✓
- Dry Cleaner details ✓
- EPA notices ✓

OpenAI GPT-4.1
Credit usage (1M tokens):
Input: 2000 Output: 8000

Creativity (Model Default) (0)

```
{END-IF}  
{IF $sample?.triplicate_rpd}  
TRIP RPD - {$sample?.triplicate_rpd}  
{END-IF}  
{END-FOR sample}
```

Knowledge Sources

RPD

Snippets Data

Chromium (hexavalent)
HA01@0.1

Generation

The following samples exceeded the RPD acceptance criteria of 30%:

- Arsenic: DUP RPD - 105.88
- Cadmium: DUP RPD - 34.48
- Chromium: DUP RPD - 146.85
- Copper: DUP RPD - 176.74
- Lead: DUP RPD - 149.76
- Zinc: DUP RPD - 64.21

Justification for exceedances:
Soil samples cannot be taken from the exact same location, which can lead to discrepancies in the results, particularly for comparison purposes such as RPD calculations between original and duplicate/triplicate samples. These natural variations in soil composition and the limitations in sample collection can explain the elevated RPD values observed above the acceptance criteria.

Prompts Approved: 0 out of 9

Consultants Experience



**Create
Prompt**



AI Generation



**Human
Review**



**Approve as a
company
Document**

**Consultant adds
in PDF data and
field info and
generate**

Who can use it?

The screenshot displays the ONLYOFFICE document editor interface. The top menu bar includes 'ONLYOFFICE', 'File', 'Home', 'Insert', 'Draw', 'Layout', 'References', 'Collaboration', 'Protection', 'View', and 'Plugins'. The document title is 'DSI report.docx'. The main editing area shows a document with the following content:

 **ABC LTD**

DETAILED SITE INVESTIGATION

Client: {project_client}

Address: {project_address}

Project Number: {project_number}

The right sidebar contains a 'Snippets' panel with 'AI Snippets' (Beta) and 'AI Prompts' sections. The 'AI Prompts' section includes a search bar and a list of prompts: 'Results Prompts', 'Land Insight Prompts', and 'PSI and Proposal Prompts'. Under 'PSI and Proposal Prompts', there are items: 'Objectives', 'Site History', 'Former PSI', and 'Background', each with copy, edit, and delete icons.

At the bottom of the editor, the status bar shows 'Page 1 of 10', 'Word count', 'All changes saved', 'English - United States', and 'Zoom 100%'. A 'Preview' button is visible in the bottom right corner of the Snippets panel.



Outputs: What a normal user sees

To make it crystal clear in the final report:

Green

Factual, auto-generated content directly from verified data sources

Yellow

AI-generated content that needs human review and verification

Blue

Sections that need direct consultant input and expertise

No Highlight

Content from template that requires no changes

Results

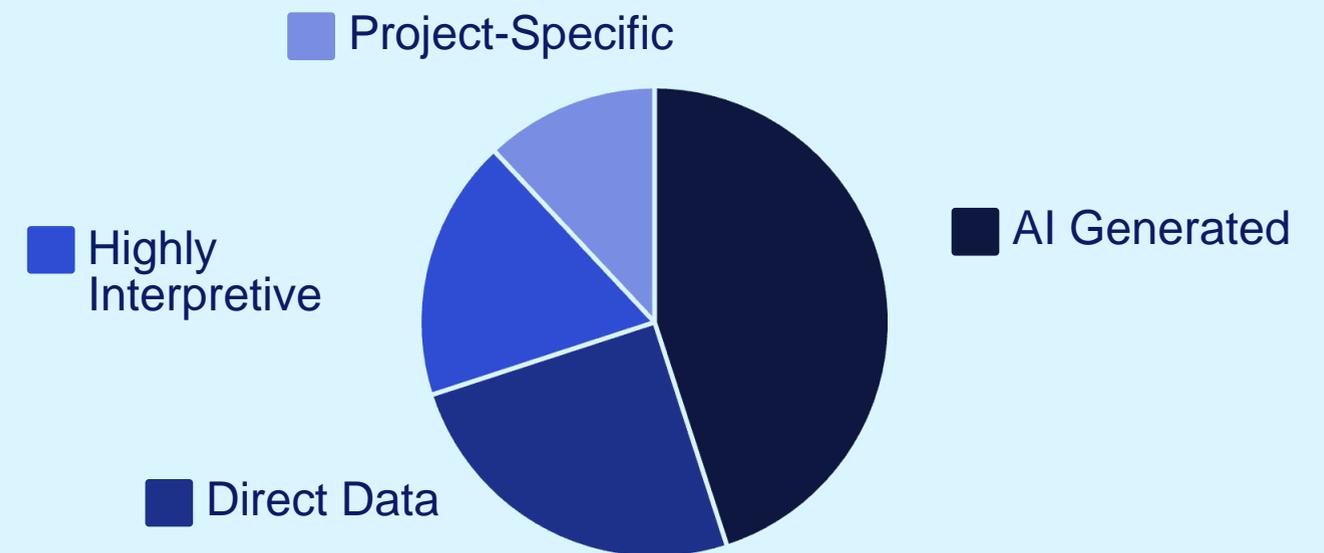
Reports Tested

- PSI/Phase 1 Reports
- DSI/Phase 2 Reports
- Site Assessments
- Remediation Action Plan/Site Management Plans

PSI Reports

- 87 editable fields in the report
- **Over 70% was generated** by AI or direct data
- The rest were either highly interpretive or project-specific content requiring expertise

Initial feedback indicated that report writing time was reduced by 60%.



V2 - Updates

- Prompting results from a prompt
- Prompting results from a report
- Table generation



Results - updated

PSI Reports

- 63 editable fields in the report
- **Over 90% was generated** by AI or direct data

Updated feedback indicated that report writing time could be reduced by over 80%

Further Work



**Create
Prompt**



AI Generation



**Human
Review**



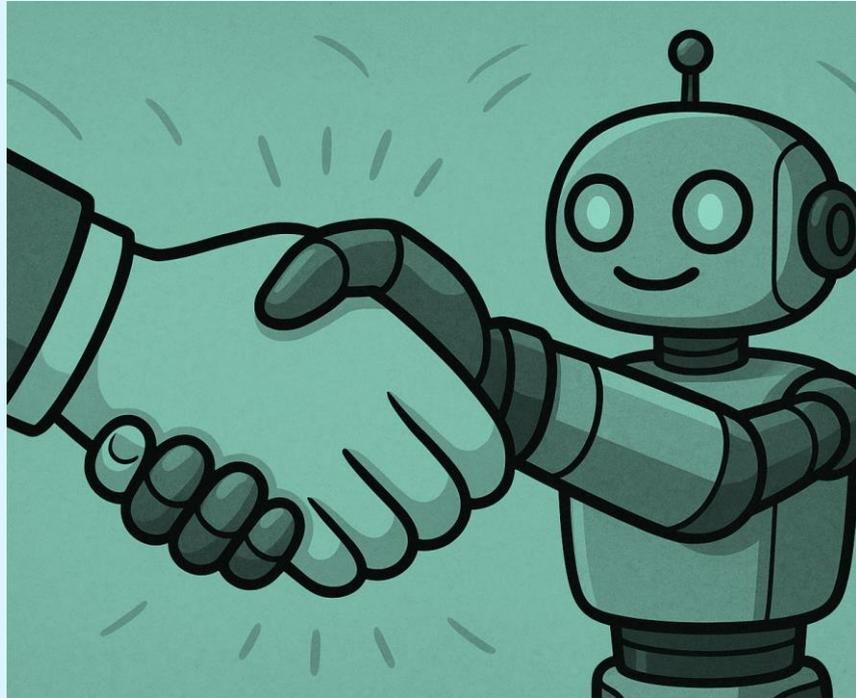
**Approve as a
company
Document**

**Consultant adds
in PDF data and
field info and
generate**



**Human
Review**

So Where Does That Leave Us?



- Faster reports
- More consistency
- Less errors
- Still needs human in the loop processes

Final Thought

AI isn't here to take our jobs. It's here to support the **boring** bits of our jobs.

