

Prioritising Vapor Intrusion Risk Across Entire Residential Suburbs

4 June 2024

James Coley
Senior Adviser
South Australia Environment Protection Authority



Acknowledgement of Country

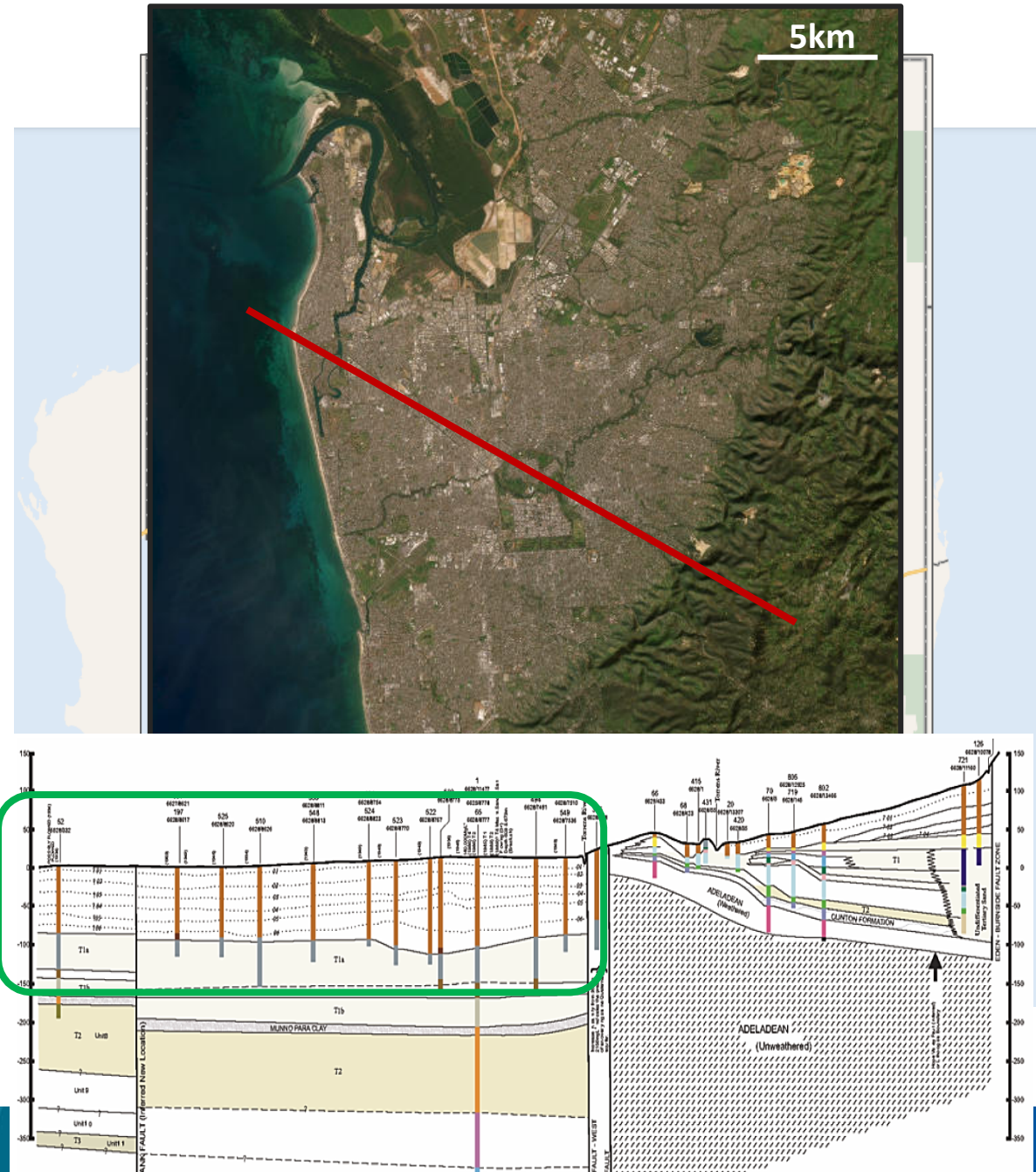
The South Australian EPA acknowledges Traditional Owners of Country throughout Australia, including the Kaurna people as the custodians of the Adelaide region, and recognises their continuing connection to lands, waters and communities.

We pay our respects to Aboriginal and Torres Strait Islander cultures; and to Elders past, present and emerging.

Artwork: 'Caring for Country', courtesy of Arrernte man Scott Rathman

South Australia

- 18 separate wine regions producing >80% of premium Australian wine
- An entire island for kangaroos (Kangaroo Island)
- State Area: 380,000 miles² (more than 3 times Colorado)
- State Population: 1.8M (less than 1/3 Colorado)



Contaminated Land in South Australia

1993 – Enactment of *Environment Protection Act 1993*

- South Australian EPA established

2009 – Updated Environmental Legislation

- Define ‘Site Contamination’
- EPA powers to force responsible parties to clean-up
- Requirement to notify EPA of harm to groundwater

2014 – Clovelly Park

- Large automotive manufacturing district operating since 1950s
- Trichloroethene (trichloroethylene, TCE) contamination identified during 2000s
- Challenges identifying original polluter (“orphaned” contamination)
- Largely considered groundwater contamination issue, then vapor risk became apparent...



2014 – Clovelly Park



Toxic heat on minister
as tenants look for out

Failure to explain
made matters worse



Labor in hot seat
No excuse for not coming
clean on Clovelly
**Month-long delay to
toxic zone evacuation call**

**Apology
for toxic
inaction**

Debacle
descends
to weasel
words



CLOVELLY SCANDAL Residents tell Government to come clean

**WE WANT
ANSWERS**



Just do your
job and give
us the facts

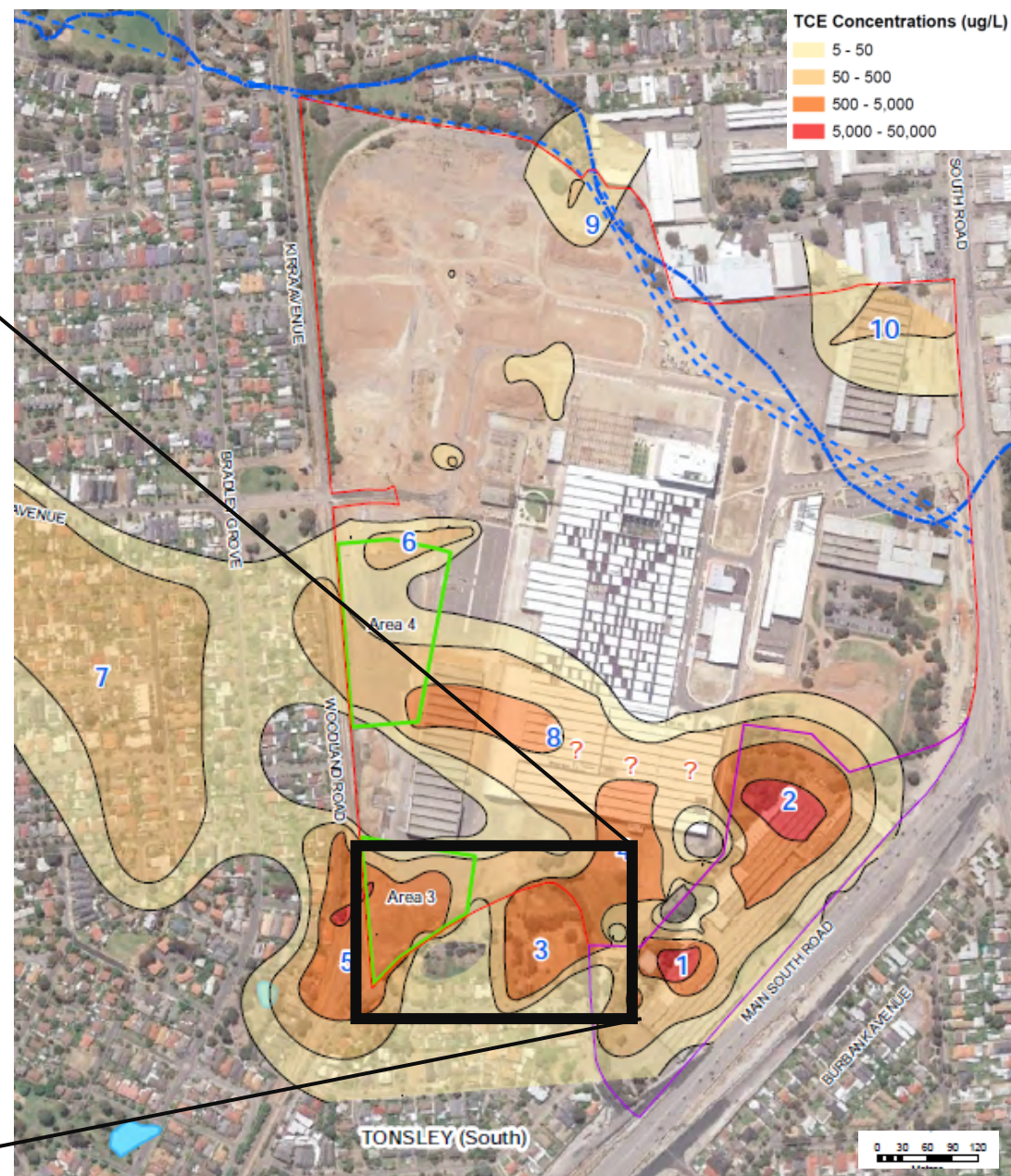


Clovelly Park

July 2014



April 2016



2015 – Review Committee Report



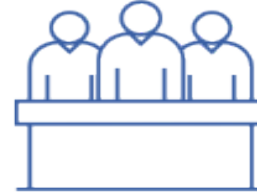
Budget for
orphaned
contamination



EPA
Orphaned
Sites Team



Community
engagement



Government-wide
coordination



Action levels



Staged assessment
& mitigation
process

2016 – Development of Policy & Framework

- New *Exceptional Circumstances Policy*
- Orphaned Site Contamination Framework
- Both documents updated in 2022

Orphaned Site Contamination Process

1. Assessment in Public Spaces

Nature and extent
Estimate vapor intrusion risk
Engage with local community

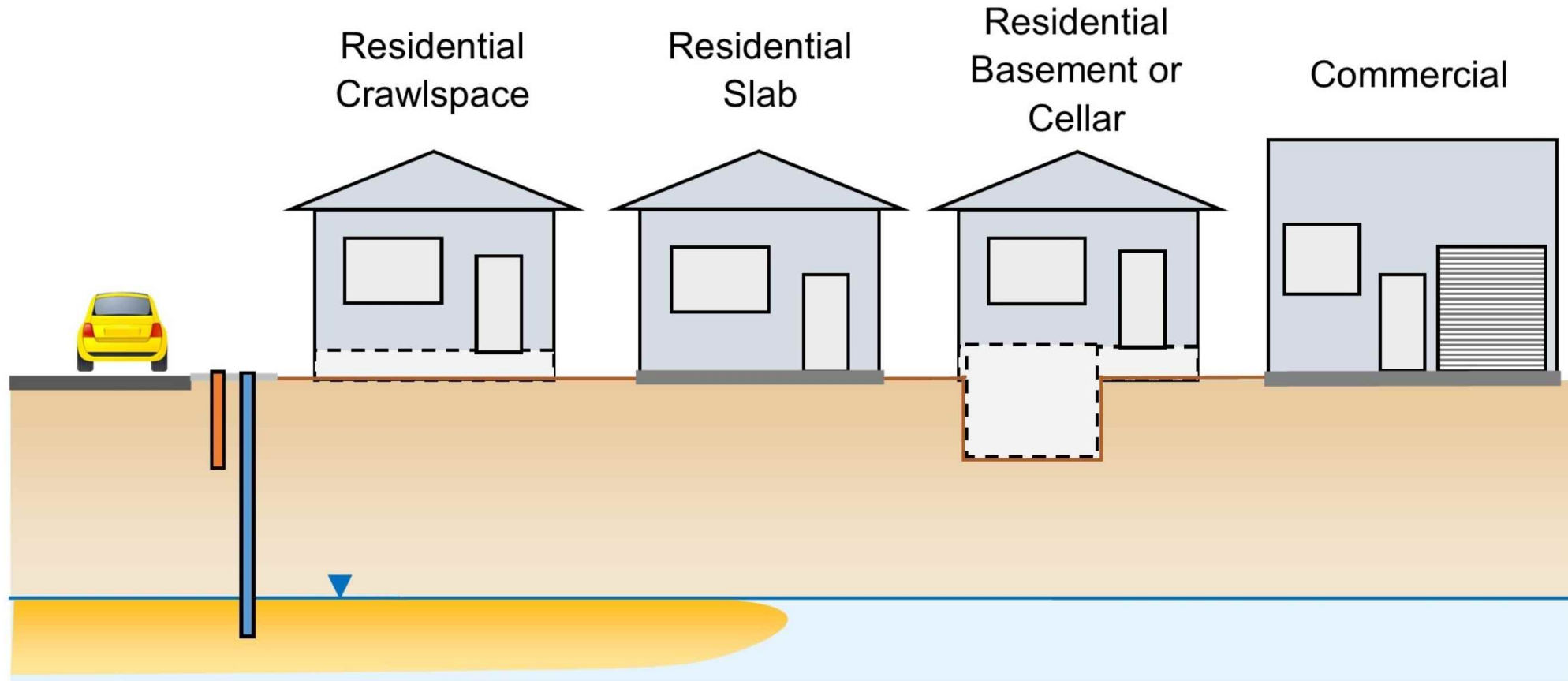
2. Property Vapor Testing

Prioritise highest estimated risk
Measure vapor intrusion risk
Educate & inform owners

3. Vapor Mitigation

Prioritise highest measured risk
Mitigate vapor intrusion risk
Engage with owners

Estimating Vapour Intrusion Risk



Action Levels for TCE in Indoor Air

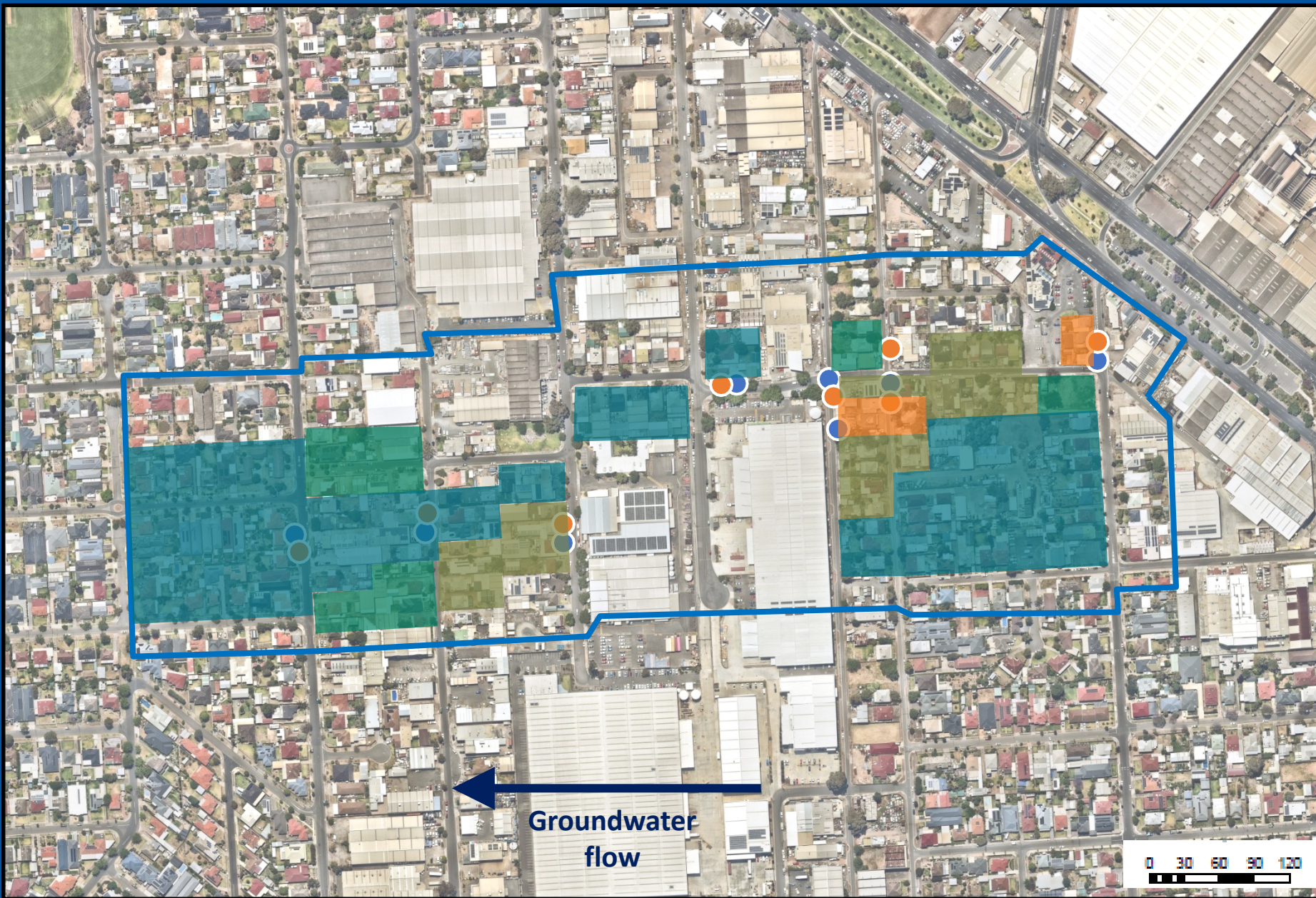


 Accelerated Intervention	Above 200 $\mu\text{g}/\text{m}^3$	There is a health risk	Immediate action, engage with owners about temporary relocation or mitigation
 Intervention	20 - 200 $\mu\text{g}/\text{m}^3$	There may be a health risk	Action within weeks/months, engage with owners about mitigation strategies
 Investigation	2 - 20 $\mu\text{g}/\text{m}^3$	No immediate health concerns	Action within months, engage with owners about further assessment and potential mitigation
 Validation	Less than 2 $\mu\text{g}/\text{m}^3$	Safe, further testing possible	Action within months, engage with owner about possible further assessment
 No Action	Below detection ($<0.1 \mu\text{g}/\text{m}^3$)	Safe	No further action

Beverley

- History of whitegoods and automotive manufacturing
- Mix of residential, commercial, industrial
- TCE contamination in groundwater at 7m deep
- High plasticity clay soils



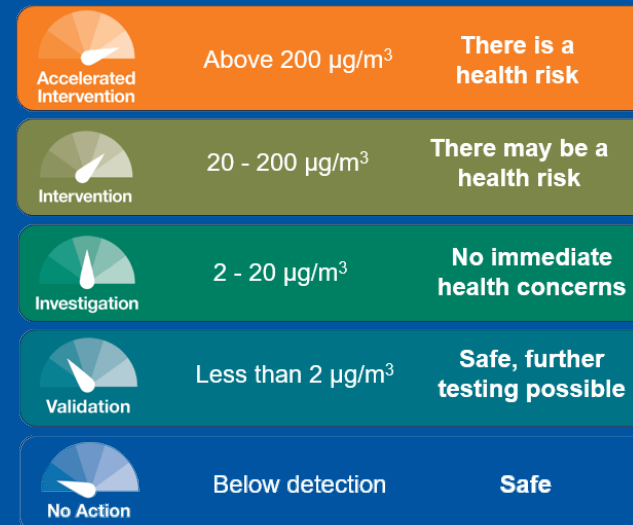


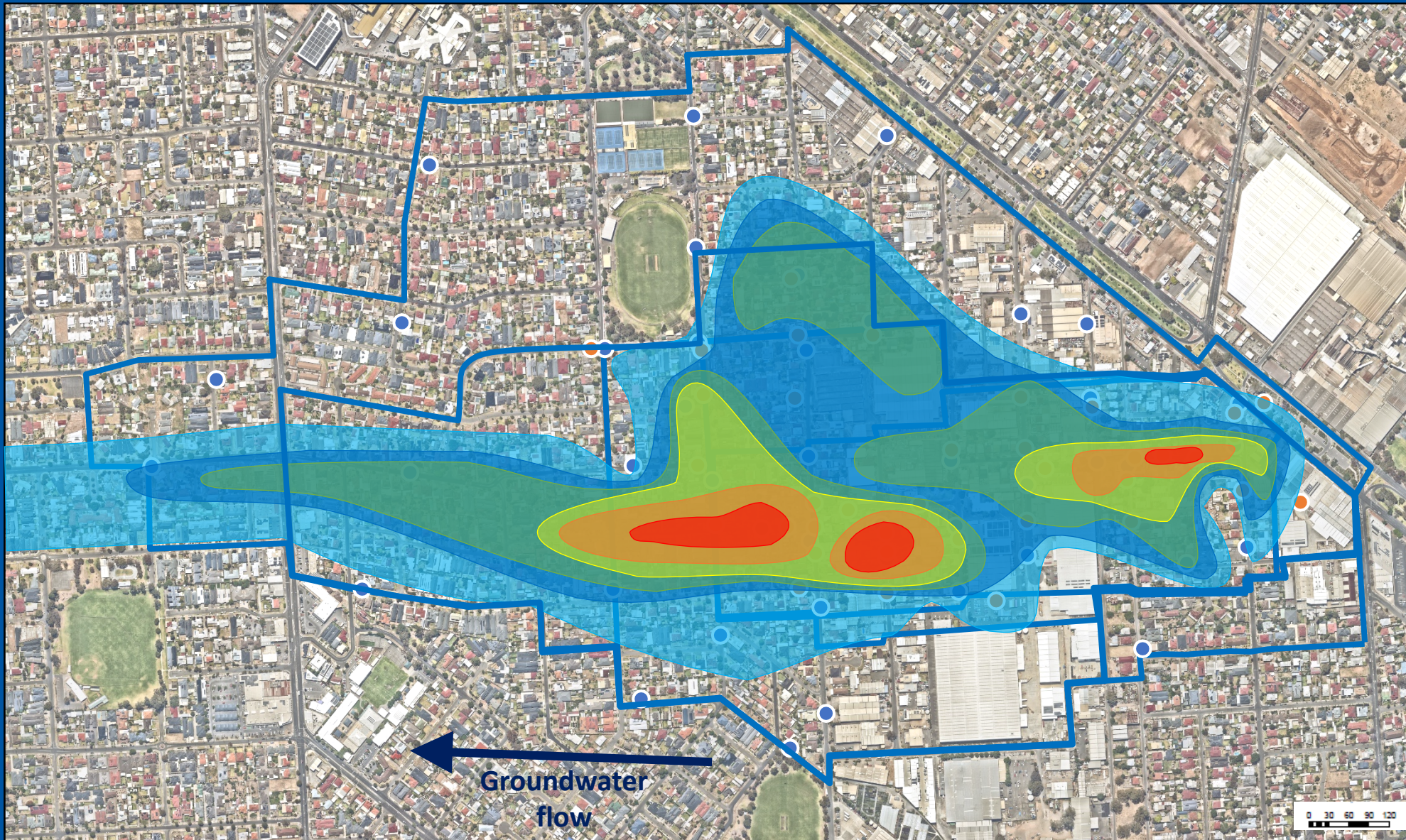
□ Assessment Area

○ Groundwater bore

● Soil Vapor bore

Estimated TCE in indoor air

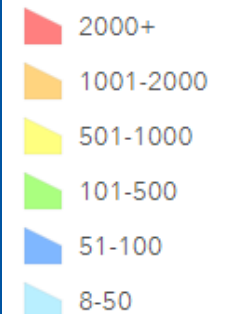




Stage 1 – 300 properties
Stage 2 – 400 properties
Stage 3-4 – 660 properties
Stage 5-6 – 1000 properties
Stage 7-8 – 1650 properties

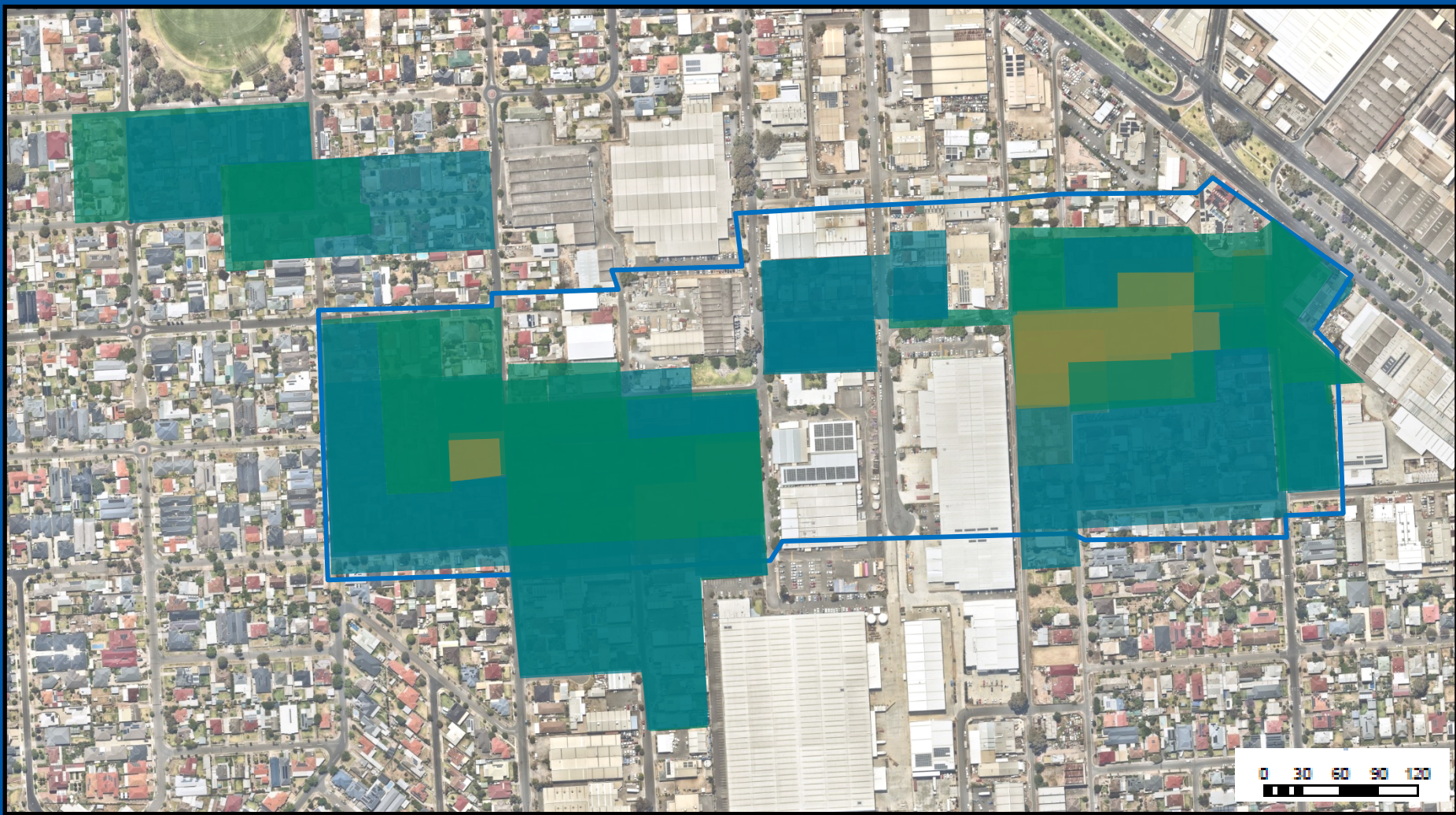
○ Groundwater bore
○ Soil Vapor bore

Trichloroethene (TCE) in
Groundwater ($\mu\text{g/L}$)



Refinement of Vapour Attenuation Factors

Beverley stage of assessment	Soil vapor to indoor air attenuation factor
Tier 1 Health Investigation Level	0.1
Stage 1	0.01
Stage 2	0.003
Stage 5	0.012, 0.004, 0.001, 0.0006
Stage 7	0.05, 0.002



Stage 1
Stage 5
Stage 7
Stage 8

Estimated TCE in indoor air

	Above 200 µg/m ³	There is a health risk
	20 - 200 µg/m ³	There may be a health risk
	2 - 20 µg/m ³	No immediate health concerns
	Less than 2 µg/m ³	Safe, further testing possible
	Below detection	Safe

Offering Property Vapour Intrusion Testing

- Door-knocking owners and residents
- Provide information about testing
- Advice on reducing vapor intrusion
- Online videos & animations
- Online appointment booking
- Regular engagement with the owner



Estimated Vapor Risk



Above 200 $\mu\text{g}/\text{m}^3$



20 - 200 $\mu\text{g}/\text{m}^3$



2 - 20 $\mu\text{g}/\text{m}^3$



Less than 2 $\mu\text{g}/\text{m}^3$



Below detection

Property Vapor Testing



Measured vapor risk

There is a health risk

There may be a health risk

No immediate health concerns

Safe, further testing possible

Safe

Vapor Mitigation – Technical Considerations

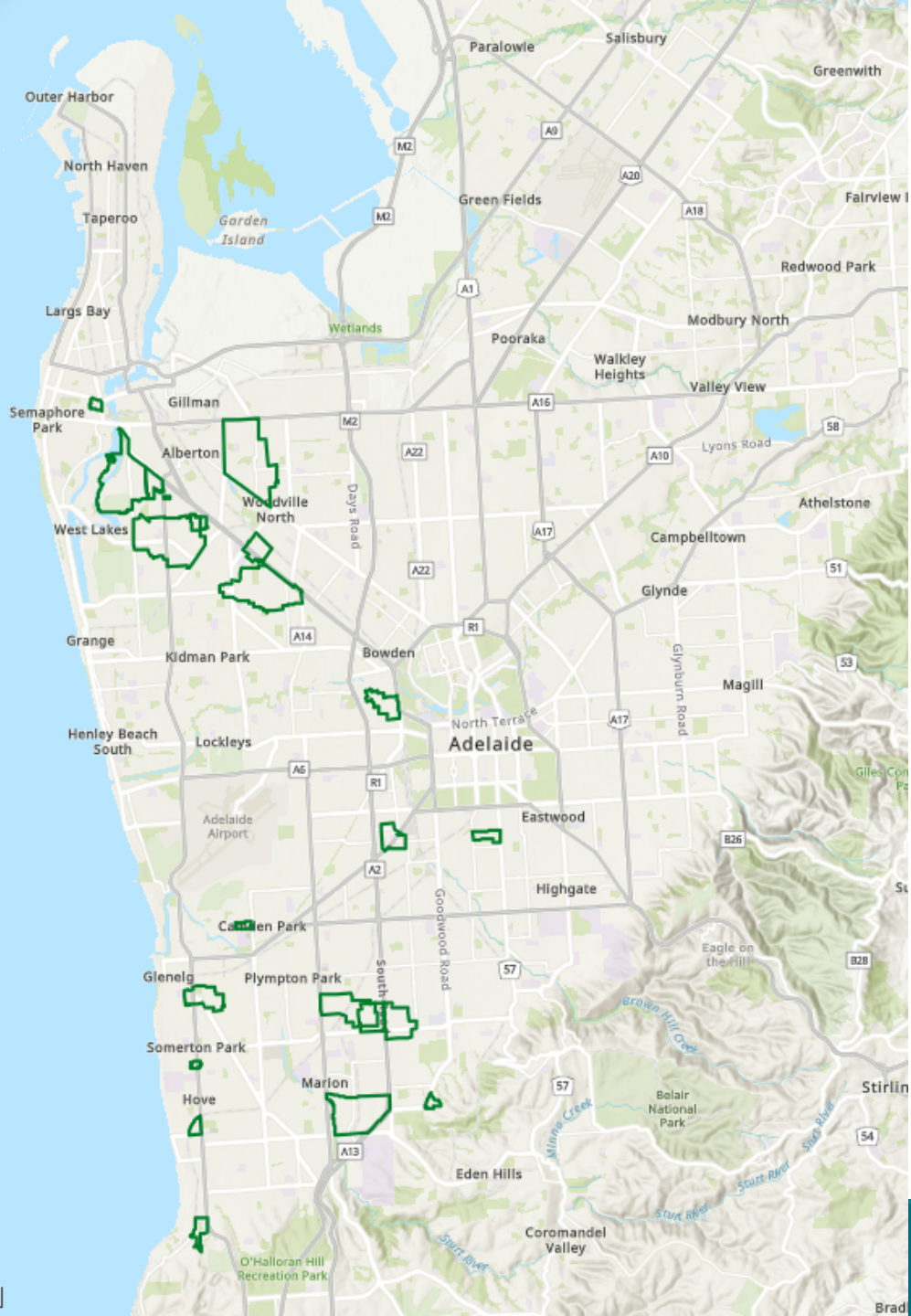
- Retrofitted vapor mitigation system
- Active sub-floor vapor extraction
- Alarm for pressure drop



Vapor Mitigation – Owner Engagement

- Regular engagement with owner
- Pre & Post condition reports
- Operation & troubleshoot manual
- Environment Performance Agreement – owner responsible for maintaining the system
- Future owners aware prior to purchase





20 EPA Assessment Areas



>15,000 properties
considered



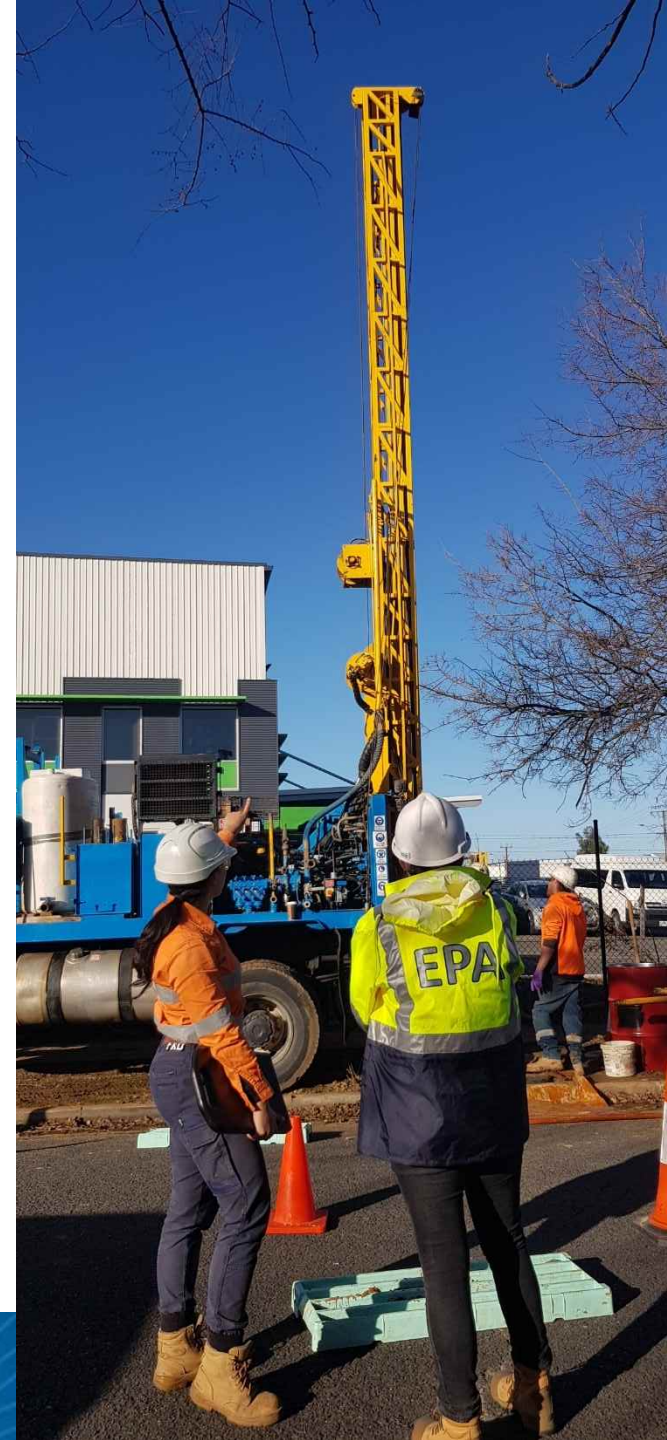
119 properties
offered vapor
testing



75 properties
tested for vapor



20 vapor mitigation
systems installed



Key Learnings

- Annual funding and an established team allows proactive management of orphaned contamination
- Framework provides clear and consistent approach to assessment and prioritisation
- Making use of public spaces to estimate and refine vapor intrusion risk
- Regular and pro-active community and owner engagement



Thank you

James.Coley@sa.gov.au

Environment Protection Authority

211 Victoria Square

Tarntanyangga, Kaurna Country

Adelaide SA 5000



References

- BlueSphere Environmental Pty Ltd, 2018. *Conceptual Site Model (CSM) Rev4*. South Australia
- Gerges, N., 2006. *Overview of the hydrogeology of the Adelaide metropolitan area*. South Australia. Department of Water, Land and Biodiversity Conservation. DWLBC Report 2006/10
- enHealth, 2023, *Guidance for human health assessment of volatile chlorinated hydrocarbon vapour*. Canberra. Australian Government Department of Health and Aged Care
- South Australian Environment Protection Authority 2022, *Site contamination – Orphaned site contamination management framework (OSCM Framework)*