South Australia's Environment Protection Authority

Beverley Update: Vapour mitigation pilot trial

Community Working Group

Thursday 6 December 2016

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EPA South Australia

Overview

Background

Procurement

Design, installation & validation

Property owner engagement

Brief Background

Four indoor air sampling events were undertaken at the property prior to installation.

Each event included indoor air, sub slab and crawl space sampling.

Results of sampling indicated that when the house was closed that concentrations of Trichloroethene (TCE) were in excess of 20 µg/m^3.

Highest concentration recorded was 41 µg/m^3.

Need for mitigation

Advice given by SA Health was that concentrations of TCE greater then 20 µg/m^3 (intervention action level) requires mitigation to reduce exposure.

As multiple rounds of testing had shown concentrations in excess of 20 µg/m^3 mitigation was deemed necessary.

Approval was granted to proceed with mitigation as part of a ‘Pilot Trial’ of mitigation technologies.

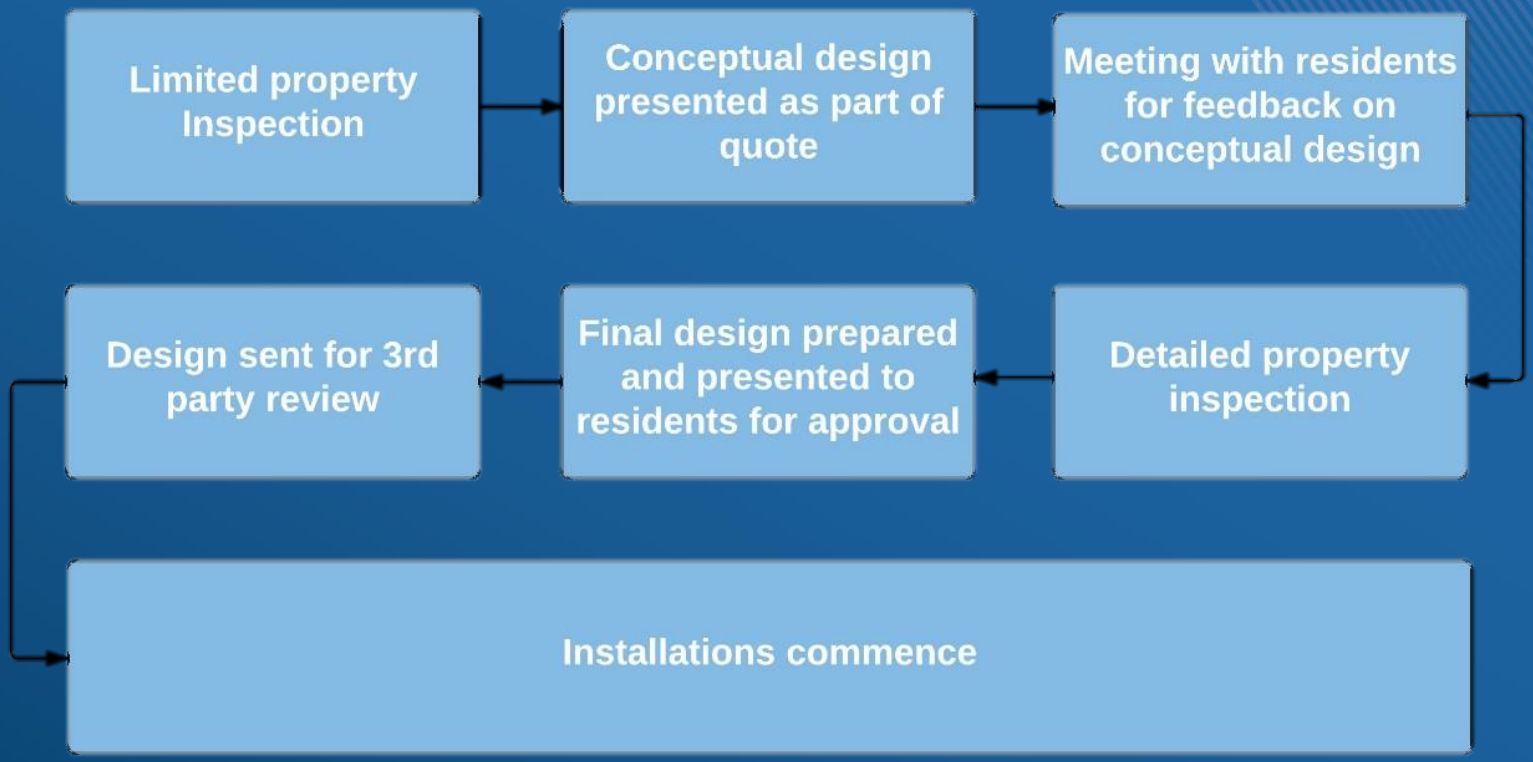
Selecting a consultant

- No companies based in Australia had undertaken retrospective vapour mitigation to a residential dwelling.
- Six quotes were received, assessed on their experience in mitigation design; and concept designs included in the quote.
- Coffey selected as preferred supplier and an independent reviewer based in the US was engaged.
- Key objective to design and install a VMS to consistently reduce concentrations of TCE within indoor air to <2 µg/m^3.
- Secondary objectives were for enhancements to customers in regards to energy costs, aesthetics, noise etc.

DESIGN, INSTALLATION & VALIDATION

PUTTING CONCEPTS INTO PRACTICE

Design and installation



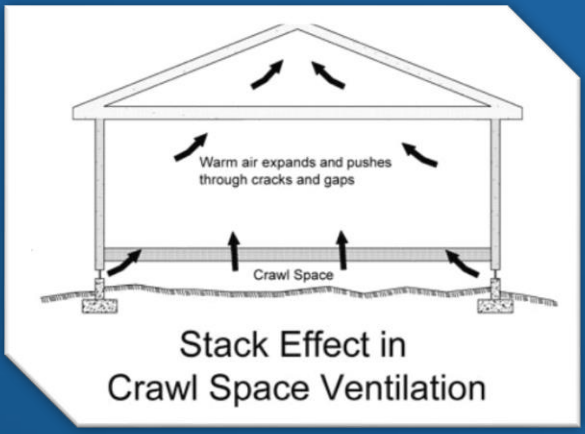
Conceptual design

The conceptual design put forward by Coffey was based upon two key principles:

- removal of the driving forces of vapour intrusion where possible; and
- reversal of the vapour flux via active depressurisation.

The depressurisation concept adopted was ‘crawl space depressurisation’ and ‘sub slab depressurisation’.

‘Membrane depressurisation’ was not possible due to limited crawl space accessibility.



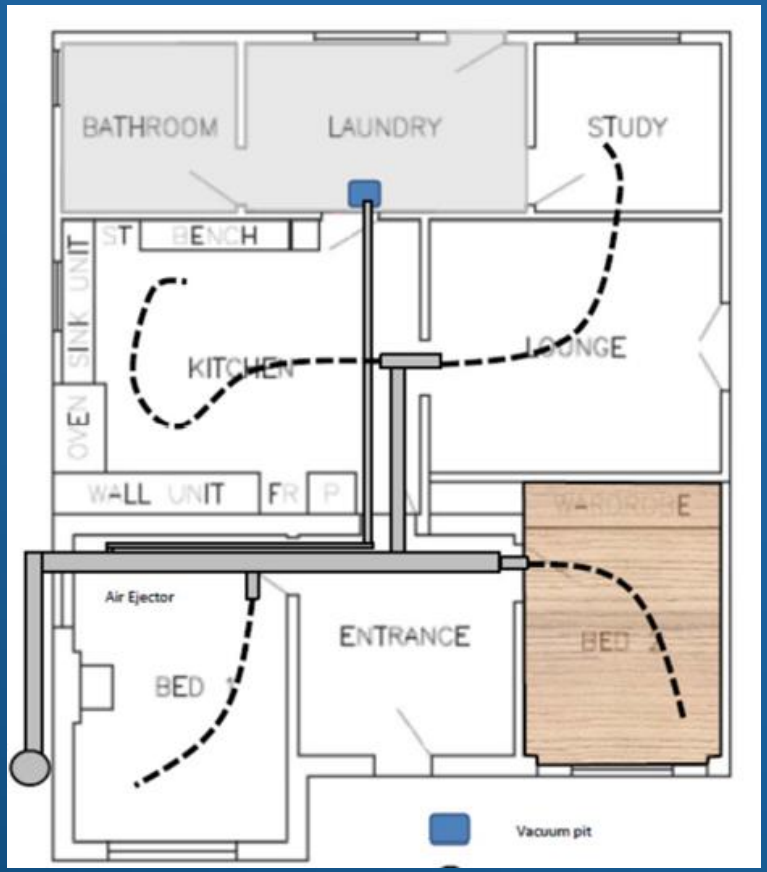
Stack Effect in Crawl Space Ventilation

Conceptual design

Key aspects of conceptual design:

- false floor and membrane installed in Bedroom 2
- CSD in all crawl space areas and beneath false floor
- SSD in rear slab areas
- Single 70 watt capacity fan
- fan mounted on eastern exterior wall; and
- sealing of ingresses into roof space.

Conceptual design



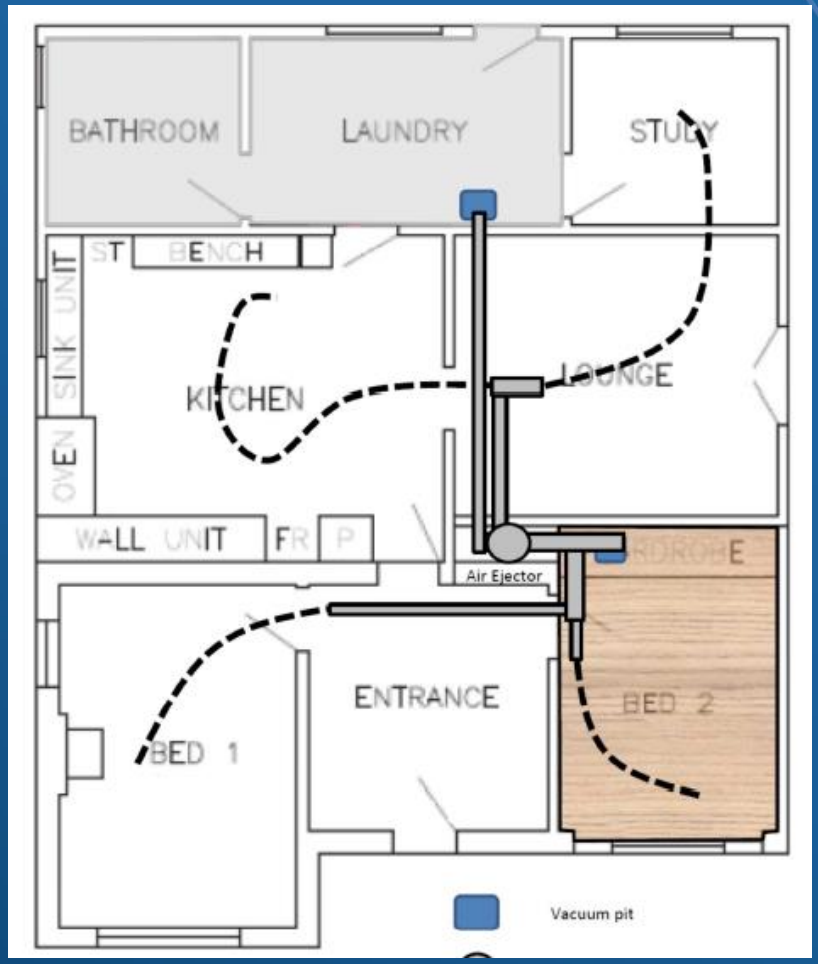
Final design

Based on feedback from the residents and other factors identified during the detailed inspection a final design was produced.

Key changes were:

- wall space utilised and fan mounted in roof space
- air ejector incorporated to provide low vacuum, high volume air flow; and
- additional sub slab sump included beneath front slab.

Final design



Other considerations

Exhaust fans in kitchen and bathroom replaced to have closing valve when not in use.

Evaporative air conditioner checked to ensure a self closing plenum was present.

Old incandescent lights were replaced with sealed LED downlights.

Backdraft from the combustion heater was considered during design to prevent accumulation of combustion by products (e.g. carbon monoxide).

System Validation

EPA has budgeted for five indoor air sampling events post installation.

Results from two indoor air sampling events have been received with all concentrations < 2 µg/m^3.

All other chemicals of concern we tested for were below detection limits.

At this stage very positive signs that the main objective of the mitigation has been achieved successfully.


PROPERTY OWNER CONSULTATION

Concerns and challenges

The main concerns that have been raise by the property owners were:

- power supply (would like the system to be cost neutral)
- aesthetics (would like the system to be hidden away as much as possible); and
- noise (would like the system to be as quiet as possible).

The complete system is running at a slight cost benefit to the residents.

The only parts of the system visible are the stack and the monitoring equipment.

There has been no noticeable increase in noise within the house.

Sealing in roof space

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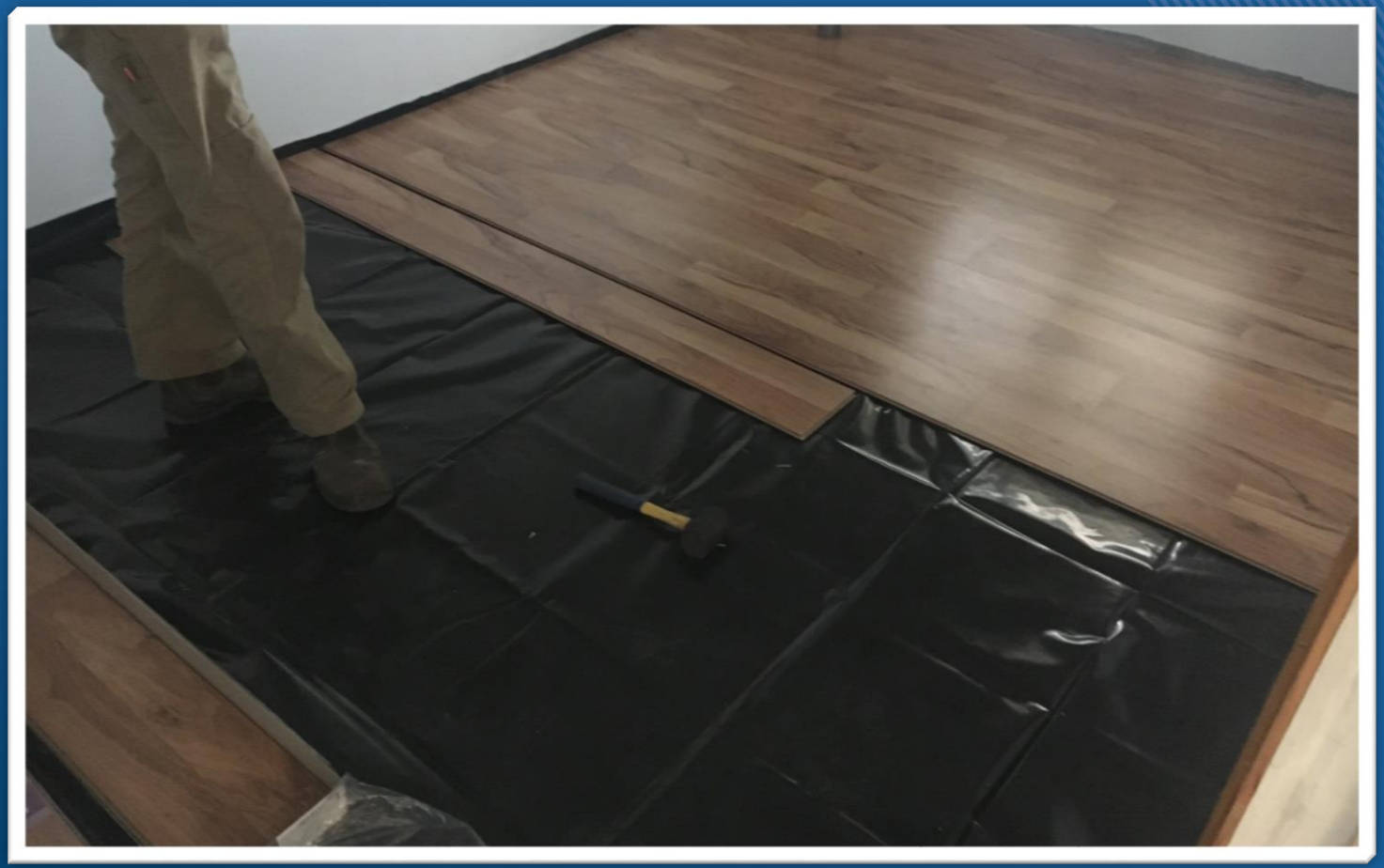
Manifold in cupboard

Manifold in cupboard



Manifold in cupboard

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Remainder of house

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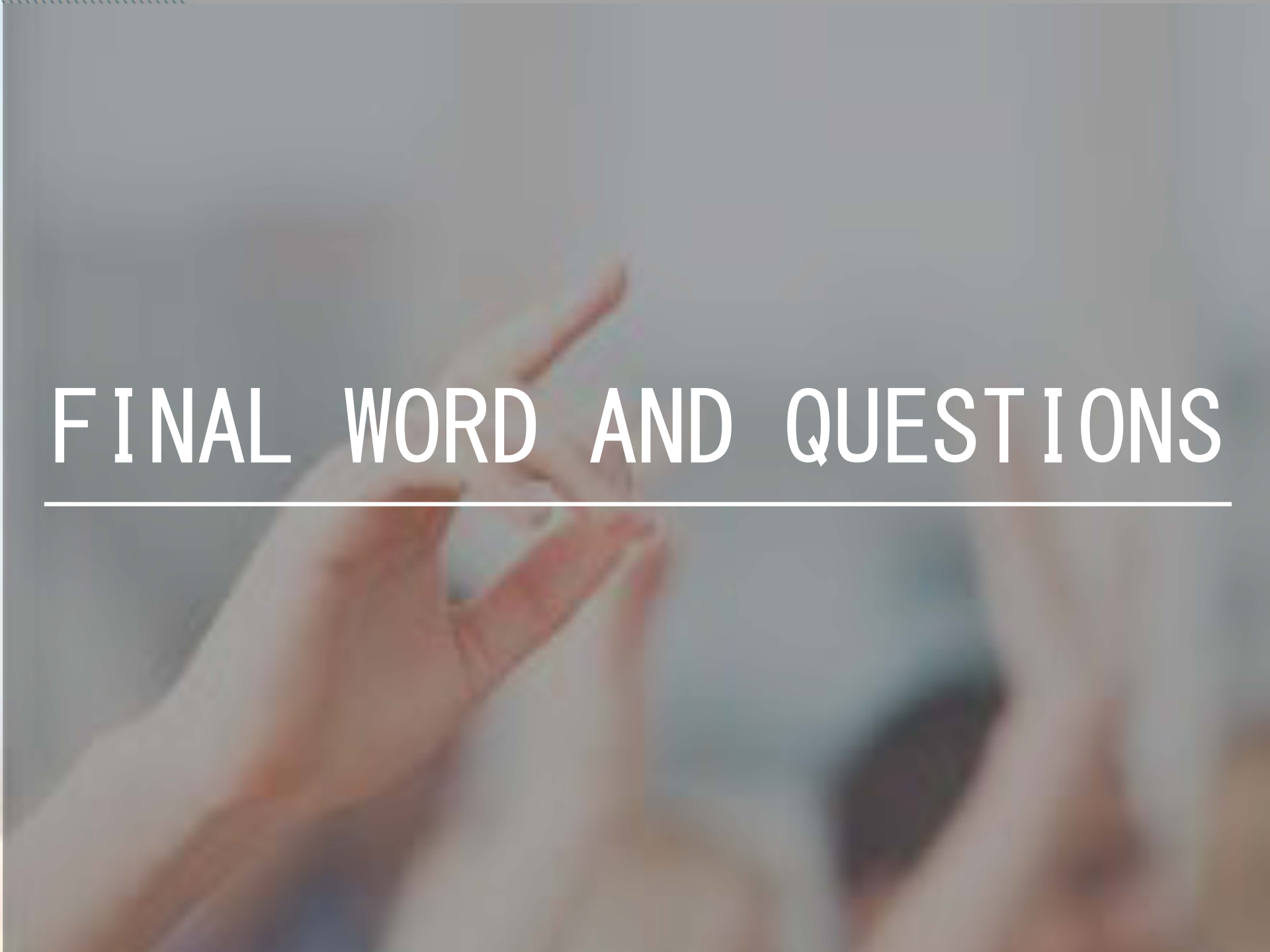
Fan in roof space



FINAL WORD AND QUESTIONS