

# Inspecting Service Reservoirs for Water Quality NOW

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# Inspection Program

82 Tanks inspected across western NSW






Looking for –

- Water Quality
- WH&S
- Security
- Structural issues

Photographic evidence

Compliance with DPI Water LWU Circular 18

# ASAM Priority Ratings

| Color   | Priority Rating | Definition  |
|---|-----------------|---|
|    | 0               | Requires action immediately to prevent a water quality incident, structural failure or injury to personnel                            |
|    | 1               | Items should be fixed within the year to ensure the reservoir remains structurally sound, safe to use, and water quality is preserved |
|    | 2               | Should be put on the priority maintenance list – items that are likely to fail within the next two years                              |
|  | 3               | Likely to remain structurally sound for the next 3 years, but should be included in a maintenance plan                                |
|  | 4               | Items rated under this priority are likely to remain structurally sound during normal wear and tear for at least 3–4 years            |

# Small tanks





# Tall tanks



# Security





# Entry Hatches



- Ladder stiles protruding
- No sealed front edge







Sliding hatch cover with the same issues...

- protruding stiles
- no front edge
- faecal material entering the tank

Type 1 entry hatch frame and hinged cover required







No hatch cover in place  
since the tank was  
painted...years ago!

Dead birds found inside

No effective sealing or  
security

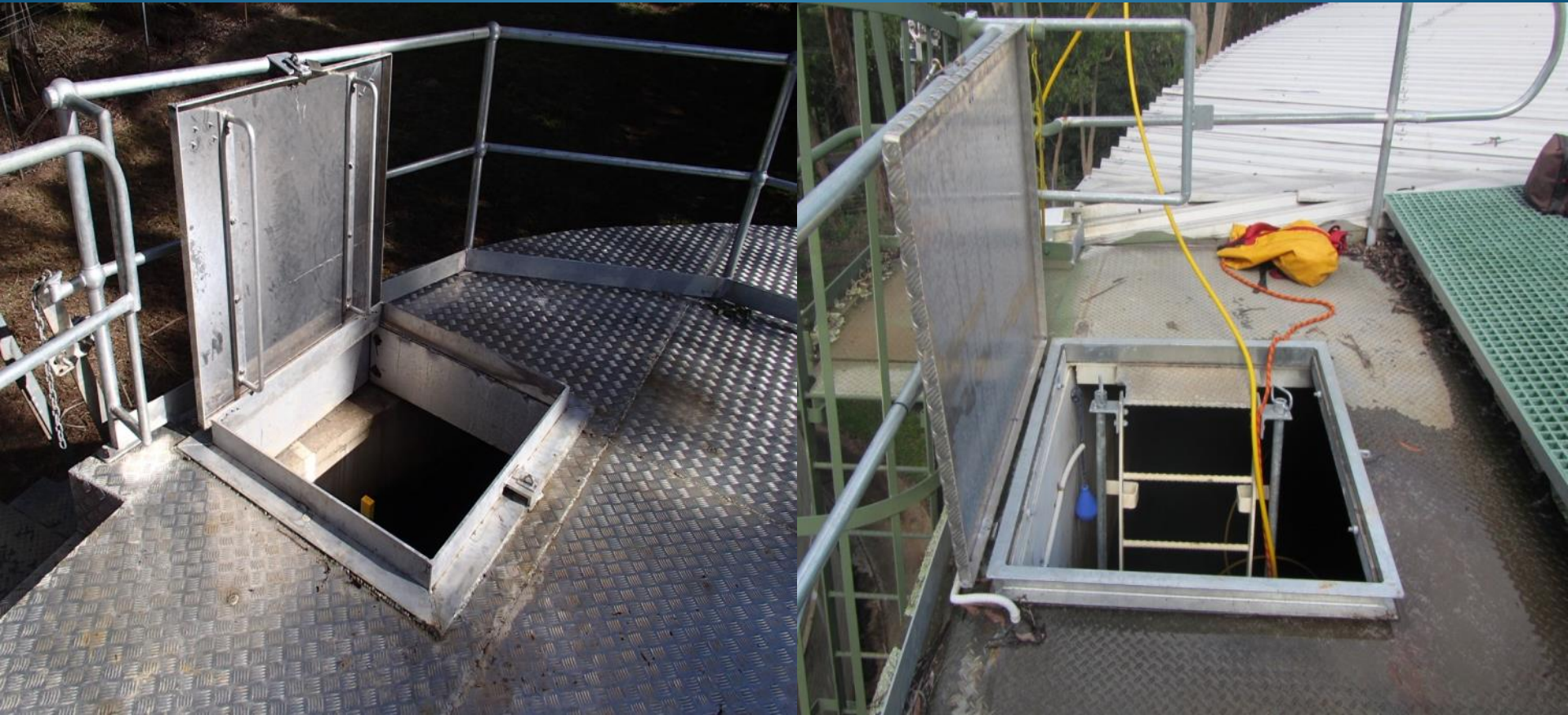
A Type 1 Platform  
renovation suggested



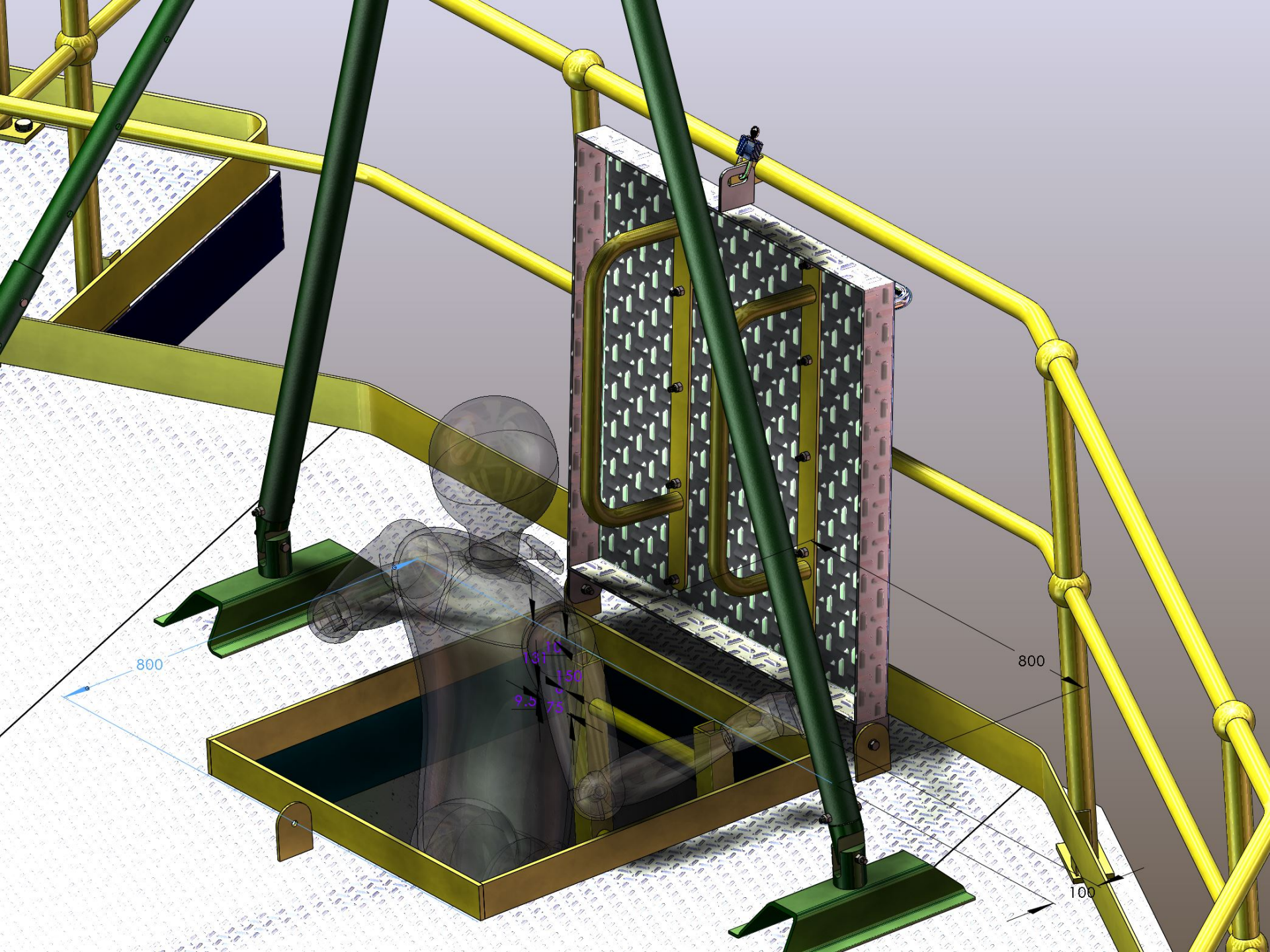


# Solutions & examples...

- Secure covers that overlap the frame
- Hatch frames that fully seal onto the roof or platform
- Practical size and positioning to suit access ladders
- Hatch covers that lock into an open position









# Platforms



- Too small to work on or around
- No safety rails on roof edges





Negative fall  
allowing debris  
ponding  
- regular cleaning  
is required

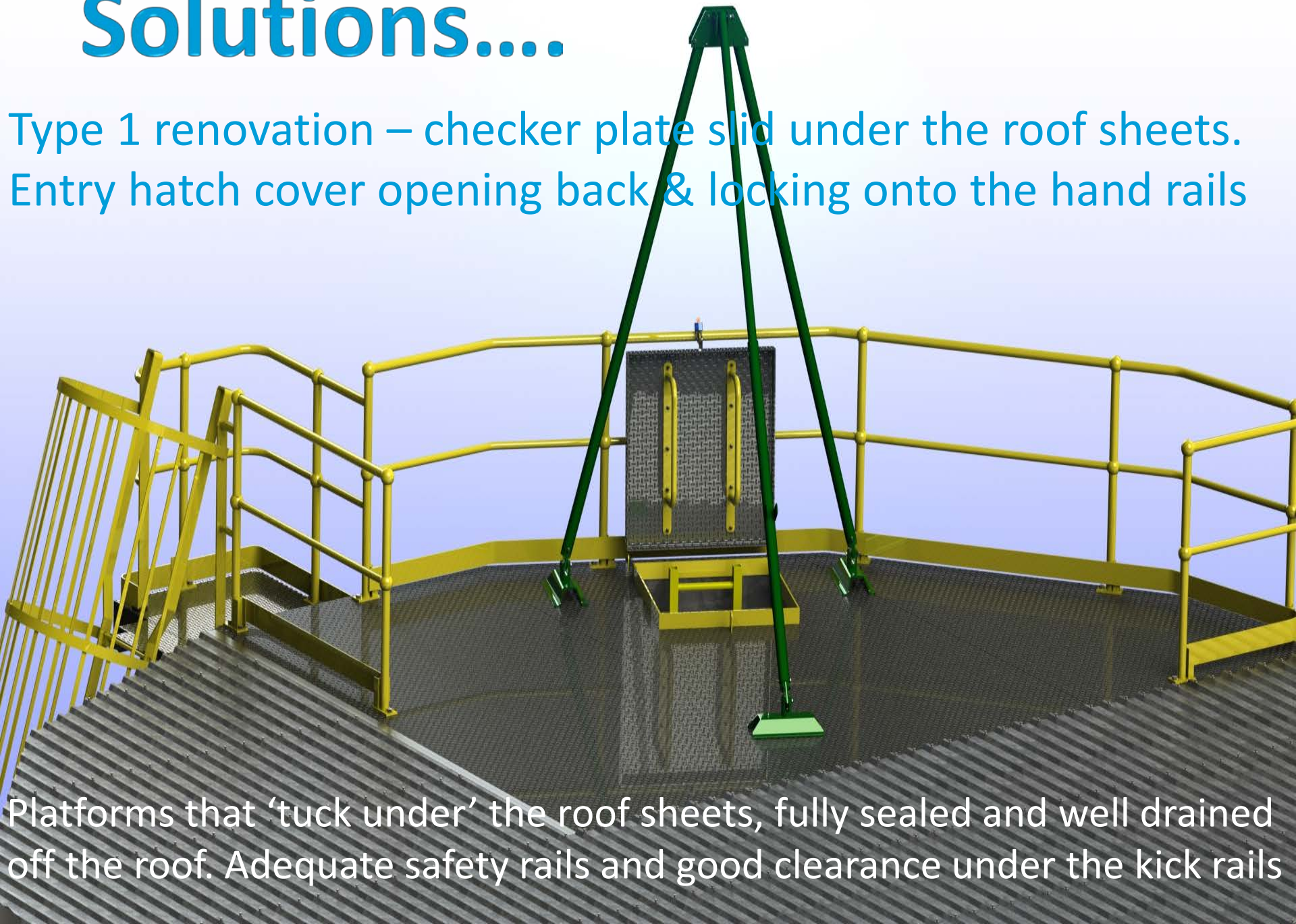
Side flashings on  
roof sheet edges  
allow debris ponding





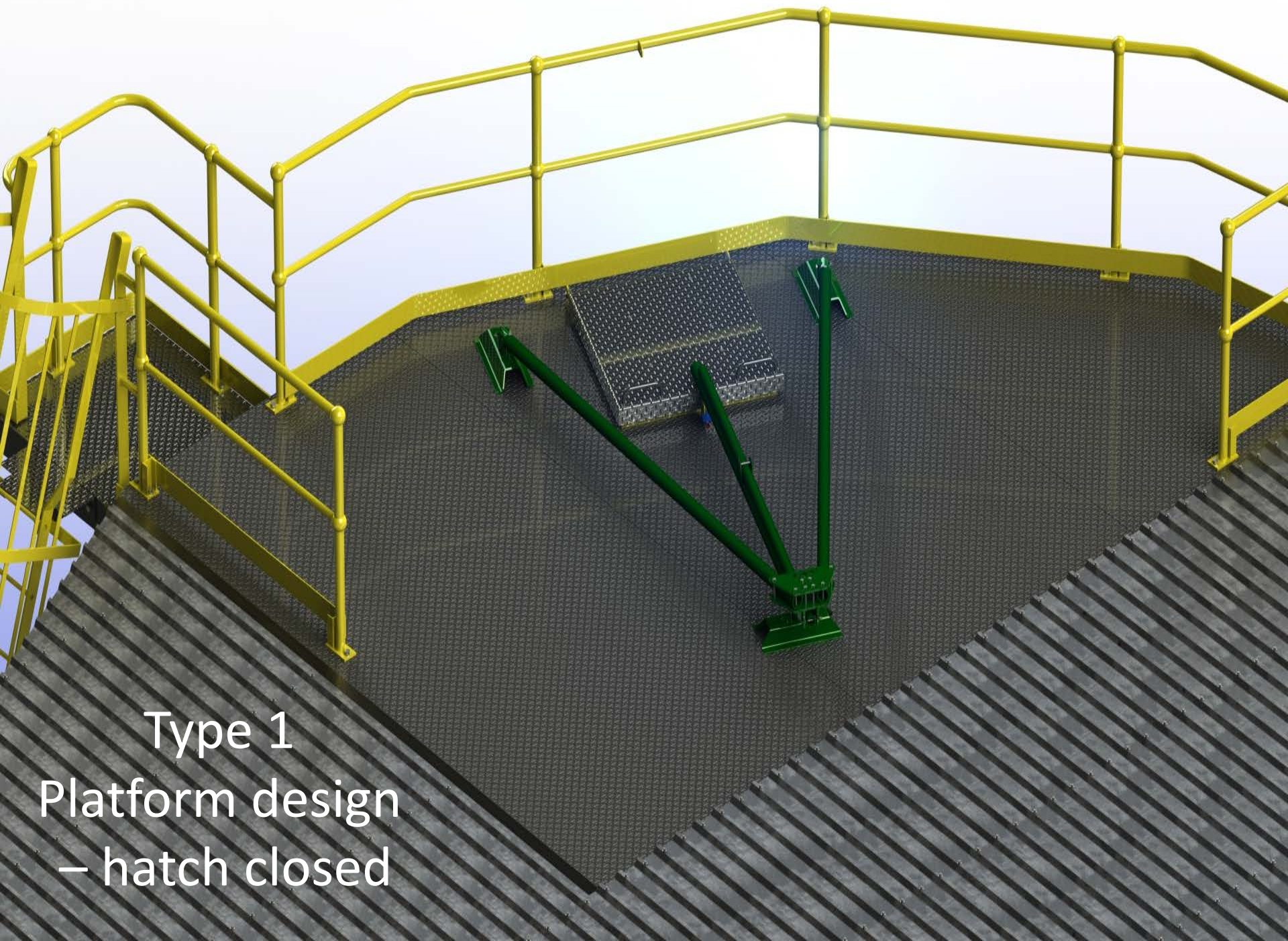
# Solutions....

Type 1 renovation – checker plate slid under the roof sheets.  
Entry hatch cover opening back & locking onto the hand rails



Platforms that 'tuck under' the roof sheets, fully sealed and well drained off the roof. Adequate safety rails and good clearance under the kick rails

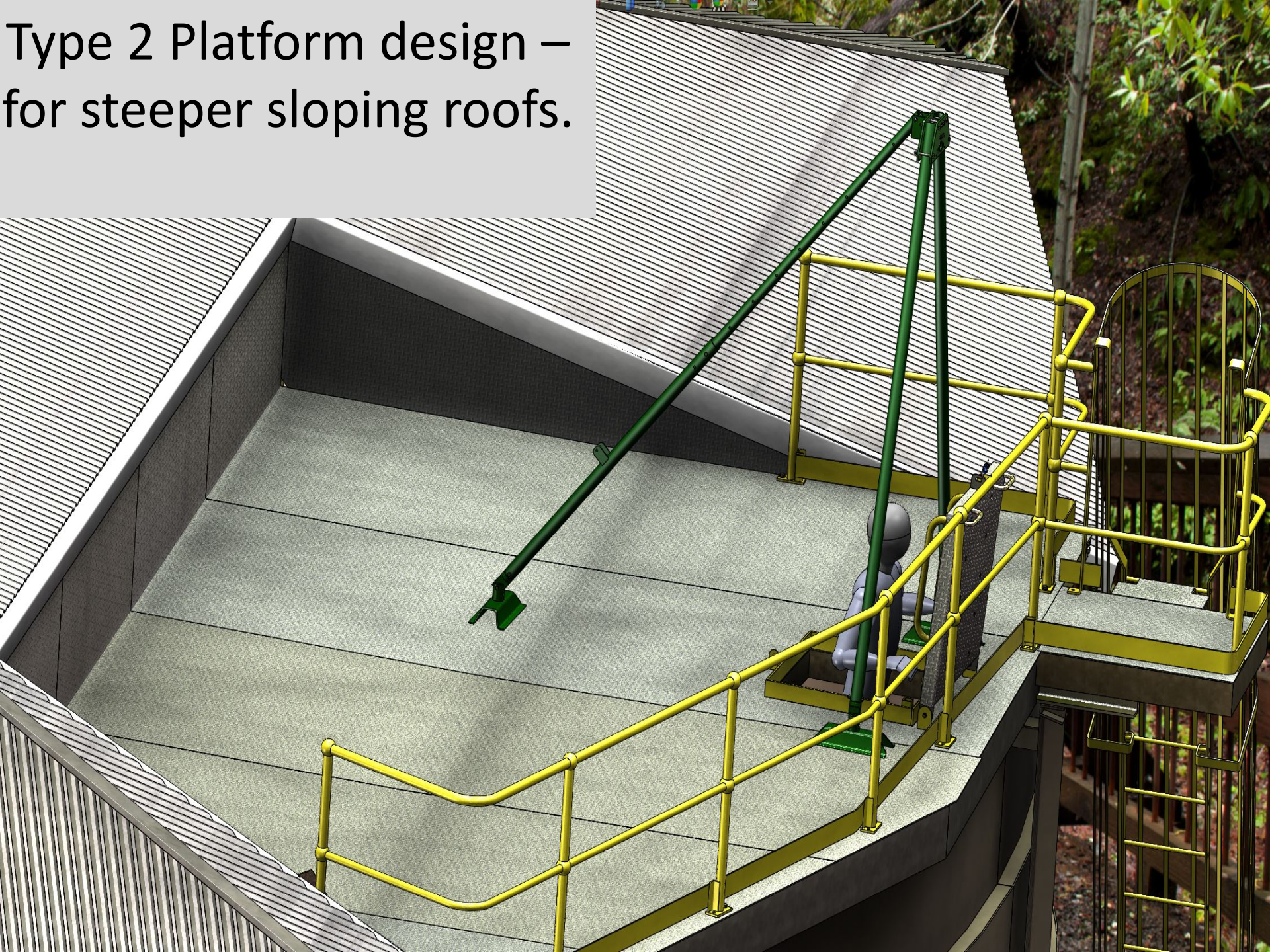




Type 1  
Platform design  
– hatch closed



Type 2 Platform design –  
for steeper sloping roofs.





# Simple renovation for in-ground tanks





# Bucket of Water Test









# Ventilation



Birds and vermin can enter past these open areas







Conduits and cable entry points cause defects in vent mesh security

Vent turbine unit missing...  
Mesh top open to natural or  
deliberate contamination event





Vent holes too large  
– not vermin proof

A 'Wheely' good  
idea to hold the roof  
down!!





# Solutions...

- Balance ventilation with roof framing life
- Face vents away from prevailing weather
- Seal roof vent bases to allow for upstream drainage



No upstream drainage -debris is ponding & entering tank



Stainless steel security mesh - a good ventilation material



# Roof areas







Flashings are unsecured  
and will become wind damaged  
in the future



Flashings torn away  
due to wind damage



The evidence upon arrival





Roof sheets and flashings not secure...

- prone to wind damage

Roof sheet edges are not secured

- vermin can enter tank
- wind damage may occur





## Corrosion damage after 7 years!

- Safety mesh causes roof sheet damage
- Zincalume not suitable for humid & under roof areas



Debris collects under roof flashings





# Solutions...

- Avoid steep, centre pitched roof designs
- Minimalize flashings and unsealed areas
- Use long life, corrosion free framing and supports



Centre pitched roof type – lots of flashings, every sheet is a long angled cut, high labour cost



A good roof frame system  
– aluminium rafters & purlins, SS screws,  
minimal corrosion potential



# Level Indicators



Pulley cover boxes are often open on the underside

Vent mesh is often damaged where cables pass through







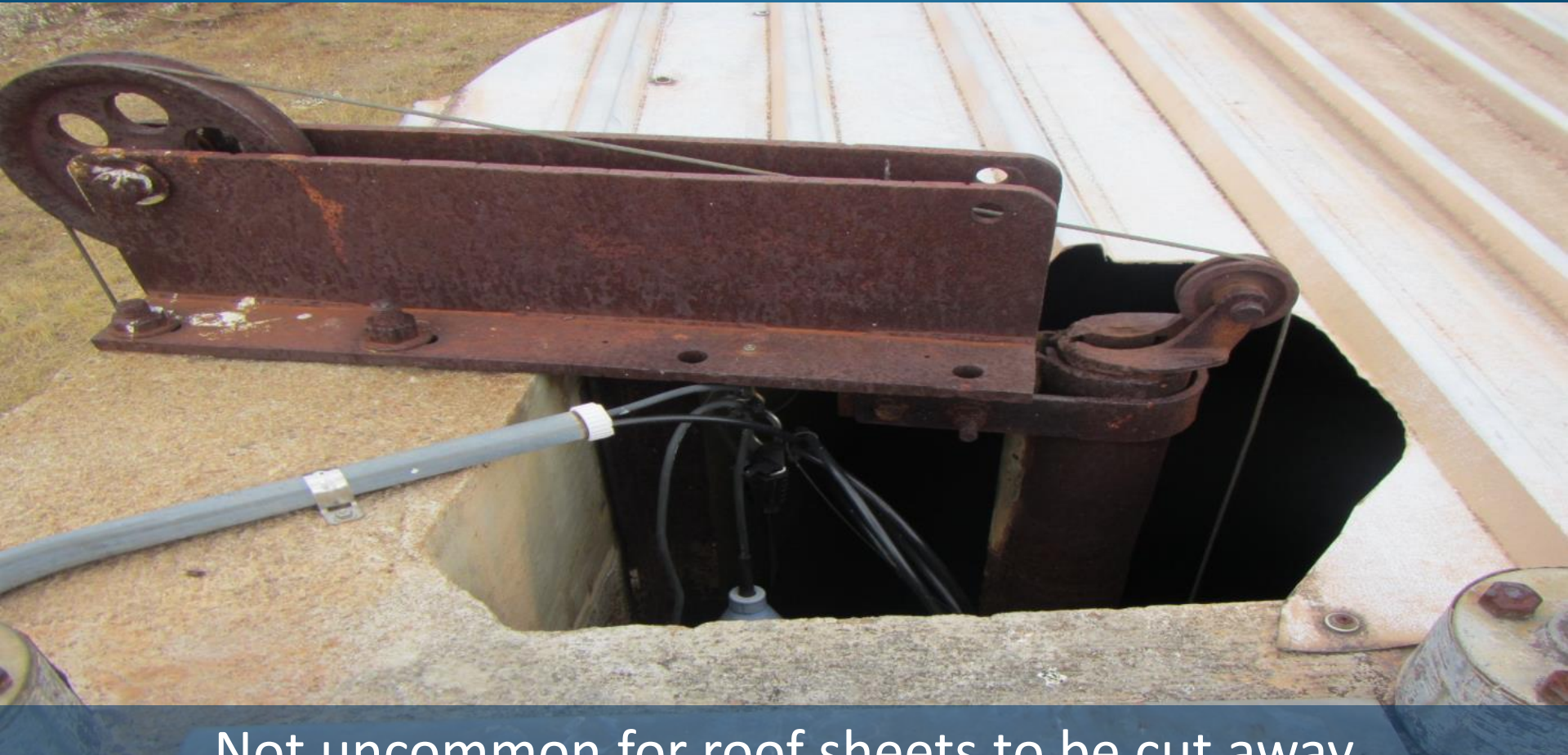
Level pulley systems  
often create bird and  
vermin entry areas





# Solutions

- Remove level indicators & remove the problem
- Learn to rely on telemetry instead



Not uncommon for roof sheets to be cut away to accommodate level pulley systems



# Contamination



Overhanging trees allow vermin entry to roof area

Excessive sediments & vandal debris







Debris - no explanation required??






Obvious bird entry area –  
note the faecal evidence of  
birds roosting (and drowning)  
for a considerable time



Quickly fixed with mesh and  
an EWP!







Faecal contamination  
from roosting birds

A close-up photograph of a rooftop antenna base. The concrete and metal structure is heavily covered with white, irregular droppings, likely from birds. A white cable runs down the side of the structure. In the background, a corrugated metal roof and a suburban neighborhood are visible under a clear sky.



No effective platform  
– too many aerials

A wide-angle photograph of a rooftop antenna array. The roof is densely packed with numerous vertical poles and antennas, making it difficult to find a clear platform. The background shows a suburban neighborhood with houses and trees under a clear blue sky.



# Solutions

- Experienced inspections and act on the results
- Ensure effective drainage off the tank and NOT into it
- Must pass the BoW (Bucket of Water) test



This platform would fail a BoW test!!



# Sediments



The penetration is 200mm diam, so.... sediment is 300mm deep at least!

Sediments are being displaced & stirred up during filling cycle  
- a directional nozzle is required







Wall hatch height  
from the outside

The same wall hatch on  
the inside....  
400mm + of sediment!





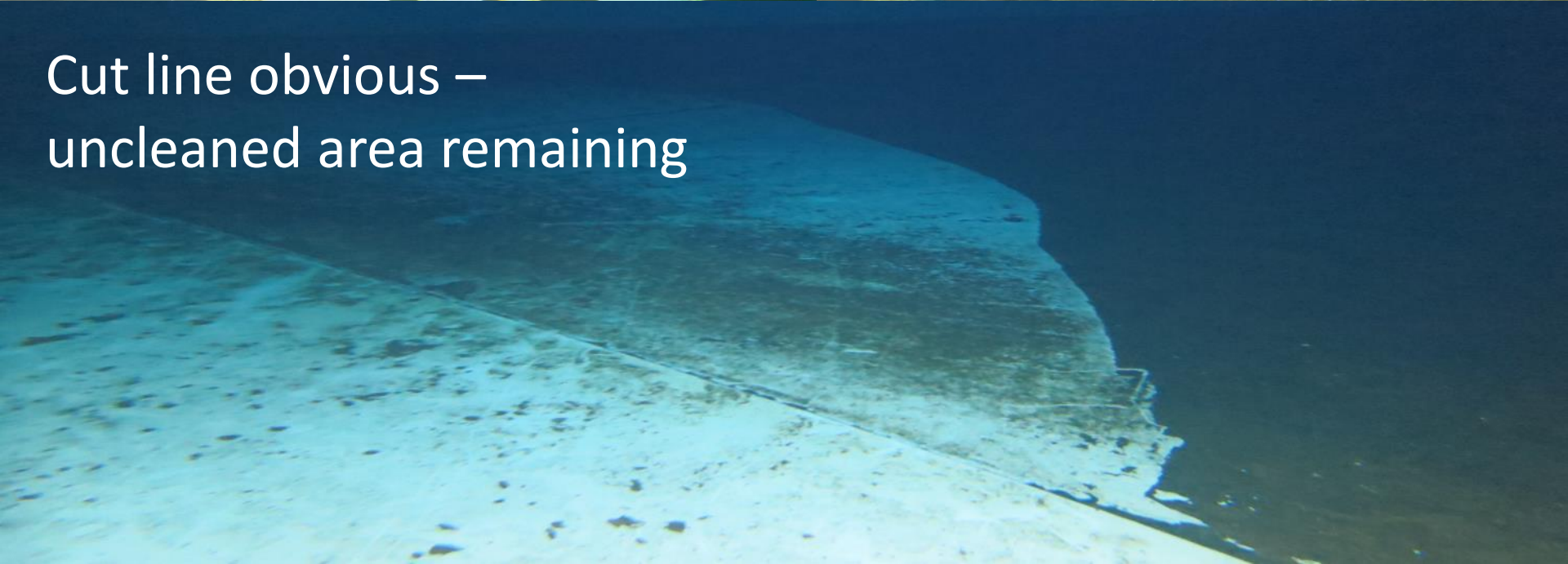
Foot prints –  
supposedly cleaned  
6 months previous



Wall step not cleaned



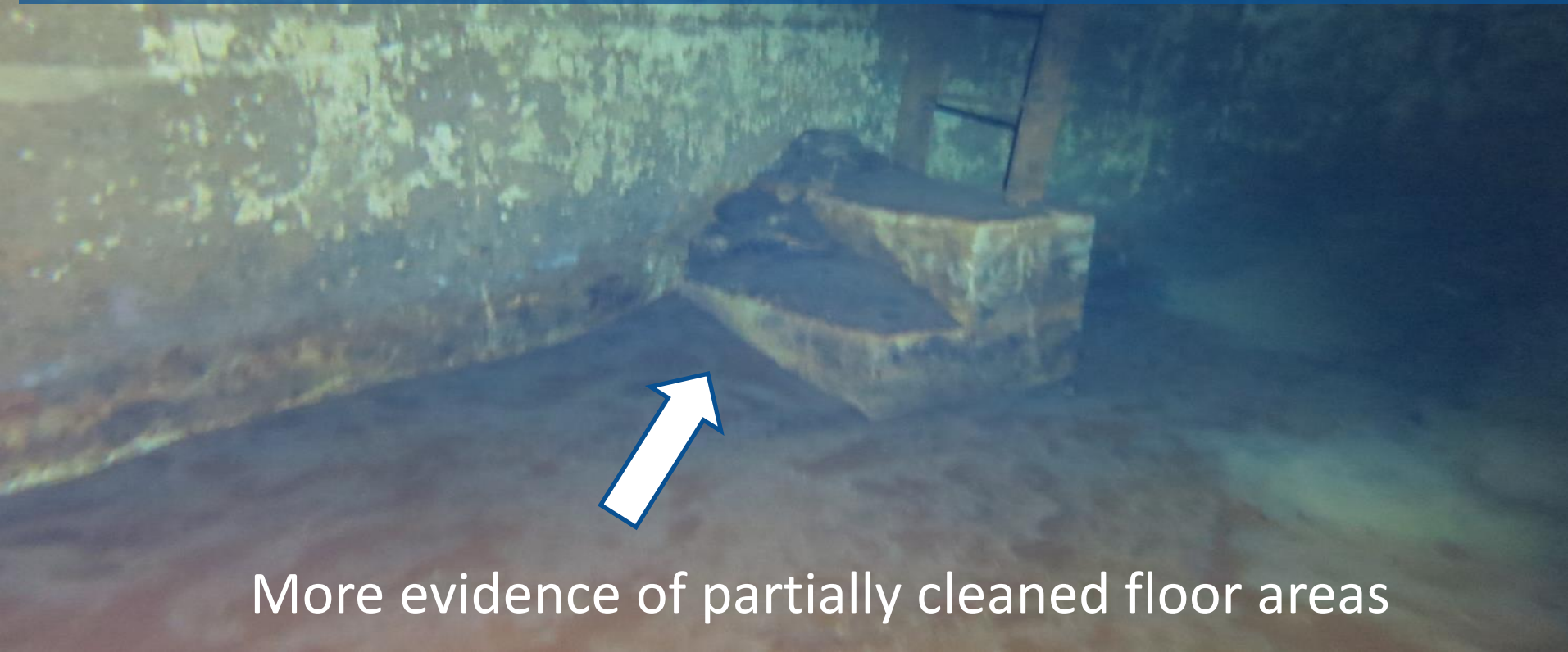
Cut line obvious –  
uncleaned area remaining





# Solutions

- Regular cleaning is good maintenance practice
- Learn what sediments indicate
- Inlets directed up off the floor area by directional nozzles, to avoid sediment disturbance



More evidence of partially cleaned floor areas



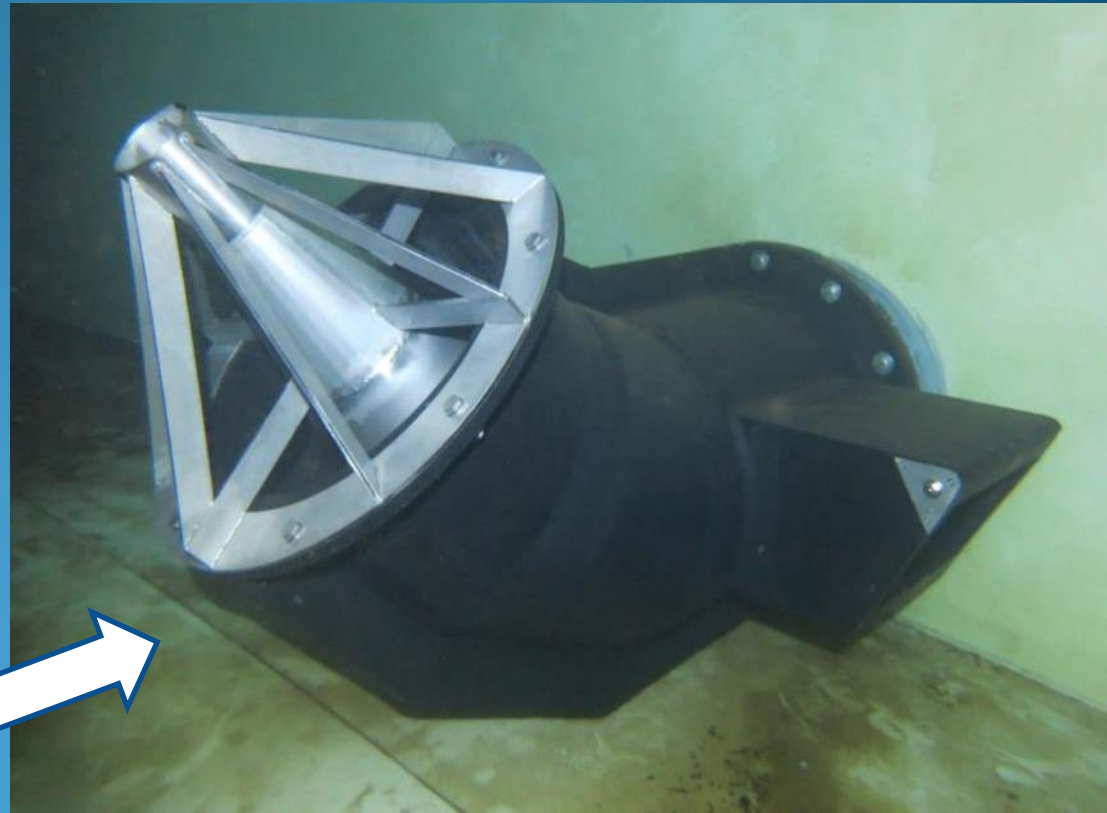


An HDPE adaptor spigot to fit inside existing wall mounted penetrations

It works similar to a 'Uniflange', except it clamps internally instead of externally

HDPE 2 way directional nozzle for common inlet/outlet penetrations

This unit directs water up off the floor & avoids sediment disturbance during filling



# Ladders



The rungs are now rust!!



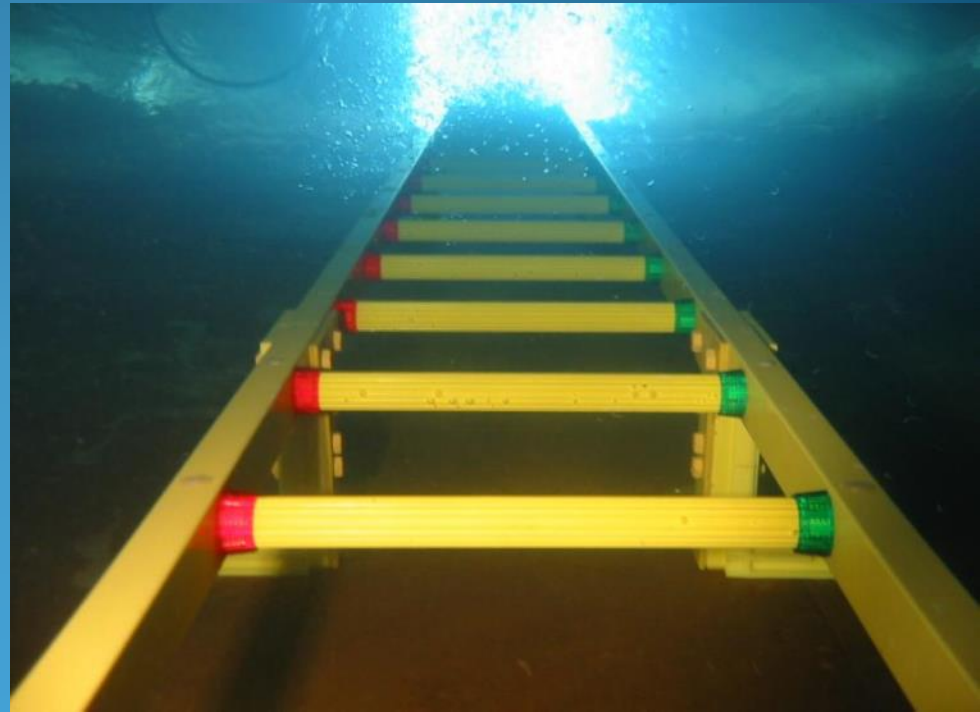
Not safe to use..  
wet or dry!



Corroded products  
create chlorine  
demand

# Solutions

- Remove heavily corroded ladders & platforms
- Simplify new ladder design to vertical, no platforms or cages
- Not all FRP units are approved or suitable
- Use Nextep FRP - WSAA approved product

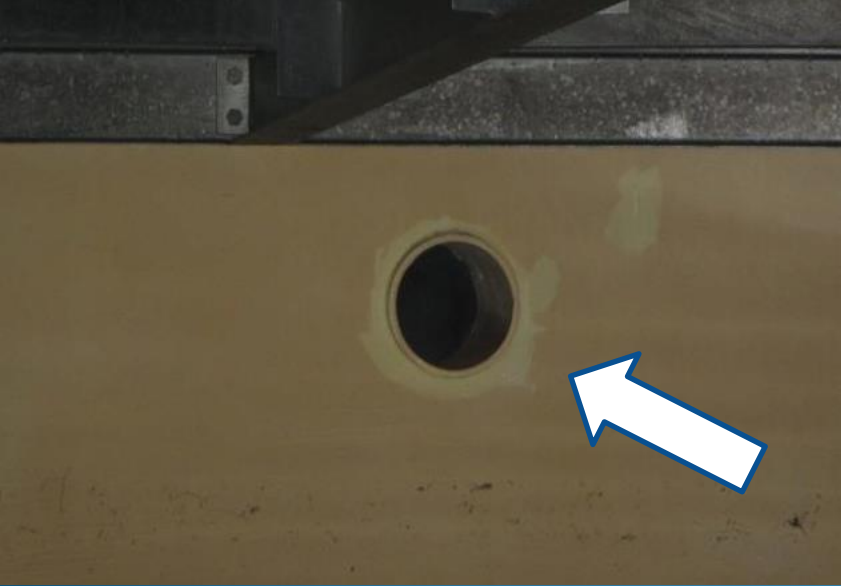




# Overflows

Most overflow systems in concrete tanks are not coated  
After 30 to 50 yrs structural failures & leakage can occur





The internal overflow is  
now a simple hole  
in the wall



External overflow systems are a good option  
- nothing inside tank to corrode or crush

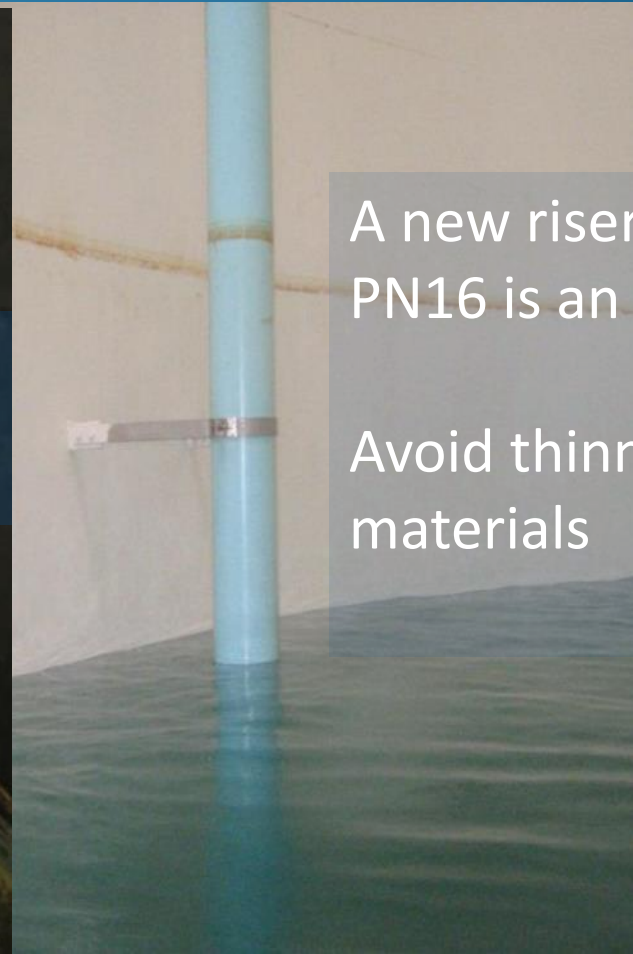


# Solutions

- On new tanks, make the overflow external
- Replace with proven, corrosion free materials
- Renovate by blasting and coating when replacing roof



A SS adaptor is placed over the top of the existing floor stub - a new riser can then be installed



A new riser of PVC-M PN16 is an option

Avoid thinner walled materials

# Structural

Tree roots will undermine floor  
& cause cracking and leakage







Poor construction & inferior materials may lead to significant structural defects developing

Inferior roof framing  
materials have  
corroded and  
collapsed



Regular inspections would have identified the problem....  
before it caused a complete structural failure



# Solutions

- Inspect roof framing condition and connections
- Be aware of materials that are prone to failure
- Act before it is too late



The whole roof has collapsed due to framing failure  
– it is only held in place by the screws around edges!  
Serious contamination is now occurring

# NOW Template

## Reservoir Details

Cambooya No2

## General Details

General  
Cleaning  
Safety  
Mixer C.P.  
Penetrations  
Valuation  
Comments

## External Inspection

General  
Condition  
Coatings  
Renovations  
Comments

## Internal Inspection

General  
Condition  
Coatings  
Renovations  
Comments

## Attachments

View Images  
Insert Image

## Contractors

Contractor Roles

## Actions

Project System  
NOW Projects  
General Projects  
Project Images  
Maintenance Cal.

Help

## Project Management System - Now

Project Type:

Reservoir:

Raised By:

Map Datum Standard:

Co-Ord 1:

Scheduled Date:

Client Responsible Person:

Person Nominated For Action:

Comments:

Some of the roof edge flashings are restricting drainage - they need to be adjusted to create a large clearance area. One section @ 2 oclock has become loose and needs to be re-fixed. Two of the three turbine vents have frozen and will need to be replaced before they fail and break off leaving the tank open to bird entry.

☐ Accepted/Modified & Approved for Action

☐ Finance Approved

☐ Work order issued

Project Details (500 Chars Max):

NOW - Roof, Ventilation.

Co-Ord 2

Responsible Date:

Action Date:

Action Taken:



# ASAM Project Management System Report



11/07/2015

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|                  |              |                 |            |                 |
|------------------|--------------|-----------------|------------|-----------------|
| Inspection Date: | 22/06/2015   | Client Name:    | [REDACTED] |                 |
| WS #:            | 0            | Reservoir Name: | [REDACTED] |                 |
| Job No:          | 026427       | Project Number: | 0          |                 |
| Cleaning Due:    | 22/6/2019    | Inspection Due: | 22/6/2019  | Register No: 26 |
| Raised By:       | dbAdmin      | Date:           | 29/6/2015  |                 |
| Map Standard:    | WGS 84       |                 |            |                 |
| Co-ord 1:        | S 027 56 037 | E 151 55 015    |            |                 |
| Co-ord 2:        |              |                 |            |                 |

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**Project Category - NOW**

**NOW Projects**

**Maintenance Item:**

NOW - Entry hatch, Ladder internal, Overflow.

**Comments:**

The entry hatch cover is unsealed where the ladder stiles extend through and there is faecal material around this area. The internal ladder is corroded and should be replaced with a Nextep vertical FRP system 8000mm long. The overflow base and riser are all heavily corroded.

**Action taken by nominated staff member/contractor:**

**Accepted or modified and approved for action:**

**Date:**

**No**

**Comments:**

# Review of Benefits

- Regular asset reviews
- Experienced assessors
- Independent perspectives
- Identification of high risks to water quality
- Evidence of DPI Water compliance
- Preservation of asset information
- Projects planned based on proven outcomes

For more information go to:

[www.asam.com.au](http://www.asam.com.au)

[www.aqualift.com.au](http://www.aqualift.com.au)