Greenfields Sewage Pump Station
Odour & Corrosion Risk Screening Assessment

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Pump Stations – Potential Odour & Corrosion Risks

- Sewage Pump Stations – Essential components of wastewater collection systems
- Odour generation & infrastructure deterioration
- Hydrogen sulphide can create both community odour nuisance and microbiologically induced corrosion
- Other compounds also contribute to odour (reduced sulphur compounds, ammonia/amines, VOCs)

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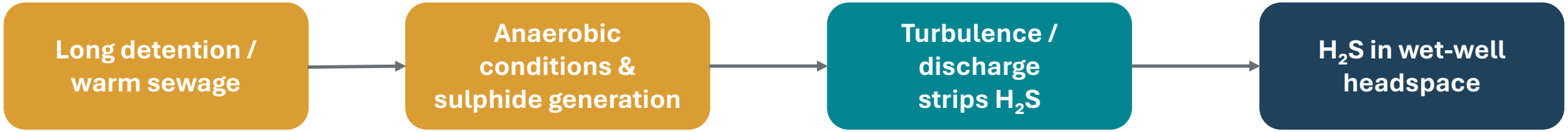
How the H_2S Problem Develops



ODOUR NUISANCE

BIOGENIC CORROSION

One underlying sulphide problem → Two different design risks

The ‘Design’ Problem

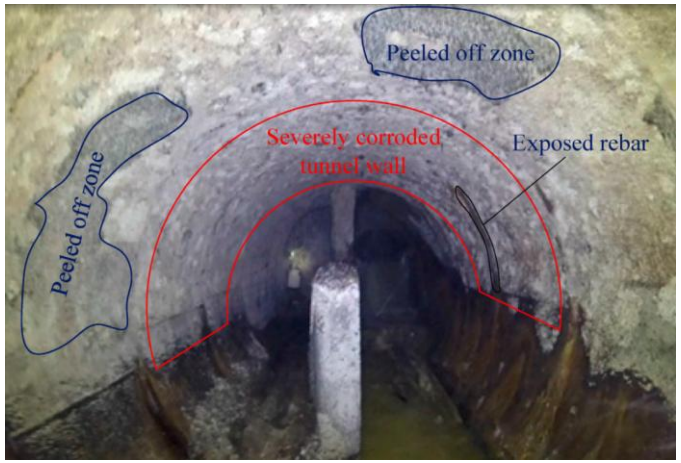
- Odour and corrosion risks are often not adequately assessed during planning and concept design
- Detailed assessment typically occurs later, when more design and operating information is available — but by then key design decisions may already be fixed

The Opportunity

- Identify potential odour and corrosion risks early enough to influence the SPS design

The Importance of Early Risk Identification

- Sulphide prediction models, dispersion assessment, specialist corrosion investigations – Require hydraulic information, flow monitoring data & specialist expertise not available during concept design stages
- Considering these issues late in detailed design can cause significant delays
- Once the asset is built, mitigation can mean retrofitted covers, ventilation, odour treatment or concrete rehabilitation
- The opportunity is to identify risk while layout, hydraulics and materials can still be changed (e.g. Concept Design stage)



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How to Identify Potential Problems

- How do we identify a potentially problematic SPS before the design is fixed?

➢ A simple **Concept Stage Screening Framework**

  - Structured scoring system
  - Odour & corrosion classification linked to proportionate design responses
  - Support informed decision making
  - Identify where enhanced mitigation or additional assessments required
  - *Note: Doesn't replace detailed investigations – decision support tool*

➢ Improve asset resilience / avoid community impacts

Screening Assessment Methodology – Key Points

- Information available during Concept Design:
  - Preliminary hydraulic calculations
  - Catchment characteristics
  - Site observations
  - Local meteorological observations
- 14 Screening Factors
- Each factor assigned a score from 0 to 3 (0 = favourable; 3 = unfavourable)
- Separate Odour & Corrosion scores calculated
- *Note: Low odour risk does not necessarily mean low corrosion risk*

Risk Classification	Odour Risk Score	Corrosion Risk Score
Low Risk	0–10	0–9
Medium Risk	11–20	10–18
High Risk	≥21	≥19
Maximum Score	39	27

The 14 Screening Factors

Sulphide Generation

- Detention time
- Catchment land use
- Local contribution
- Temperature
- Wet-well storage
- Diurnal variation

H_2S Release

- Discharge turbulence
- Pump exposure / ventilation
- Rising-main discharges

Corrosion Vulnerability

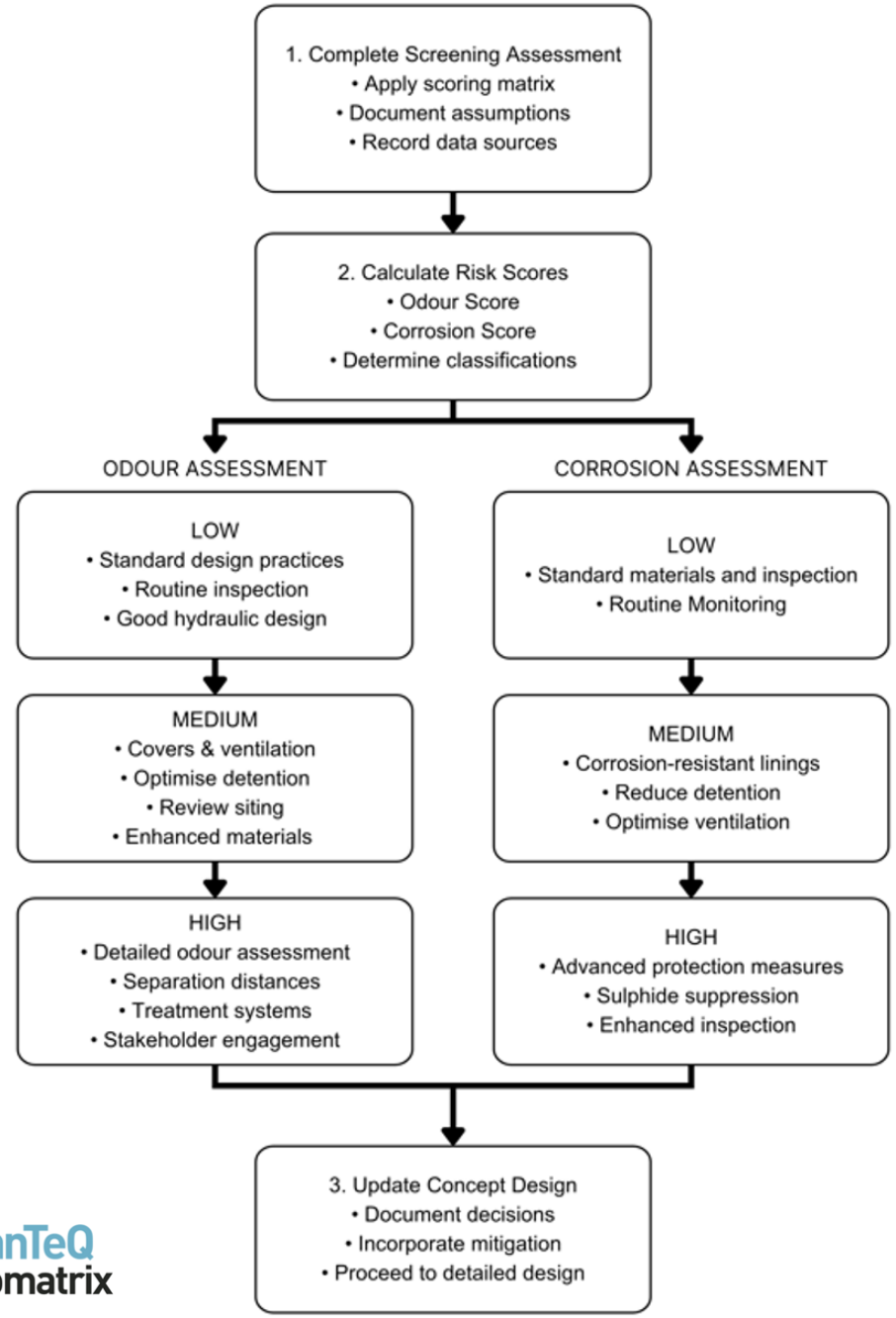
- Wet-well materials / linings

Odour Exposure

- Sensitive receptors
- Relative elevation
- Wind shielding
- Wind direction

Screening Factors - How the Scoring Works

No.	Factor	What to check at Concept Stage	Score = 0 (favourable)	1	2	3 (unfavourable)	Applies to Odour	Applies to Corrosion
1	Sewage detention time (wet well + rising main + upstream retention)	Sum average detention (wet well + rising main + any upstream gravity mains at low flow)	< 2 h	2–4 h	4–8 h	> 8 h	✓	✓
2	Discharge / Inlet Turbulence & Drop Configuration	Whether the inlet/discharge into the wet well or structure (from gravity or rising mains) is submerged or free-fall; drop height; presence of energy dissipation or flow diffusers; turbulence potential at discharge point.	Submerged or low-energy discharge (< 0.2 m drop, diffuser or gentle slope, minimal turbulence)	Mild drop / partially submerged, minor turbulence (0.2-0.5 m drop, some mixing)	Moderate drop / mostly free-fall or submerged with high velocity, visible splashing, turbulence (0.5-1.0 m)	High drop (> 1.0 m), free-fall jets, steep gradient or rising main discharge without mitigation, high turbulence, poor inlet protection	✓	✓
3	Catchment Land Use	% industrial vs residential	Predominantly residential	Mixed, low trade waste	Industrial pockets (pretreated)	Predominantly industrial (high sulphate/COD)	✓	✓
4	Local Catchment % (near-field vs total) – Refers to the proportion of the flow (or load) entering the Sewage Pump Station (SPS) or similar facility that comes from near-field sources vs the total catchment.	Local % of total flow entering SPS	> 60%	30-60%	10-30%	< 10%	✓	—



Risk score ▶ proportionate design response

COMPLETE SCREENING

CALCULATE SCORES

ALLOCATE RISK LEVELS

UPDATE CONCEPT DESIGN

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Odour & Corrosion Risk Screening Report

And this is ultimately what the framework produces — a relatively simple screening report that can be completed at concept stage and retained as part of the design decision record

Case Study

- Pump Station with mixed residential / low trade-waste catchment
- Extended sewage detention (>4 h)
- Long rising-main system (4.5 km rising main)
- Warm summer wastewater conditions (24°C)
- Periodic filling and draining conditions
- Turbulence / gas stripping potential (Discharge drop: ~0.8 m with visible splashing)
- Pumps normally submerged
- Infrastructure vulnerable to corrosion
- Sensitive receptors nearby (≥55 m)
- No shielding from surrounding receptors
- Winds toward receptors: ~45% of the time

Screening Assessment Scoreboard

	Score	Odour	Corrosion
Detention	2	2	2
Turbulence	2	2	2
Land use	1	1	1
Local contribution	1	1	—
Temperature	2	2	2
Wet-well storage	2	2	2
Diurnal variation	1	1	1
Wall lining	1	—	1
Pump exposure	0	0	0
Sensitive receptors	3	3	—
Elevation	2	2	—
Wind shielding	3	3	—
Wind direction	2	2	—
Rising-main discharge	2	2	2

Main contributors: multiple moderate factors

No single factor controls the outcome

TOTAL	ODOUR	CORROSION
	23	13

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Result – Different Risks, Different Responses

ODOUR SCORE = 23
HIGH RISK

- Detailed odour impact assessment
- Community engagement
- Sealed wet-well covers
- Maintain negative pressure within well
- Venting to Odour Control Facility

CORROSION SCORE = 13
MEDIUM RISK

- Corrosion-resistant materials / linings
- Review ventilation and H_2S exposure
- Increased inspection / monitoring provisions

Reduce detention / Minimise turbulence / Consider chemical dosing

- Sewerage piping incorporating corrosion resistant materials
- Sewer pipe rehabilitation
- Ventilated wet well
- Odour Control Facility Implemented
- Shielded for Community Aesthetics

Why Early Screening Matters

The same risk is easier to manage at concept stage than after the asset is operating

AT CONCEPT DESIGN

Options still available

- ✓ Optimise hydraulics / reduce detention
- ✓ Select materials and protective linings
- ✓ Design appropriate ventilation
- ✓ Allow for odour treatment
- ✓ Optimise layout / receptor separation

LOWER COST • GREATER FLEXIBILITY

AFTER CONSTRUCTION / IN OPERATION

Problems become retrofit solutions

- ! Hydraulic modifications / operational constraints
- ! Repair or reline corroded infrastructure
- ! Retrofit covers and ventilation
- ! New ductwork / odour control facility
- ! Limited options for sensitive receptors

HIGHER COST • LIMITED FLEXIBILITY

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Identify the risk while you still have the opportunity to design it out

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Framework Scope and Limitations

WHAT IT DOES NOT DO

- Predict H_2S concentrations
- Calculate odour emission rates
- Predict corrosion rates
- Replace modelling, monitoring or regulatory requirements

WHAT IT DOES

- Rapid, structured concept-stage screening
- Consistent and transparent documentation
- Flags need for mitigation / further assessment
- Supports planner–designer–operator communication

It is a screening and decision-support tool, not a predictive model.

Key Takeaways

1. Assess odour and corrosion before the SPS design is fixed
2. Consider the combined effect of multiple risk factors - not H_2S generation alone
3. Match the engineering response to the identified risk
4. Prevent odour nuisance & achieve sewerage infrastructure longevity

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Questions?

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