Landscape Matters

From System Failure to Public Health Risk in Coastal Tauranga

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Purpose of Presentation

- Set the scene for challenges of land based discharged in coastal Bay of Plenty
- Discuss how landform plays a large role in decisions
- Consider management of growth pressures
- Discuss critical design parameters
- Identify pathways for risk to human health and the environment

Going to raise more questions than provide answers!!


Google Earth


Papamoa
Tauranga
Google Earth


Google Earth


Development
Flat Land
Hills
Google Earth


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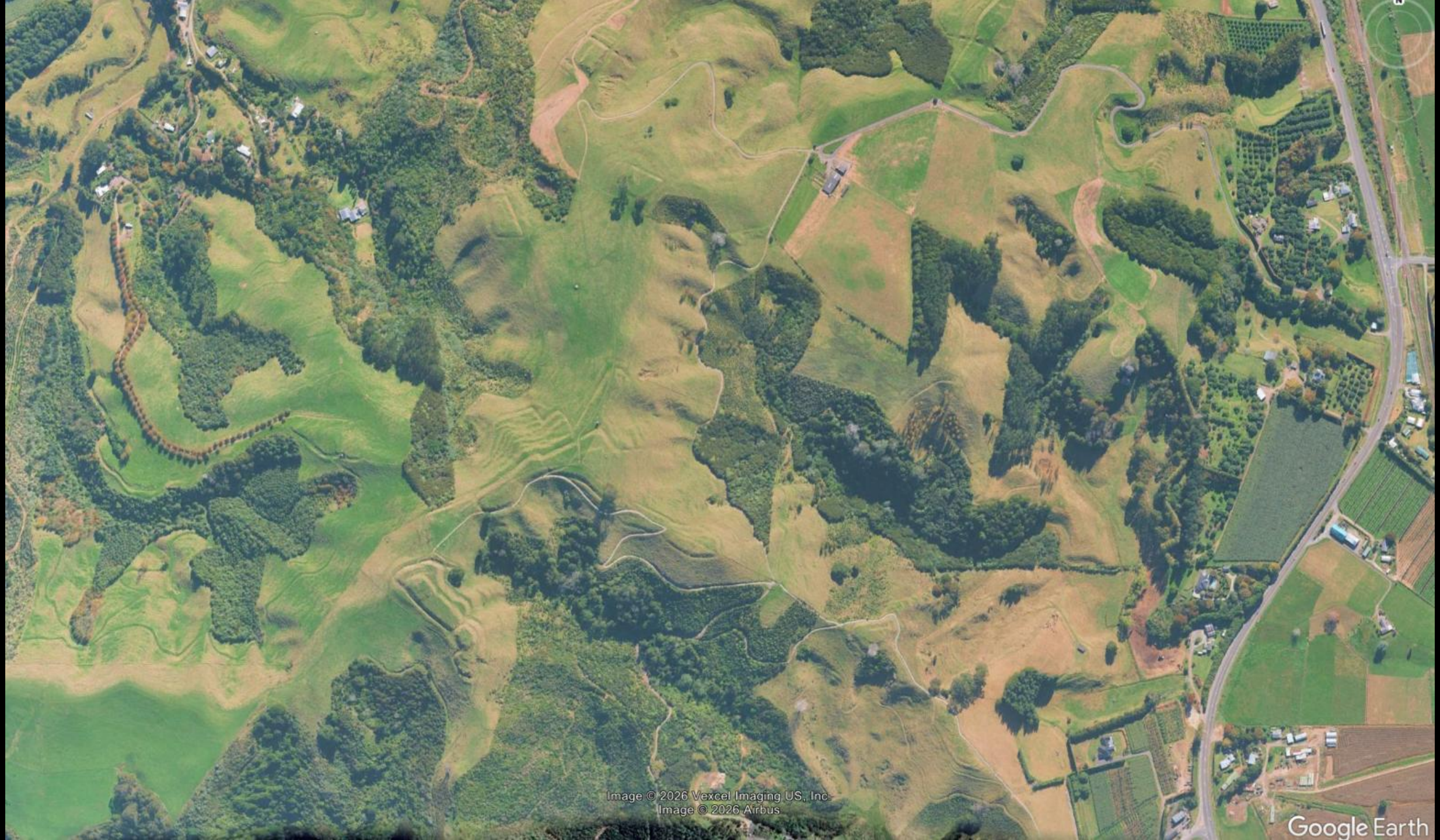
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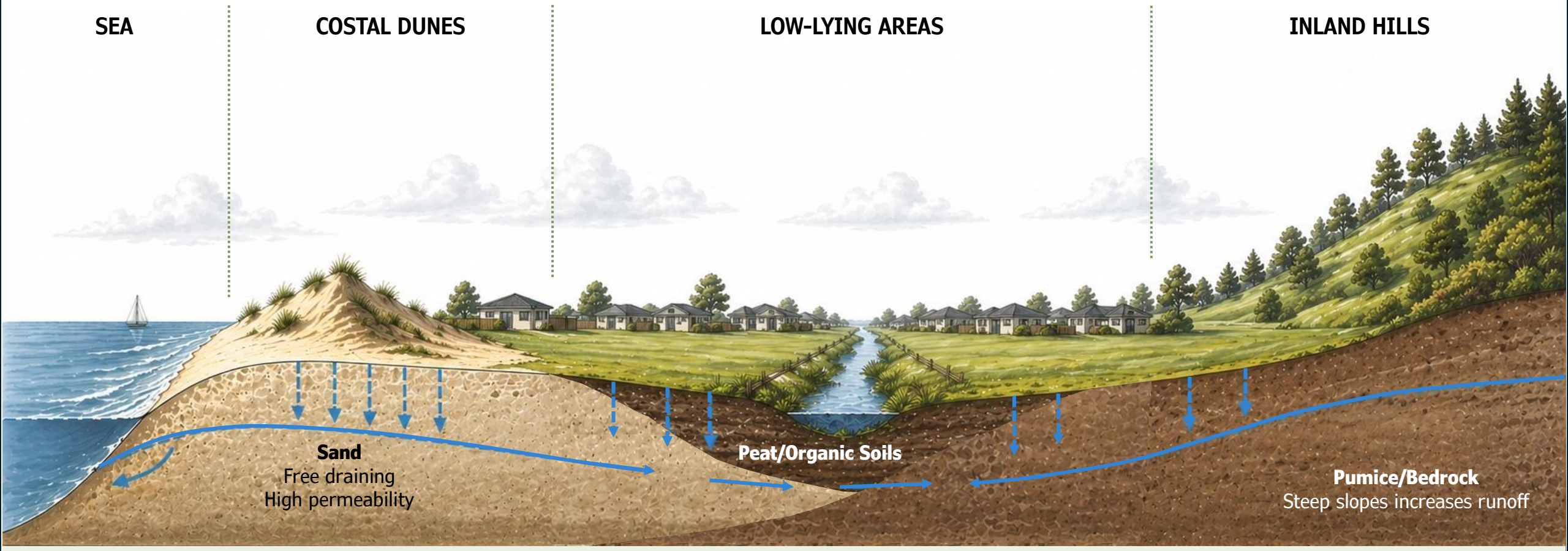
Cross Section

A CONNECTED LANDSCAPE



Hydrological connection – groundwater and surface water flow systems are linked across the landscape


Google Earth


Ohope
Whakatāne
Google Earth

Challenges: Landscape v Development

Developments create pressure and impacts on land resources

Suitable land is limited, and population growth is fast, which result in:

- Development expands into low-lying areas
- Centralised sewer infrastructure does not expand at the same pace
- On-site wastewater management systems (OWMS) are widely adopted as an alternative

Challenges: OWMS Design and Operation

In some cases OWMS are installed in hydrologically constrained environments

- Key limiting factors:
  - Shallow groundwater reduces treatment depth
  - Sandy soils enable rapid contaminant transport
  - Seasonal saturation limits infiltration capacity

Higher housing density → multiple systems in close proximity

Result: cumulative wastewater loading exceeds site capacity

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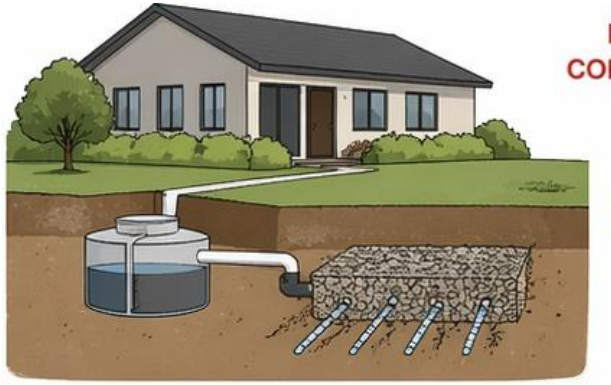
The issue is not only individual system design, but the mismatch between system requirements and landscape conditions

From System Failure to Public Health Risk – Risk Profile

RISK ASSESSMENT PROFILE

1. HOUSE + OWMS

Source



- OWMS treats household wastewater
- Installed on individual lot

2. DRAINAGE, PONDING AND OVERLAND FLOW

Vector - Failure at Source

- System underperformance leads to excessive drainage or ponding.
- Wastewater emerges at the surface and flows overland
- Shallow groundwater passes laterally

3. DRAIN NETWORK

Vector – Transport Pathway

- Wastewater enters the drainage network
- Drains connect properties and convey flow downstream

4. PEOPLE + ESTUARY

Receptor – Exposure Pathways

- Direct contact with ponded wastewater
- Recreational use of drains
- Transport to estuarine environments


Google Earth

What This Looks Like In Practice

Papamoa Development Case

- Residential development using OWMS at individual lots
- Located in low-lying area
- Surrounded by a network of drainage channels

After several years of operation:

- Systems showed signs of underperformance
- Wastewater ponding observed
- Overland flow to adjacent drains

Papamoa Development

Papamoa Development

Papamoa Development

Papamoa Development

Papamoa Development

Papamoa Development

Papamoa Development

Subdivision Recommendations

- Onsite
  - Better management of what is there
  - Design – some good, some re do
  - Make owners aware of obligations and risks
- Decentralised
- Reticulate

Rethinking On-site Wastewater Management Systems in Constrained Landscapes

OWMS performance is strongly influenced by:

- Landscape
- System density
- Hydrological connectivity

In the coastal, low-lying environment of Tauranga:

- Failures are not isolated events
- Risks become cumulative and network-scale

Current approaches often overlook landscape limitations and in some cases the conflict with growth pressure

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Protecting public health requires aligning system design, land use planning, and infrastructure investment with environmental capacity.

Take Home Messages

- Look for landscape features v development pressures
- Recognise challenges in the fixed landscape
- Consider environmental implications
- Consider public health implications
- Work with fixed challenges – make solutions that last

LOWE Environmental Impact

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