# Brine Management Solutions

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# Agenda

1. Introduction
2. Not all Brine is made equal
3. A Holistic Approach to Brine Management
4. Conclusion


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# Introduction

# Outlining the Challenge of Brine Management

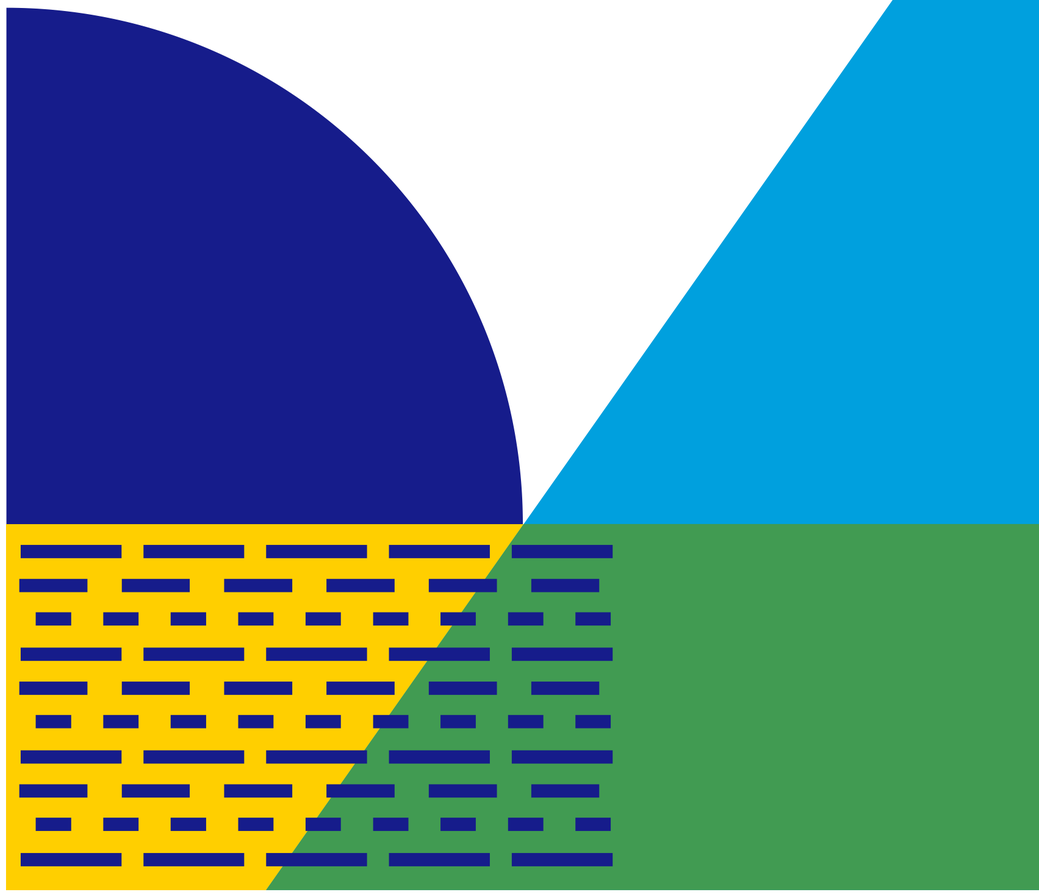
Brine Management is inextricably linked to:

i) management of the **potable water supply**

ii) local **waste water and effluent discharge** options

iii) availability of **local solids and liquid waste landfill** infrastructure

iv) **3rd party support infrastructure** is increasingly a more important consideration in the adoption of any sustainable and holistic water treatment strategy for an organisation.



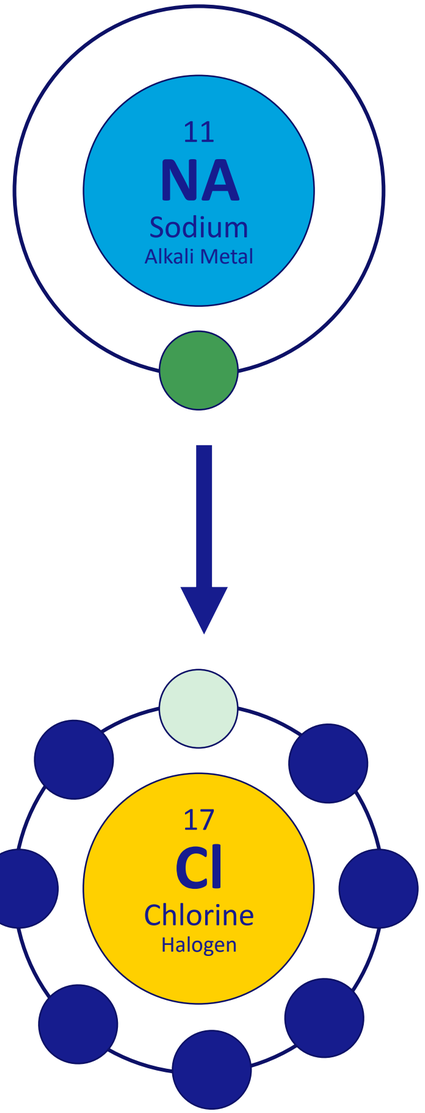
# Outlining the Challenge of Brine Treatment

What do we mean by saying – “***To Treat***”

- **Conversion** of chemical compound to another form.
- **Degradation** of a complex molecule to a simpler form.
- **“Contaminant” removal**
- **Concentration** of the chemical components

OR a combination of the above.

Brine is a high-concentration solution of salt (NaCl) in water. Typical seawater has 3.5% NaCl, while a saturated solution will have around 26%.

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# Not all Brine is made Equal

# Some Brine is more Equal than Others

Brine NaCl concentration and other trace components are highly variable.

Typical Brine Stream Examples:

- 1. <= 500 mS/m (RO Brine)
- 2. <= 4 000 mS/m (Concentrated RO Brine)
- 3. <= 7 500 mS/m (Seawater RO Brine)
- 4. <= 12 000 mS/m (Ultra-High-Pressure RO / Forward Osmosis Brine)
- 5. <= 35 000 mS/m (Evaporator Concentrate Brine)

Brine generation is fundamentally linked to

1. **feed water quality**
2. **commercial consideration** such as discharge options, volumes and transport costs as well as
3. **local support infrastructure**


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**RO = Reverse Osmosis**

# A Holistic Approach to Brine Management

# Brine Management: A Holistic Approach (Brine Destination)

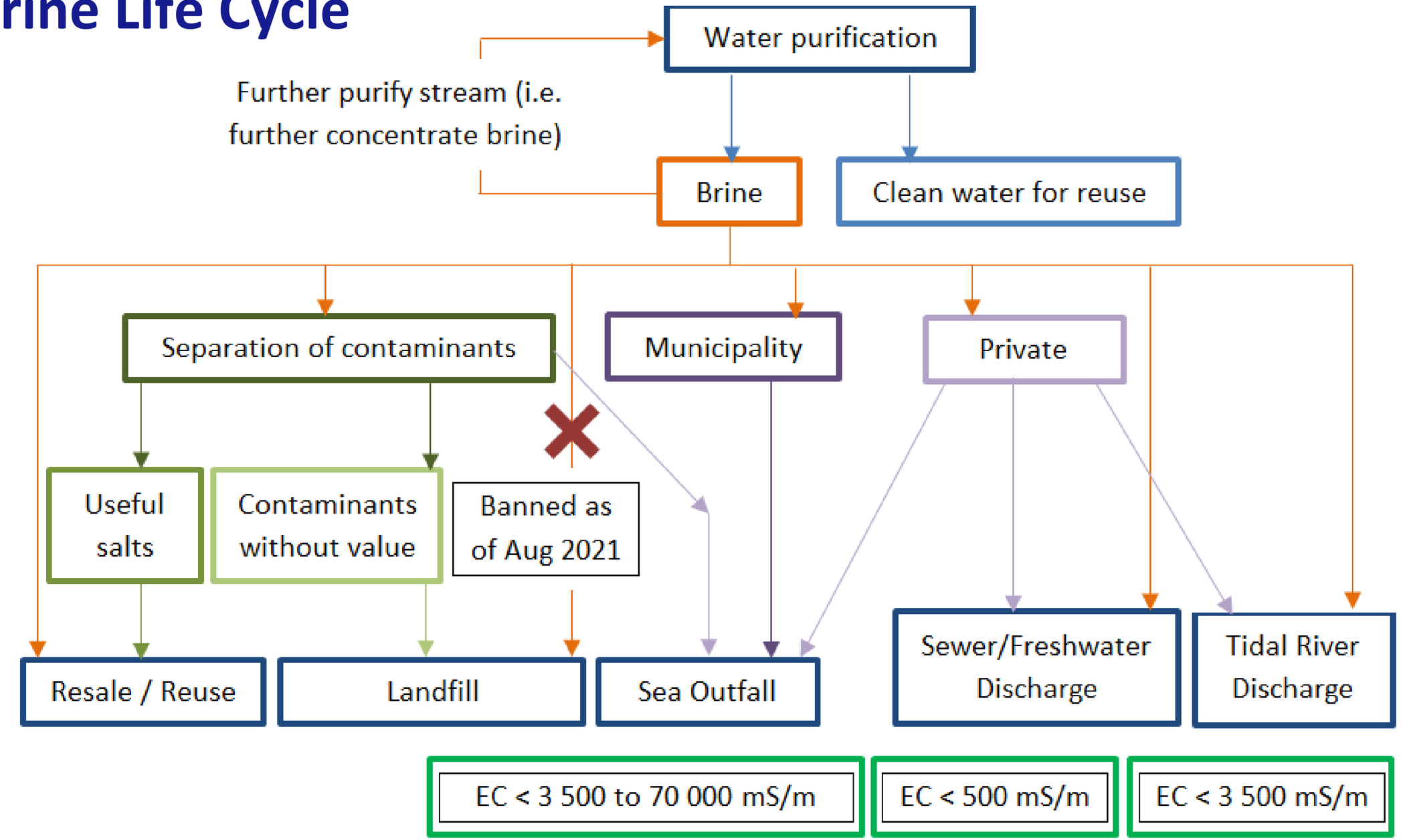
All brine generated must either be;

- **Safely released** to the environment (sewer, sea, etc.)
- **Reused**
- **Treated** before environmental release or reuse (Interim Stage)
- **Landfill** of contaminated “solids”

**Discharge Options – A High Level Proposal**

1. Environmental (Ecologically safe brine release to the environment)
   - Inland / Coastal (EC <  500 mS/m to sewer)
   - Coastal (EC < 3 500 mS/m to tidal rivers)
   - Coastal (EC 3 500 - 70 000 mS/m to sea outfall)
2. Post Processing
   - Brine Treatment
   - Landfill

# Brine Management:
# Brine Life Cycle



# Conclusions

# Brine Management: Conclusions and Proposals

Firstly - **AVOID** generating brine - comply to discharge regulations

(Dilute through Recovery of rainwater and supplement if possible)

Secondly - **Environmental Release to Sea Outfall** of Sodium-Chloride brine solutions should be considered.

Note: Enabling legal environment is required

Thirdly - **Centralised "Thermal" Brine Treatment Facility** needs to be developed to assist SMEs.

Note: Enabling legal framework is needed for **final disposal to landfill**

Fourthly - Implementation of on-site **advanced treatment technology** coupled to **3rd party processing and disposal** where economically viable

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# Brine Management: Sea Outfall – Some Challenges

Access to Sea Outfall Pipelines is typically Permitted to:

1. Large Industrial Clients
2. Municipal Wastewater Works
3. Desalination Water Treatment Plants
4. Storm Water Discharge

Adherence to discharge limits as per the **Coastal Waters Discharge Permit** (CWDP) must be strictly adhered to.

Due to the potential risk (Operational, Reputational, etc.) to the owner/ operator and compliance to the CWDP - 3rd party “brine” solutions cannot typically be released through these channels.

Furthermore **transport costs** are typically prohibitive.

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# Brine Management: Conclusion

A holistic approach will enable;

1. **Reduce $CO_2$ emission** generation through the unnecessary thermal evaporation and treatment of brine streams
2. **Increase potable water availability** through increased water efficiency
3. **Reduce brine and concentrated brine to landfill** – brine and/or salt which cannot be reused will still need appropriate landfill disposal
4. **Maintain ecological and environmental integrity**
5. **Enable business** to grow the economy and **create jobs**

# Thank you.

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