Engineering Design for an Integrated Waste Management Facility

SWANA 2026
Waste in a World of Change

April 24, 2026

worley consulting

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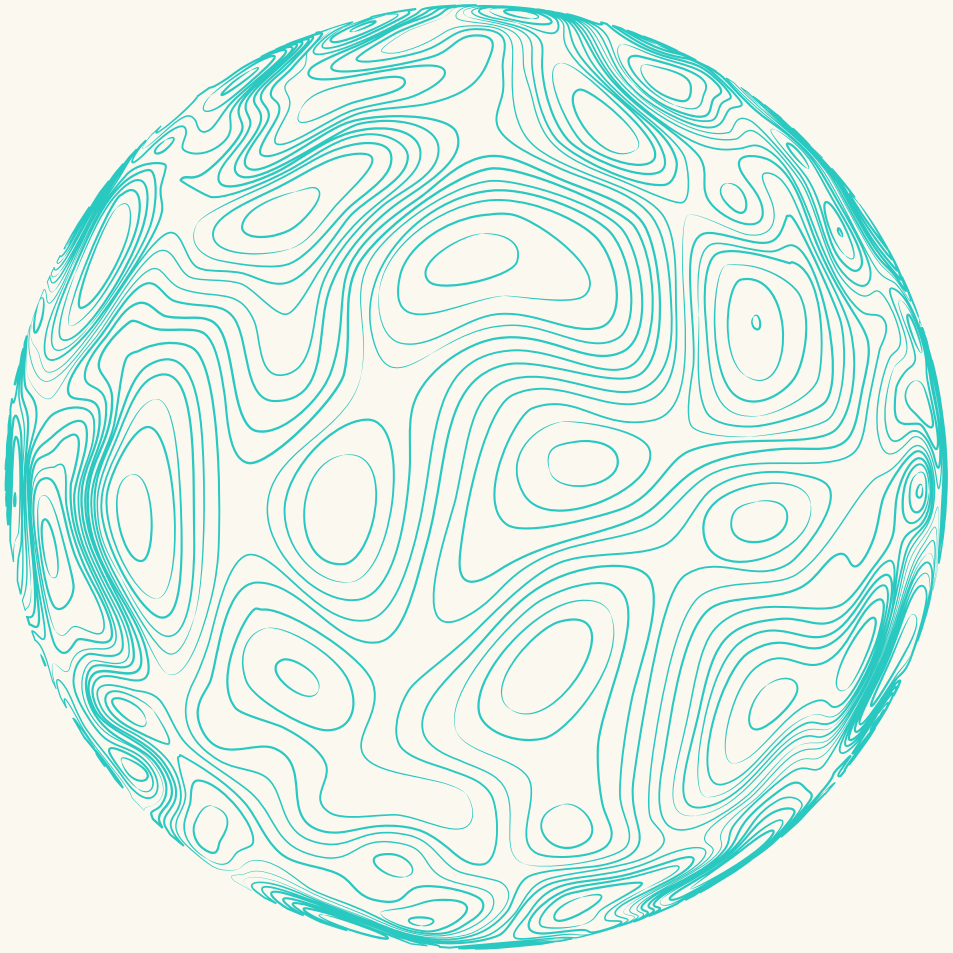
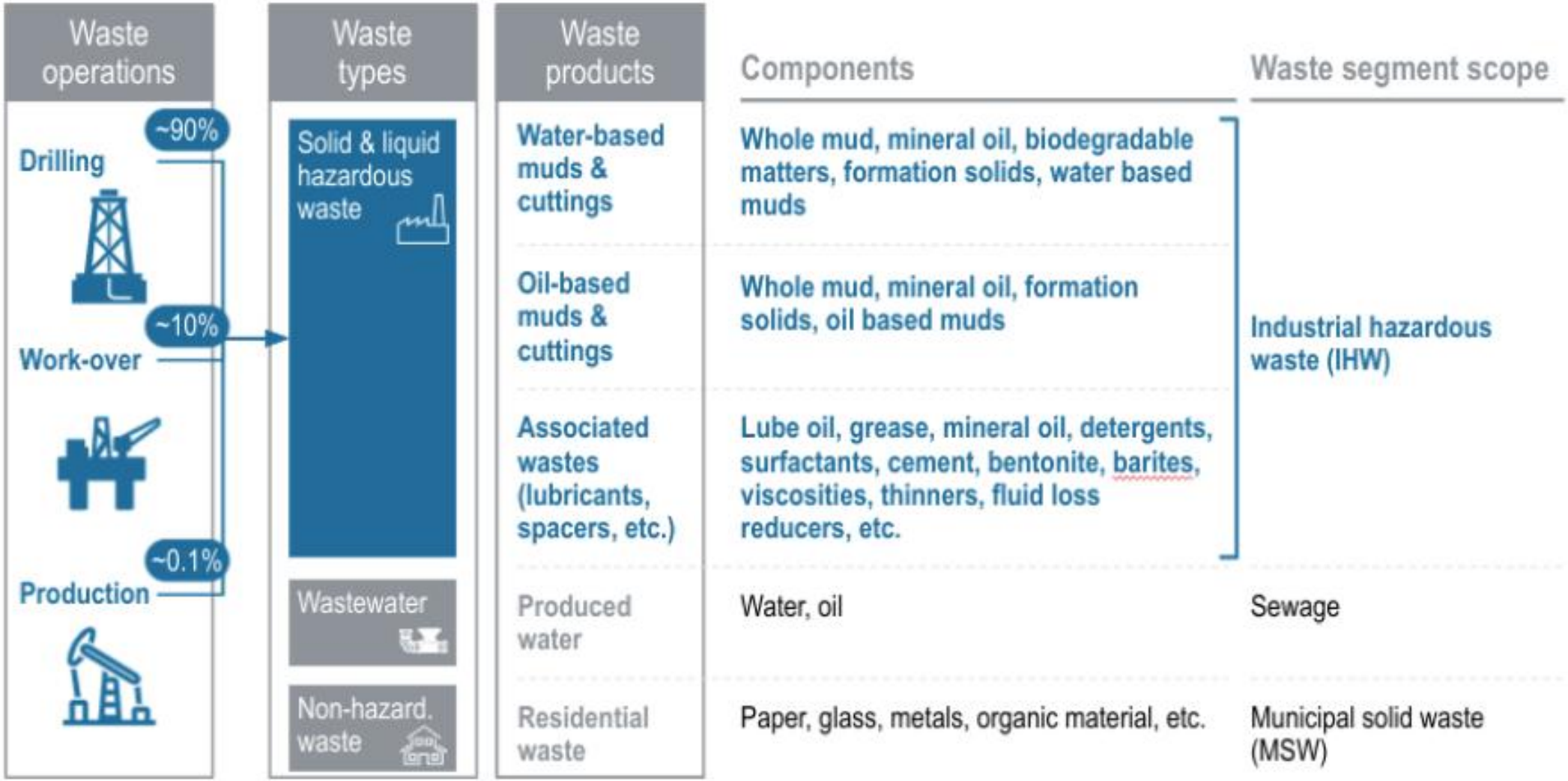


Activities Generating Waste



IHW Waste Characterization and Quantities

Category	Waste Description	Waste Capacity (tonnes/year)
1	Contaminated Drilling Muds (Offshore Plus Onshore)	120,000
2	Oily Sludge	50,000
3	Contaminated Sand	15,000
4	Oily Wastewater	90,000
5	Acids	300
6	Bases	100
7	Spent Catalyst	4,500
8	Spent Desiccants and Adsorbents	1,200
9	Black Powder	6,240
10	Spent Molecular Sieve Dust	60
11	Sanitary Wastewater (External)	1,400
Total		**262,000**

GSW Waste Characterization and Quantities

Organic Material			
Item	Material	Volume (tpa)	Notes
1	Food Waste	4,125	7.5% contamination
2	Garden Waste	34,284	2% contamination
3	Biosolids	509	2% contamination
4	Stables Waste	1,487	2% contamination (manure)
Total		**40,405**	

GSW Waste Characterization and Quantities

Inorganics	Total (Tonnes)
Dry Mixed Recyclables	13,263
Food	3,960
On Call	1,181
Residual (black bin)	14,059
Total	**33,160**

Process Scope Overview

Facility comprises of two areas, namely, IHW & GSW along with general support Facilities and Utilities:

General Facilities

Unit Code	Unit
120	Site Utilities
130	Site Treatments
115	Fuel Station
181	Vehicle Wash
182	Wheel Wash
160	Irrigation System (For Greenbelt & Wetland)
117	Laboratory
128	IHW Chemicals
130	Civil Structural Architectural
131	Firewater VOC Office(s) and Security Telecommunications

IHW

Unit Code	Unit
210	De-pack Building
220	Unloading Stations & Tank Farm
230	Centrifugation
240	Thermal Desorption
250	Ind. Wastewater Treatment (Including High Salinity Treatment)
260	Stabilization
270	Landfill Class I

GSW

Unit Code	Unit
310	Materials Recovery Facility
320	In-Vessel Composting
140	Landfill Class II

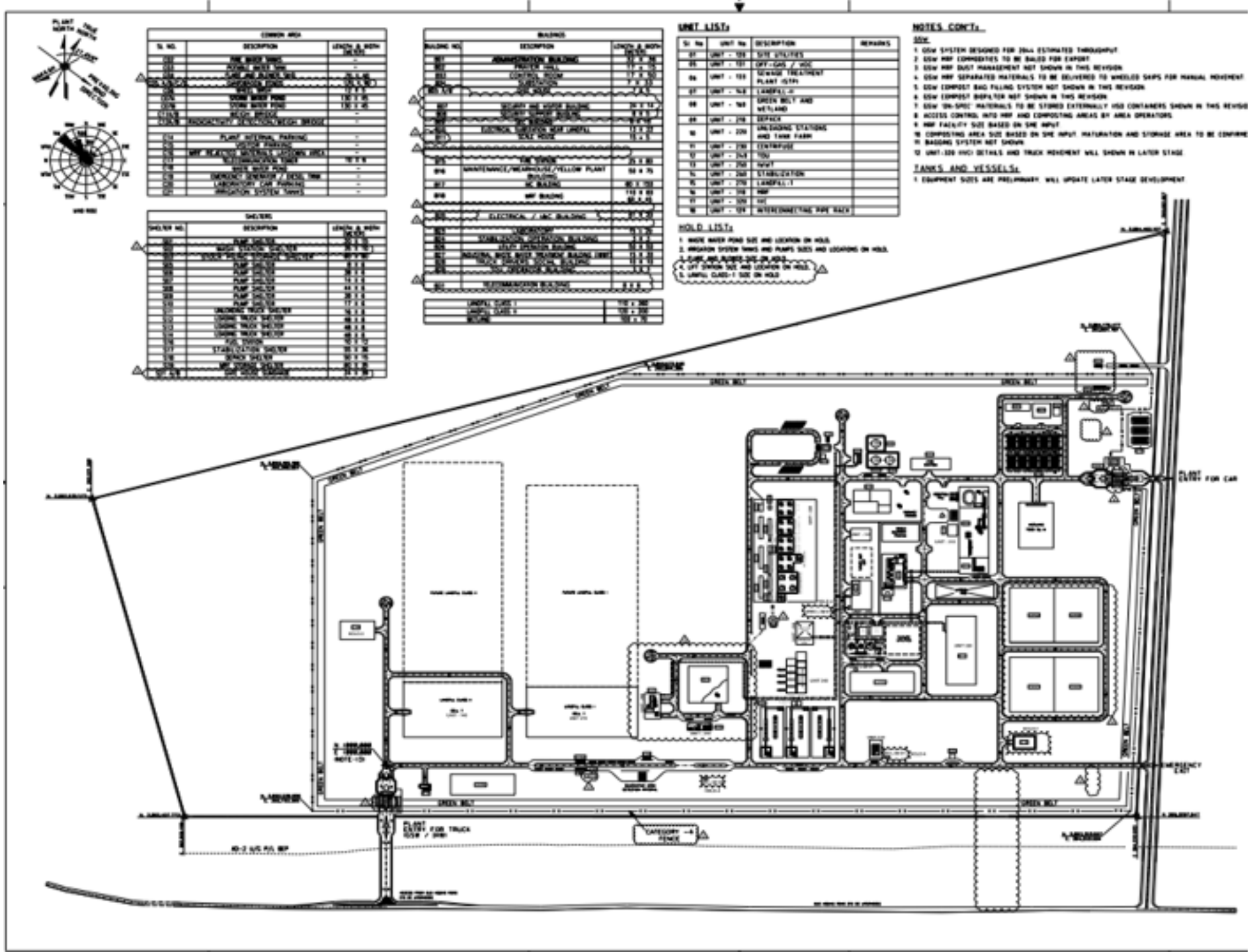
Hazardous Waste Treatment Centre operational 1987 – Pending Closure
~15,000 tpy

Incineration
Solidification
Wastewater treatment
Class I Landfill
Deep Well Injection

Hazardous Waste Incinerator operational 2024 - 120,000 tpy

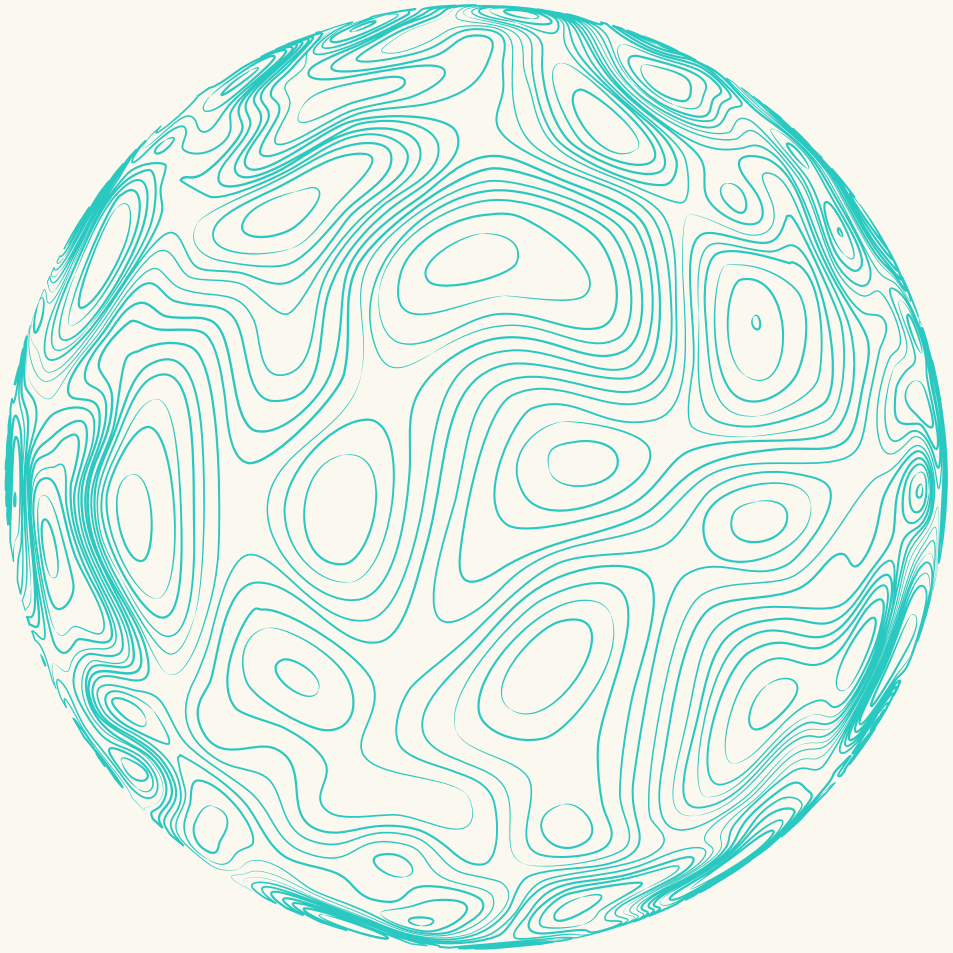
Liquid IHW
Bulk solid waste
Small packaged IHW

Overall Plot Plan Rev.G



02

Plant Process



Drilling Muds\Sludges

Make up 65% of waste stream

Invert or oil based difficult to separate and treat owning to drilling mud being an engineered fluid designed for high pressure, temperature and shear

Figure 1. Photos Feed 1 – Offshore drilling muds

Waste technology grouping

Process Phase	List of Possible Treatments Units	Acronym	Quantities	On-site vs Off-Site
Primary waste receiving	Tank storage	PWR	282,000	on-site
Preliminary liquids/solids processing	Primary separation	PWS	270,000	on-site
	Centrifugation	CEN	135,000	on-site
Industrial wastewater treatment	Oil Water Sepeartor, Dissolved Nitrogen Flotation, Membrane Bioreactor, Granular Activated Carbon, Reverse Osmosis	IWWT	192,000	on-site
Secondary solids processing	Thermal Desorption	TDU	120,000	on-site
	Incineration	INC	12,000	off-site
	Stabilization	STA	44,000	on-site
Landfill disposal	Stabilization/landfill	STA/LAN	44,000	on-site
Re Use	reuse (solids)	REU	69,000	off-site

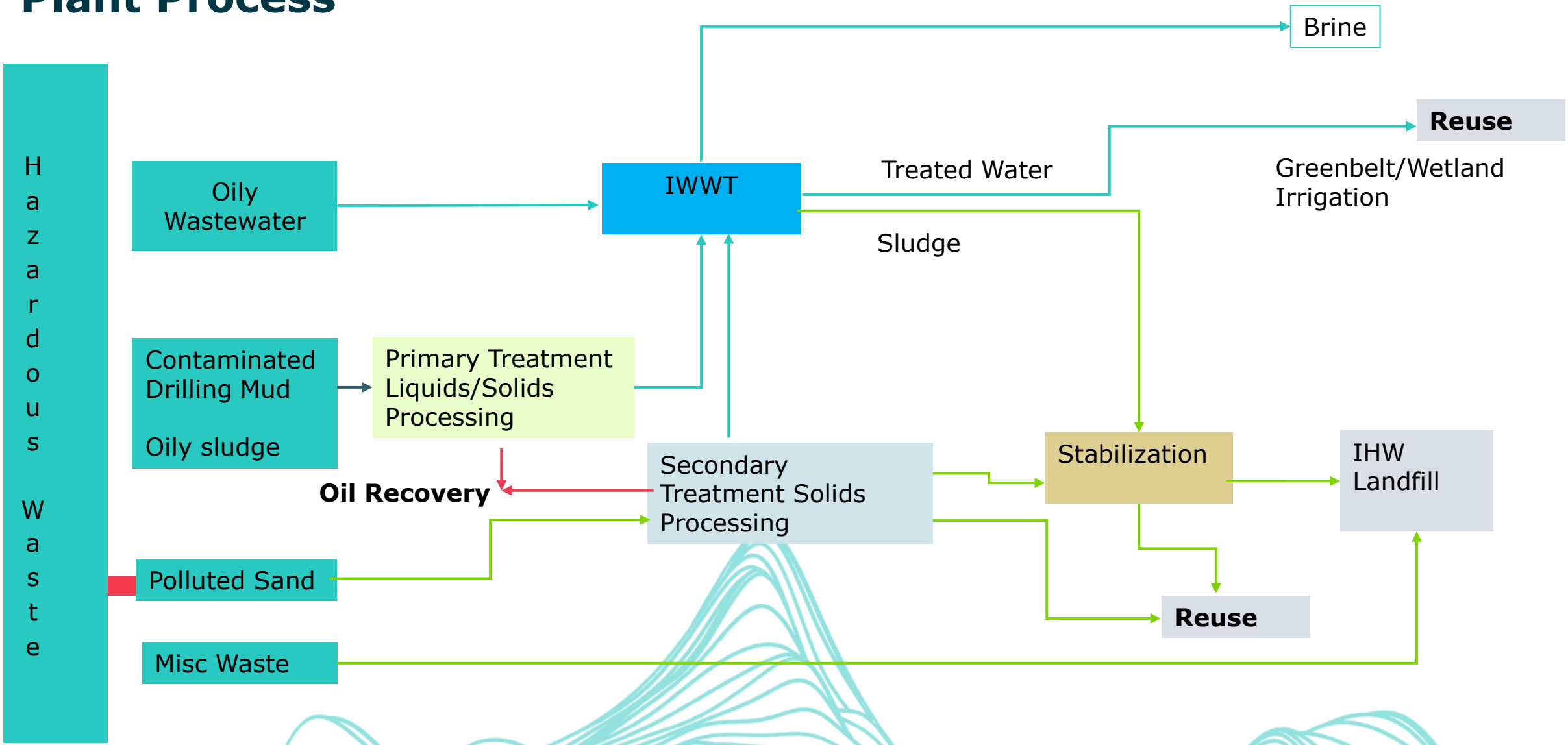
Waste Technology Rankings linking waste types and technology

			Solid Waste Processing					
Waste type / Treatment Technology	Primary Waste Processing	IWWT	Soil Washing	Bioremediation	Thermal Desorption	Thermo Mechanical Cuttings Cleaner	Incineration	Stabilization
Contaminated Drilling Muds	Y	N	N	M	M	Y	N	N
Oily Sludge	Y	Y	N	N	Y	Y	N	N
Oily Wastewater	Y	Y	N	N	M	N	N	N
Contaminated Sand	N	N	Y	Y	Y	N	Y	Y
Spent Chemicals	N	M	N	N	N	N	M	M
Other Hazardous Waste	N	M	N	M	M	M	M	M
Sanitary Wastewater	N	Y	N	N	N		N	N
Powders								
Spent Catalyst	N	N	N	N	N	N	Y	Y
Spent Desiccants And Adsorbents	N	N	N	N	N	N	N	Y
Pyrophoric Scales And Sludges	N	N	N	N	N	N	N	Y
Black Powder	N	N	N	N	N	N	N	Y
Spent Molecular Sieve Dust	N	N	N	N	N	N	N	Y
Acids	N	M	N	N	N	N	N	Y
Bases	N	M	N	N	N	N	N	Y

Legend and Color Code used to march waste categories and technologies

Y Waste is accepted by the treatment unit
P waste is possibly accepted by the treatment unit
N waste is not accepted by the treatment unit
M variable and depends on waste characteristics

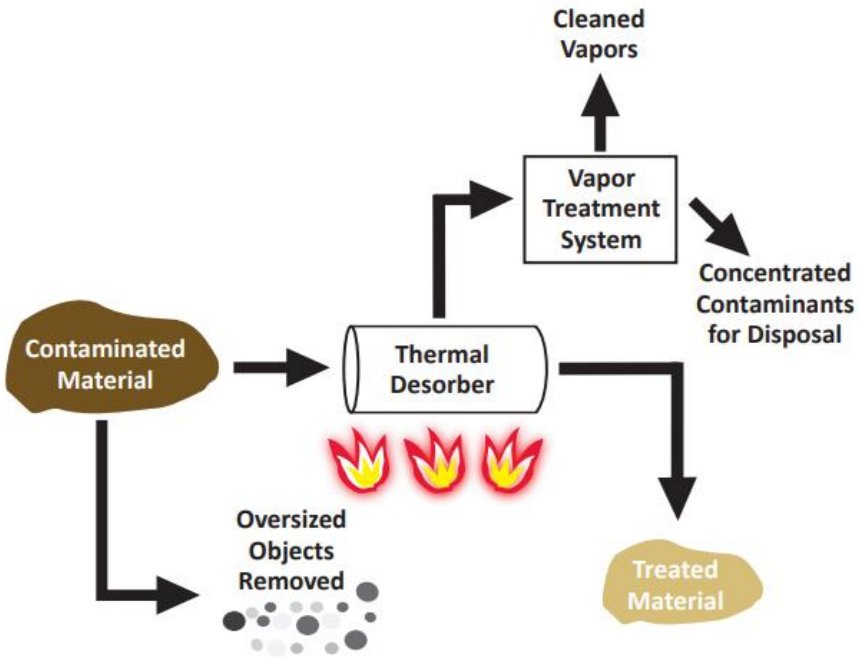
Plant Process



Truck tanker unloading area (two truck positions for simultaneous unloading

Primary Solids Processing

Thermal Desorption Applications on Oily Materials



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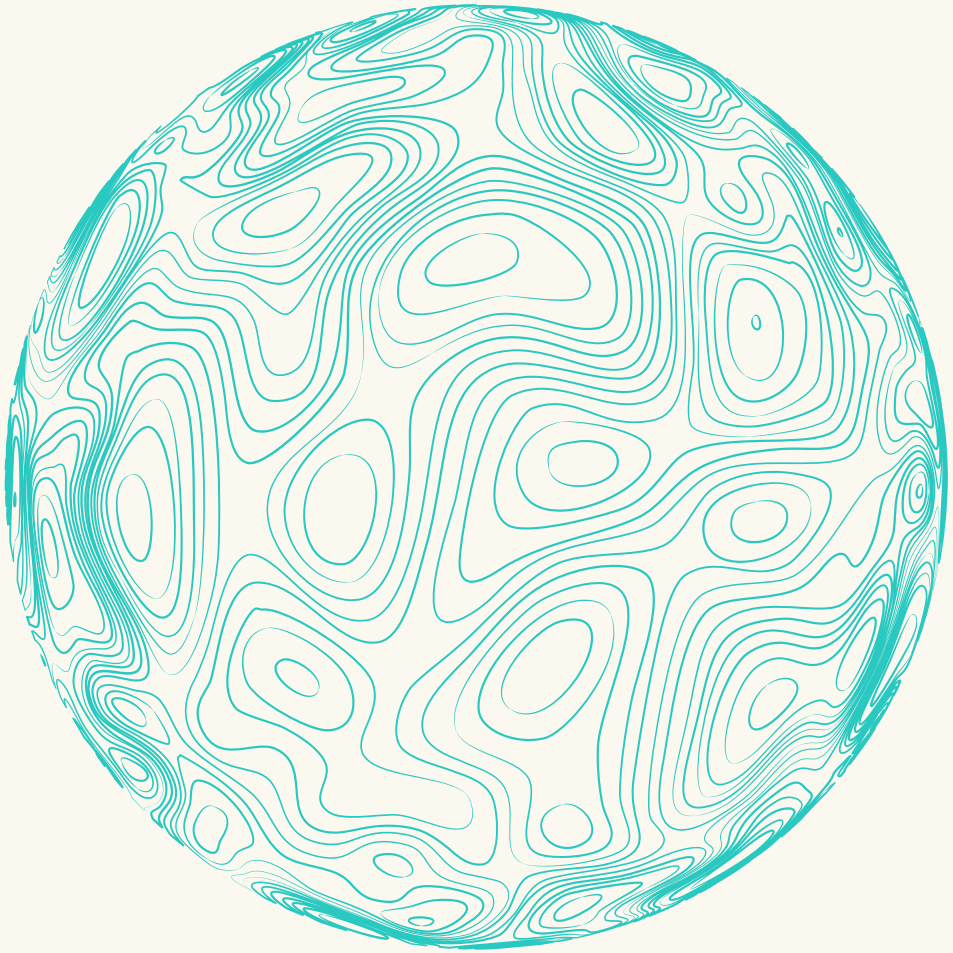
Basis of Design



End of Waste Criteria

Importance Of End Of Waste Criteria To Reach The Landfill Diversion

- Critical Point to This "End of Waste status" possibility is a critical point for the Project to be able reach the 85% landfill diversion target.
- Applies to each technology end point for treatment, disposal and reuse.

Parameter	Level (mg/kg)	Origin
Petroleum Hydrocarbons	< 500 (C10-C40)	End of Waste procedure for excavated soil under French regulations.
	< 500 (C10-C40)	Acceptance criteria in class 3 landfills (inert) in France.
	270	C6 to C10
	260	C10 to C16
	1,700	C16 to C34
	3,300	C34-C50

Incorporation of Circular Economy Principles

"A circular economy is an economic and industrial system based on the reuse of products and raw materials, and the restorative capacity of natural resources".

Recover treated water

- Wetlands + Green belt
- Irrigation water

Recover oil

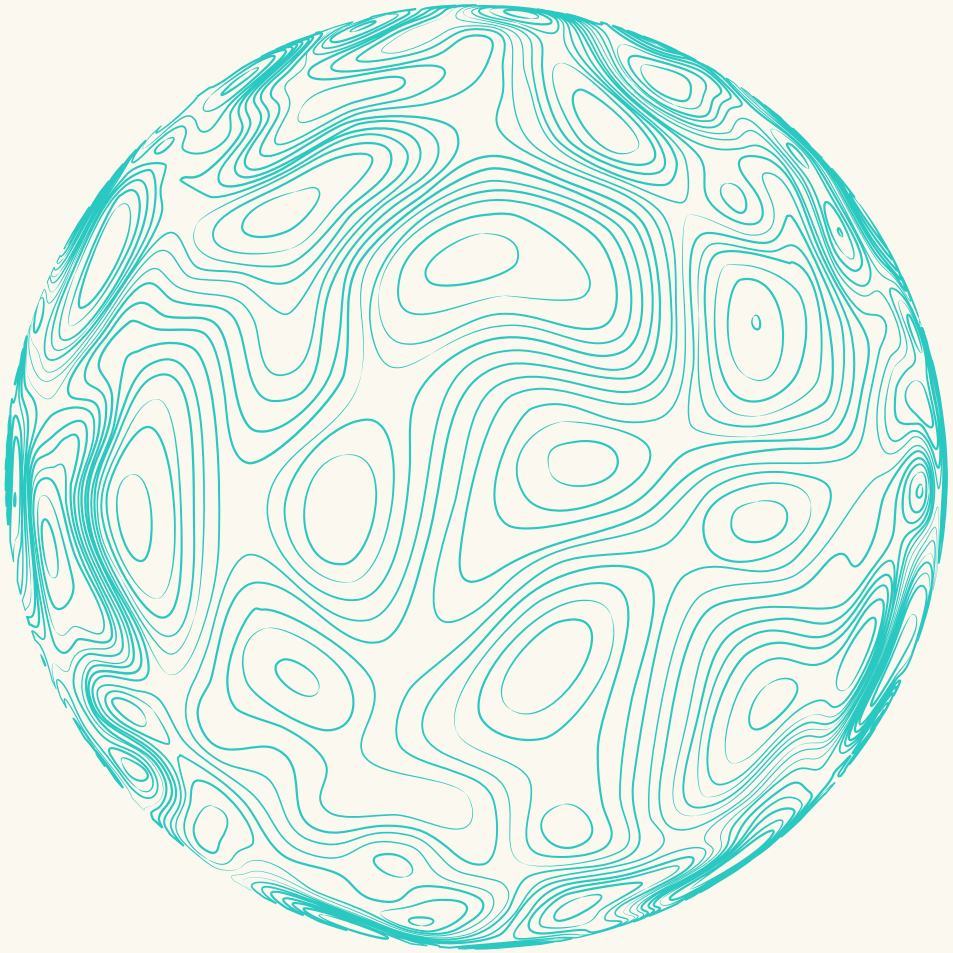
- Used as a secondary fuel (internally/externally) (= energy recovery),

Reuse treated soil

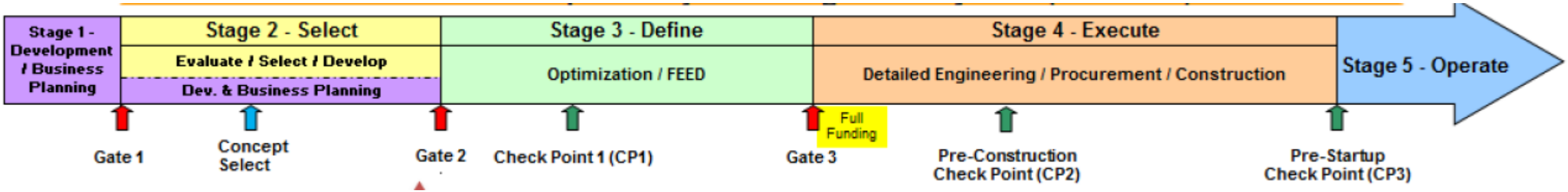
- Reprocessed for reuse (= material recovery) recover solids (sands) from the contaminated sands, drilling muds and oily sludge waste streams.

04

Engineering Deliverables



Project Phase Scope



Develop Deliverables per Stage 2/3 DCL (60%, 90% & 100%)

Complete 3rd party Subcontracts

Finalize Process Flow Scheme with Vendors

Develop MTOs and Submit Cost Estimate +/-30%

Develop Level III Schedule

Develop FEED and EPC scope of work

Support EPC Bidder Queries

Stage-3

Specialty Studies

3rd party studies were executed during FEED

Material Selection Report

Reliability, Availability and Maintainability Study

Energy Optimization & Green Energy

Industrial Security Study

Hazard and Operability & Safety Integrity Level

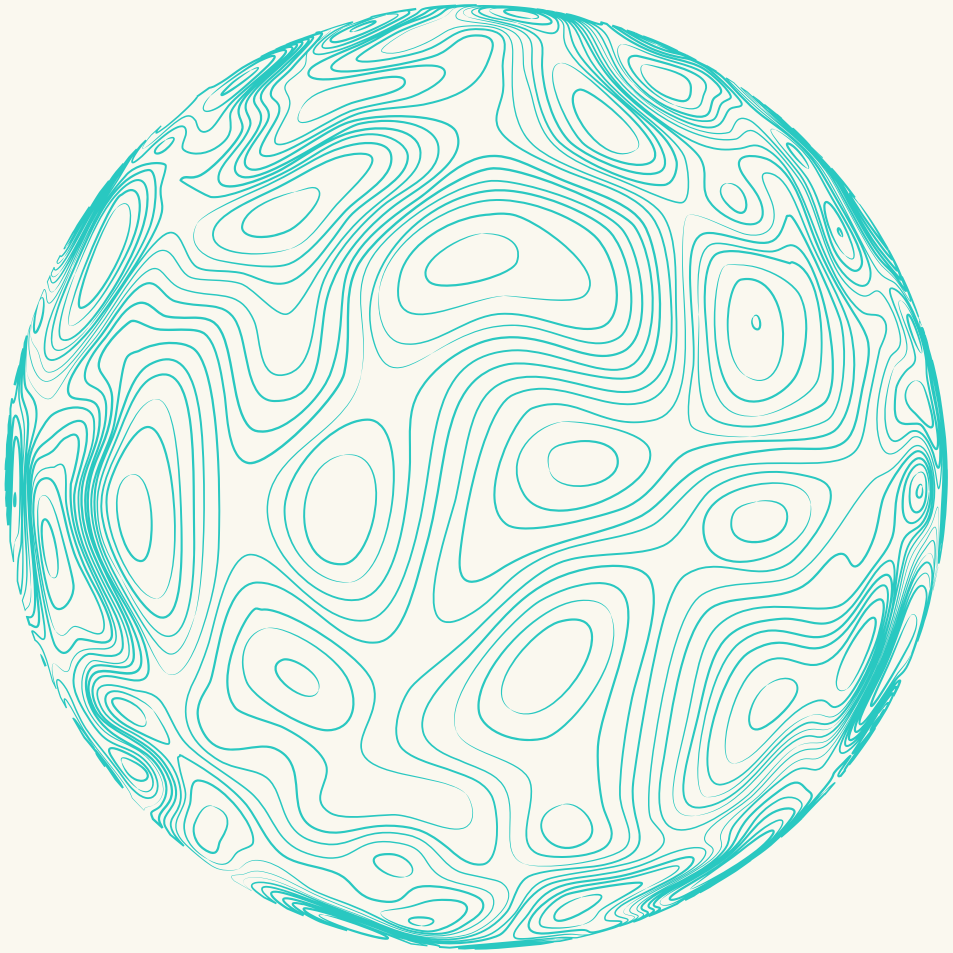
Study Fire and Explosion Risk Analysis

Building Risk Assessment Study

Constructability Hazard Study

05

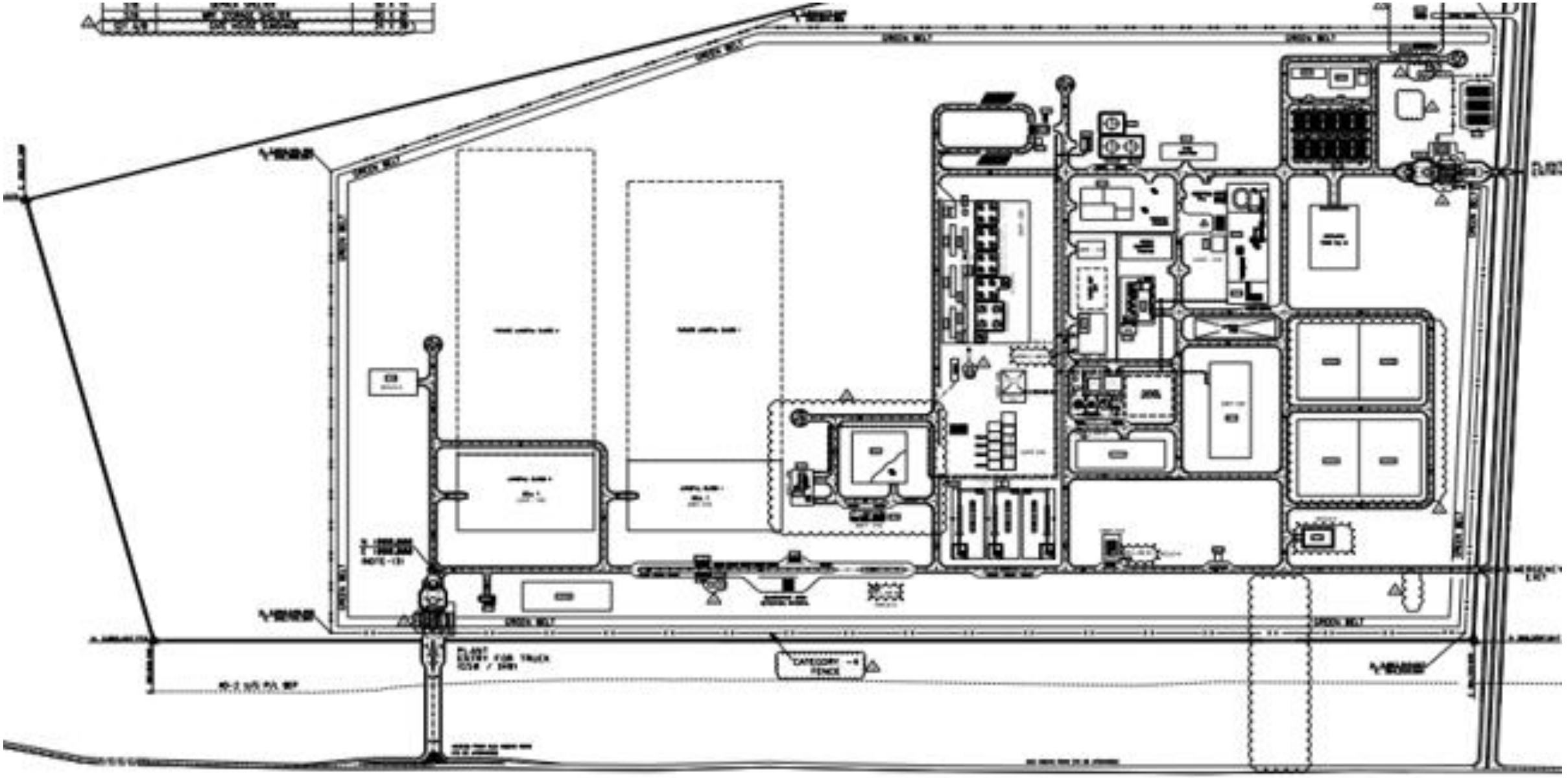
Available land and layout



Project Location

Unexpected Discovery

Overall Plot Plan Rev.G




Q&A

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