Winning Strategies

Ashbridges Bay Treatment Plant Wet Weather Flows Management and Humber Treatment Plant Odour Control Strategy

Ajay Puri and Katrina Blom

City of Toronto

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Presentation Outline

Case Study 1

- **ABTP Wet Weather Flows Management**

Case Study 2

- **HTP Odour Control Strategy**
- **Conclusions**

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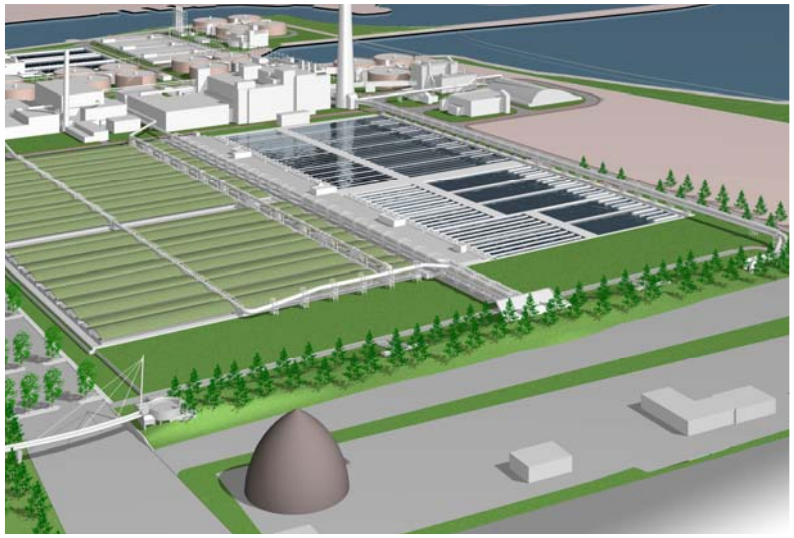
Ashbridges Bay Treatment Plant

ABTP Wet Weather Flows



- **ABTP Rated capacity 817 MLD**
- **High peak wet weather flows ~ 3300 MLD**
- **A shortfall of approx. 800 MLD preliminary/primary capacity**
  - 2,500 MLD firm compared to 3,300 MLD required

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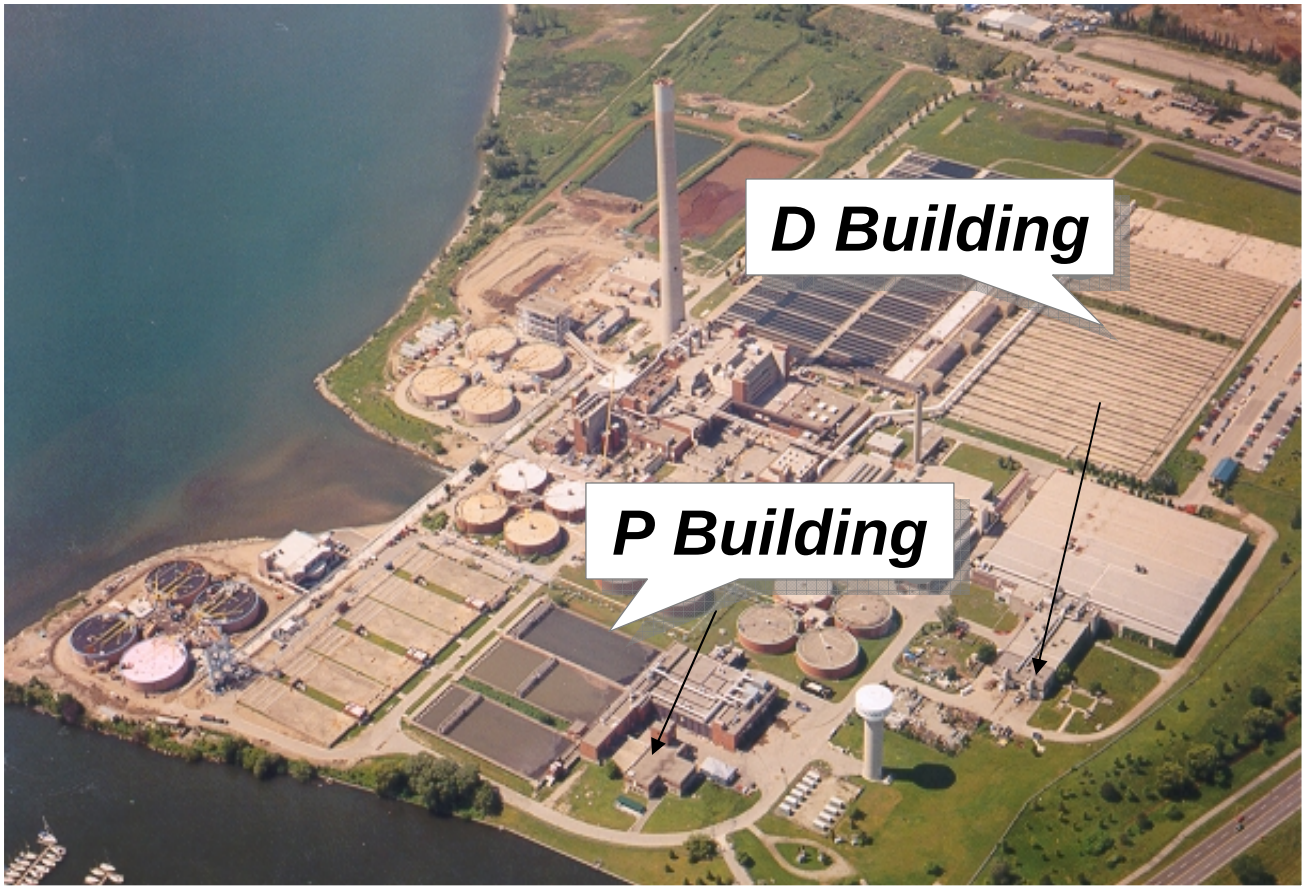
Ashbridges Bay Treatment Plant



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Wet Weather Flows - The Plan

- **Preliminary/Primary Treatment Study**
  - **Pilot Test Technologies (HRT)**
  - **Establish a preferred alternative**
- **The VE Study**
- **Design and construction**

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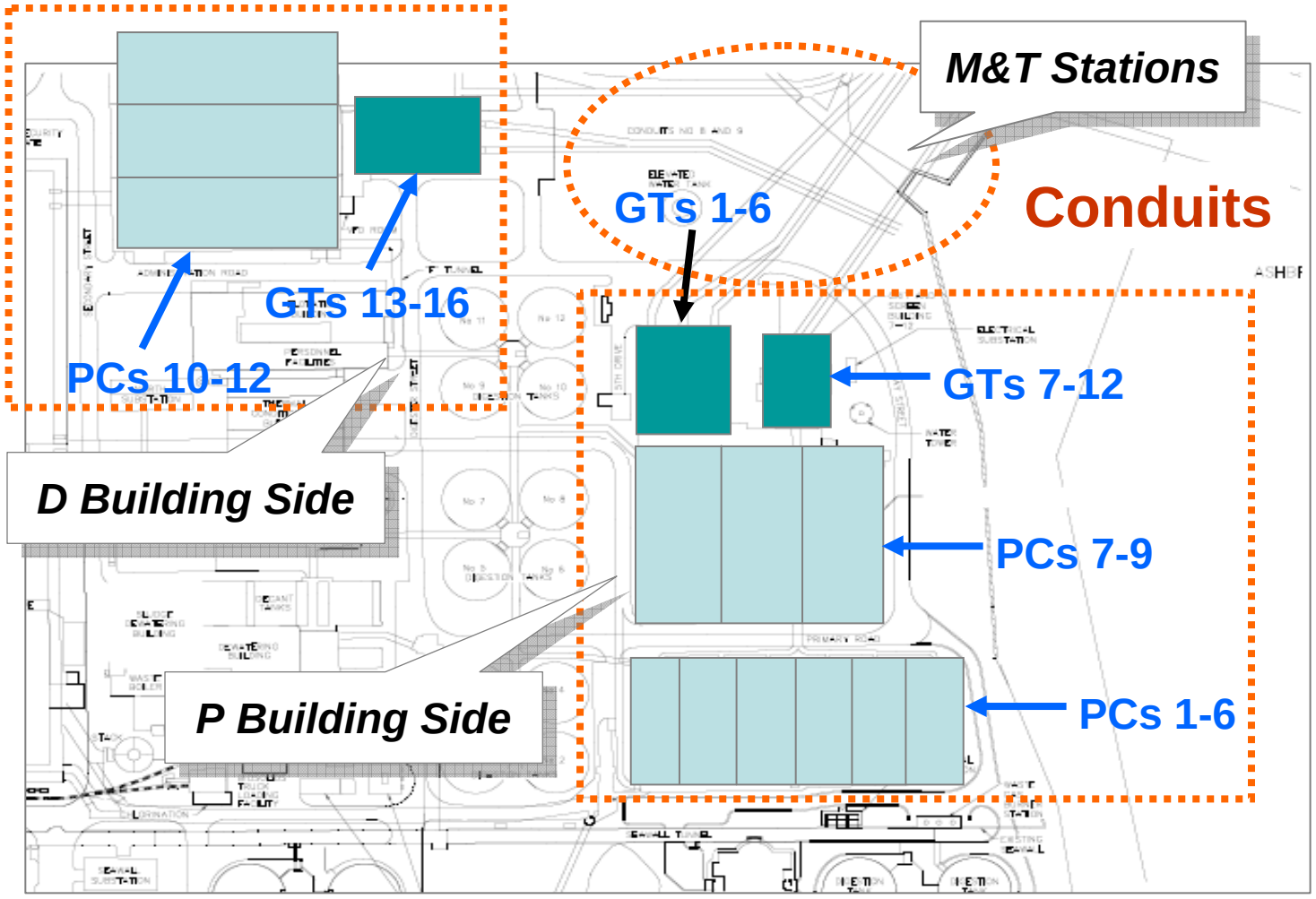
Existing Preliminary/Primary Treatment

P Building Selected for Wet Weather Flows



P Building Study – Key Drivers

- **Poor effluent quality during high flows**
- **P Building headworks in poor condition**
- **Clarifiers 1 to 6 at end of life**
- **Odours from P Building preliminary works & primary tanks**

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P Building Study – Preferred Alternative

- Headworks
  - capacity 2500 ML/d
  - fine screens & continuous grit removal
- Primary tanks 1 to 6 abandoned & replaced with HRT
- Clarifiers 7 to 9 upgraded with chain & flight & covers
- Biofilter

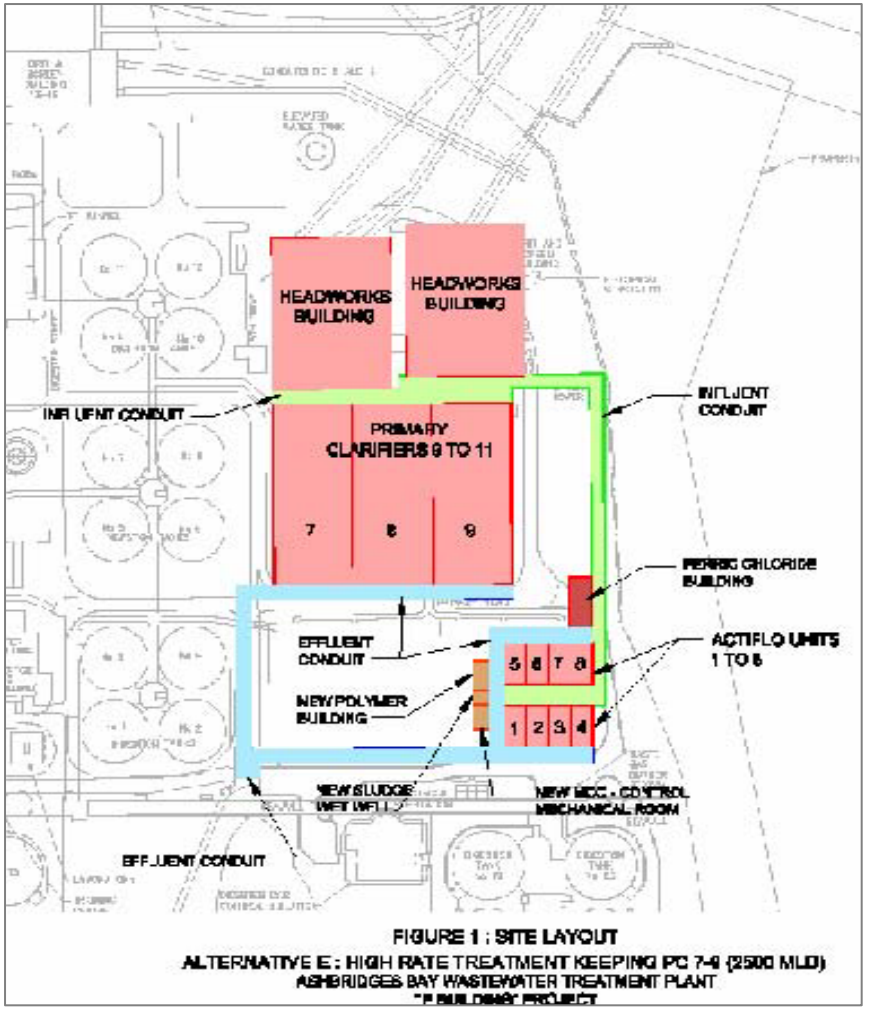

FIGURE 1 : SITE LAYOUT
ALTERNATIVE E : HIGH RATE TREATMENT KEEPING PC 7-9 (2500 MLD)
ASHBRIDGES BAY WASTEWATER TREATMENT PLANT
"P BUILDING" PROJECT

The VE Team

City of Toronto

- **Toronto Water**
- **Technical Services**

VE Consultant – NCE Value Engineers Inc.

Study Consultant – CH2M Hill Canada Ltd.

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VE Objective

- **Evaluate the preferred alternative**
- **Evaluate treatment technologies**
- **Identify and incorporate project-related risks into recommended VE ideas**

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VE Ideas

- **Generated – 150**
- **Developed – 30**
- **Created an alternative concept to baseline**

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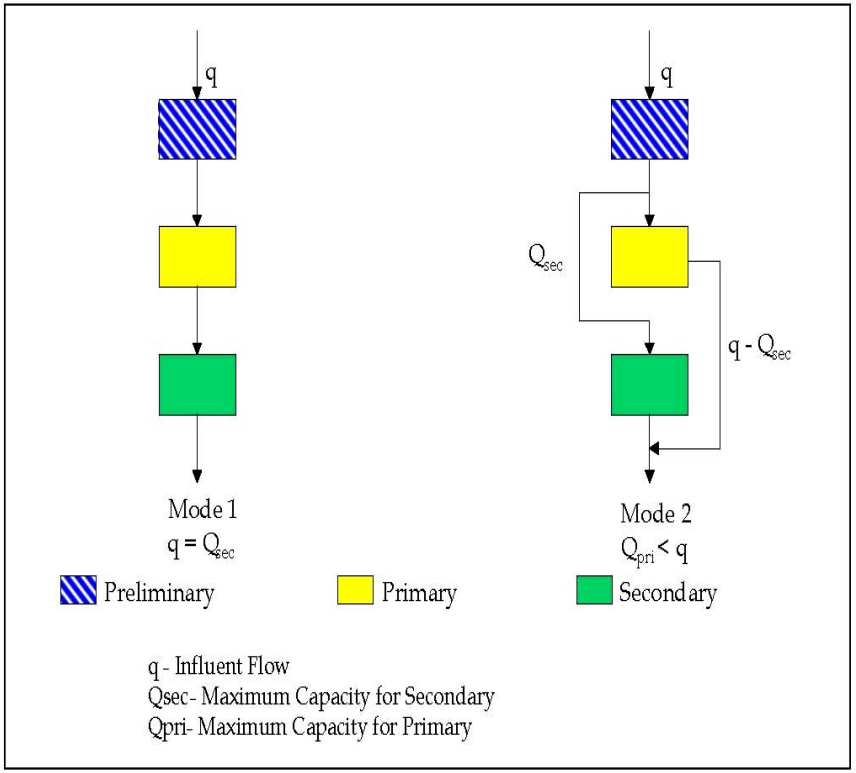
VE Alternative Concept

- **Split treatment for D Building**
- **Staged upgrade of P Building and Primary Clarifiers**
- **Estimated Savings $99**



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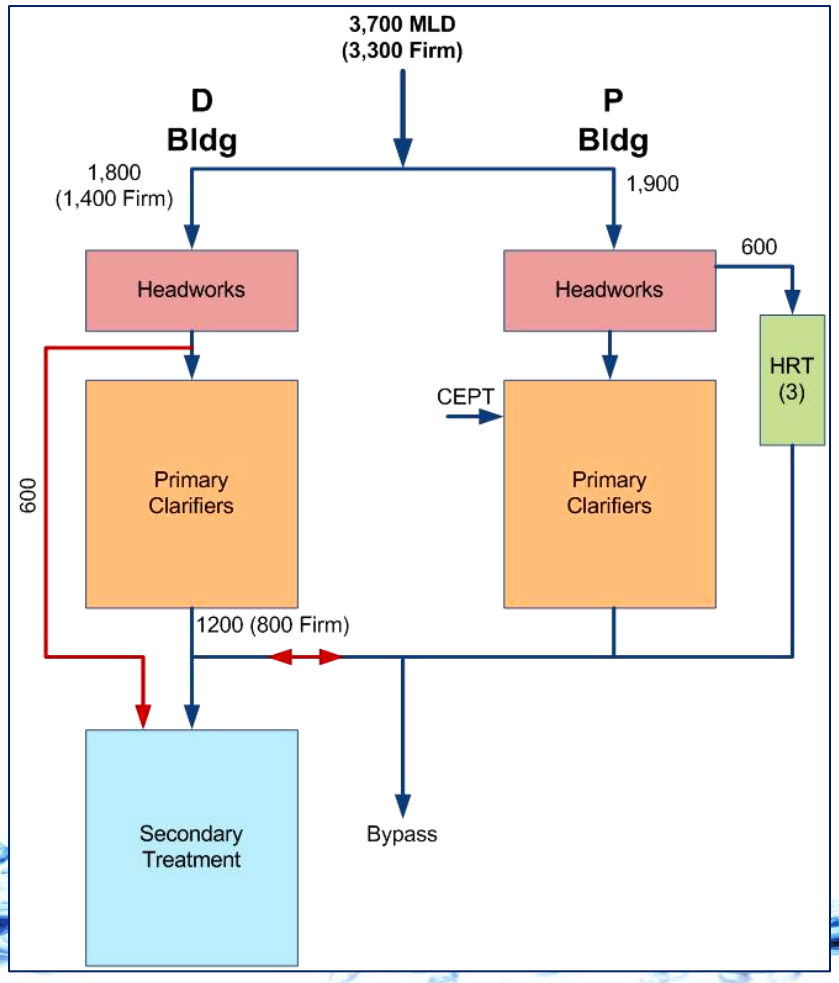
VE Alternative Concept

The VE Concept:

- **Split Treatment for D Building**
- **P Building headworks upgraded to 1300 ML/d**



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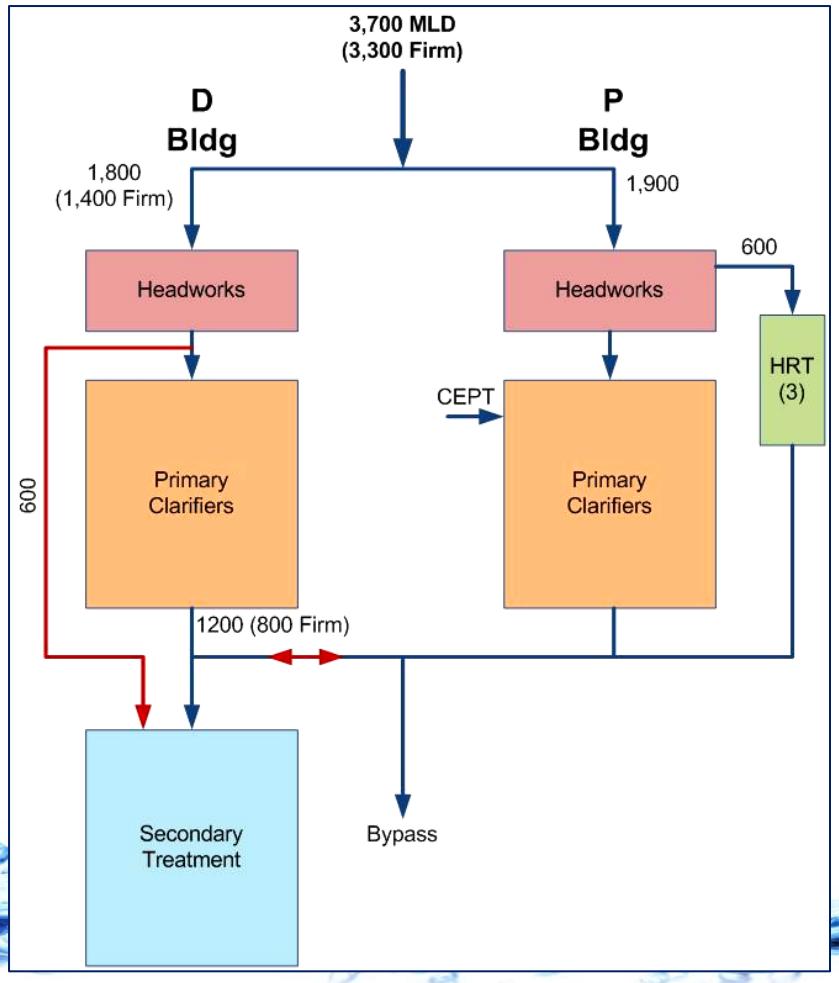
VE Alternative Concept – Cont'd

- Clarifiers 7 to 9 retained
  - Staged odour control upgrades
  - CEPT pilot testing
  - CEPT implemented if trials successful
- HRT with fine screens
  - Capacity based on CEPT trials & CSO requirements



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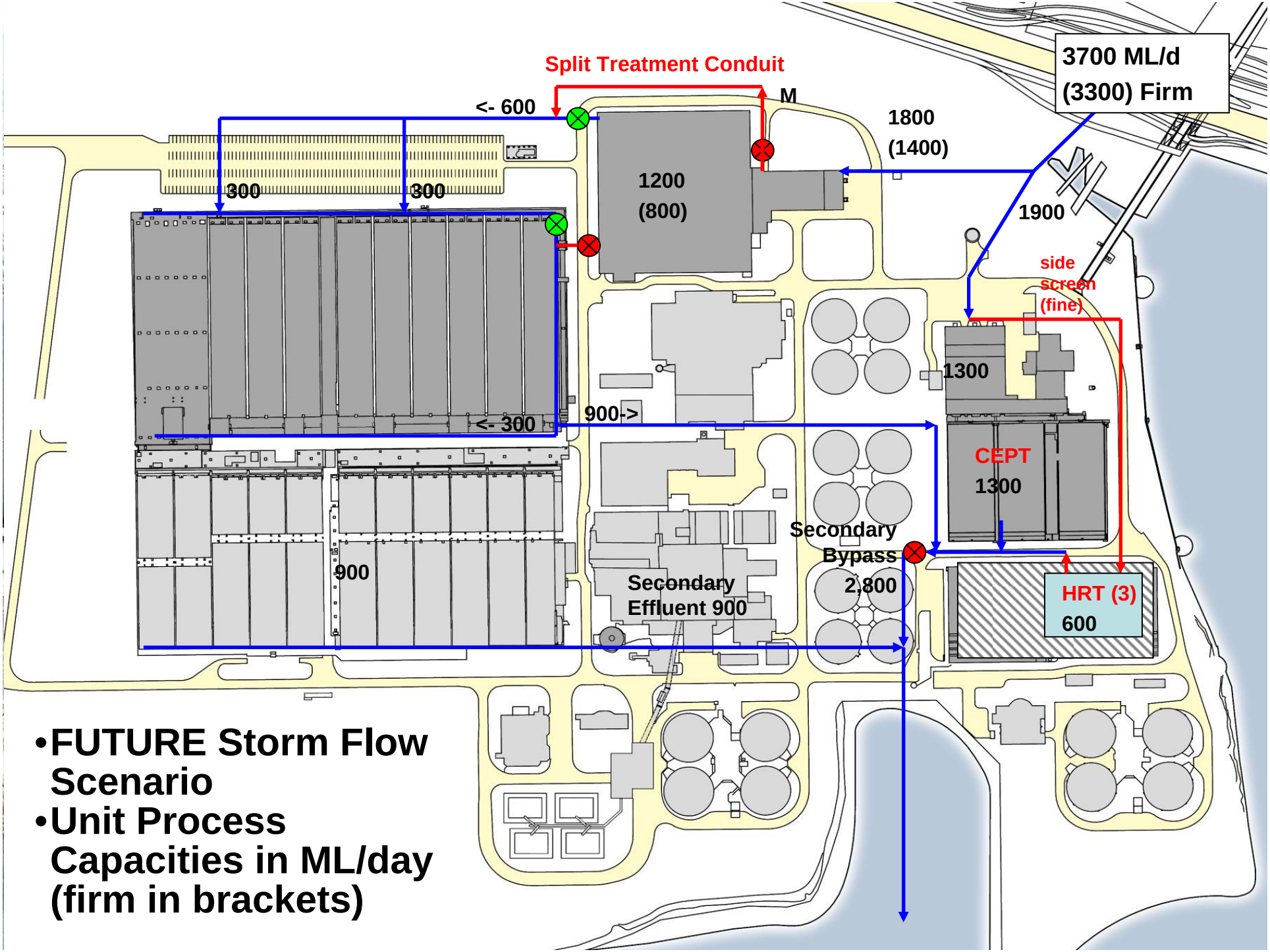

- **FUTURE Storm Flow Scenario**
- **Unit Process Capacities in ML/day (firm in brackets)**

Risk Assessment

- **Risk specialist part of VE team**
- **Risk assessment objective**
  - **Support for ideas**
  - **Identify key areas of improvement based on risk**

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Risk Assessment

Risk identification

- **Entire group**

Initial scoring

- **Risk Specialist & Selected Experts**

First scoring review

- **Consultants & City Operators**

Second scoring review

- **City Team**

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Risk Assessment Table

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Ashbridges Bay Treatment Plant - P Building

Risk Assessment

Low	Low likelihood of occurrence	1	Little negative effect
Medium	Moderate likelihood of occurrence	2	Moderate negative effect
High	High likelihood of occurrence	3	High negative effect

VE Idea		Risk ID	Potential Risk compared to Alternative E	Construction		Operation		Stakeholders		Combined Rating
				Prob	Cons	Prob	Cons	Prob	Cons	
F	Flooding Potential									
F-08	Raise the channel walls to keep the water in		Structural failure (walls, piles) and release of sewage	1	2	1	2	1	2	4
			Structural failure (walls, piles) and without release of sewage	1	1	1	1	1	0	1
			Raised hydraulic gradeline creates community flooding	0	0	0	0	1	3	3
O	Odours									0
O-04	Use HRT for all plant flows and don't do primaries at the D building		Process does not perform as designed	0	0	1	1	1	1	2
			Process fails catastrophically	0	0	1	3	1	3	6
			Sludge backup	0	0	3	2	3	2	12
			HRT does not fit the dry weather hydraulic gradeline	0	0	1	2	1	2	4
O-05	Use all HRT at P building		Process does not perform as designed	0	0	1	1	1	1	2
			Process fails catastrophically	0	0	1	3	1	3	6
			[illegible] backup			3	1			6

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Thank you!

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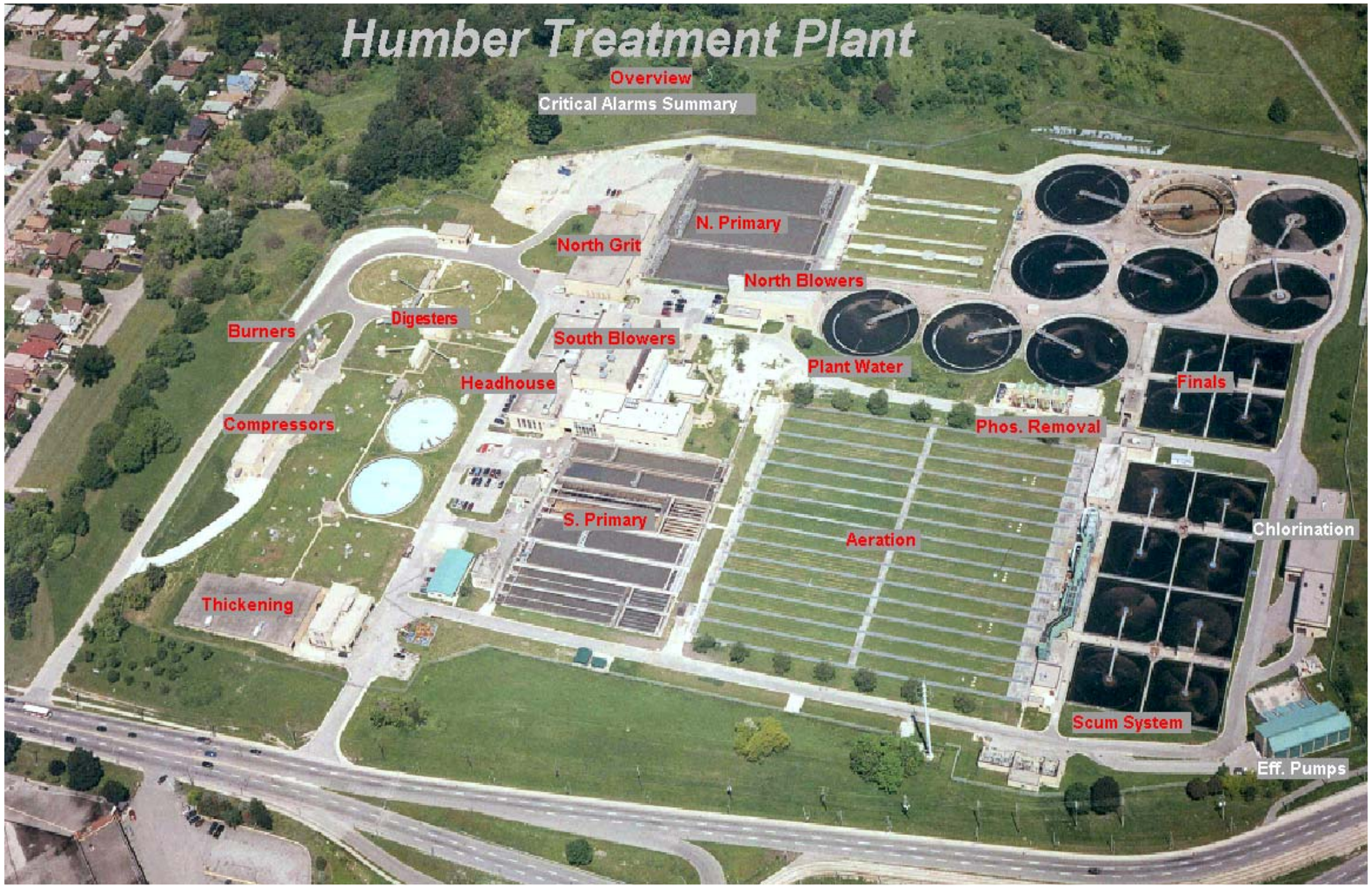
Humber Treatment Plant

Humber Treatment Plant



Why an Odour Study?

- **Odour studies at other Wastewater Treatment Plants in the City**
- **New Odour Guidelines from Ministry of the Environment**
- **New condominiums in close proximity to the plant**
- **Good neighbour initiative**
- **Odour scrubber near end of design life**

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The Team

City of Toronto

- **Toronto Water**
- **Technical Services**

VE Consultant – NCE Limited/NCE Value Engineers Inc.

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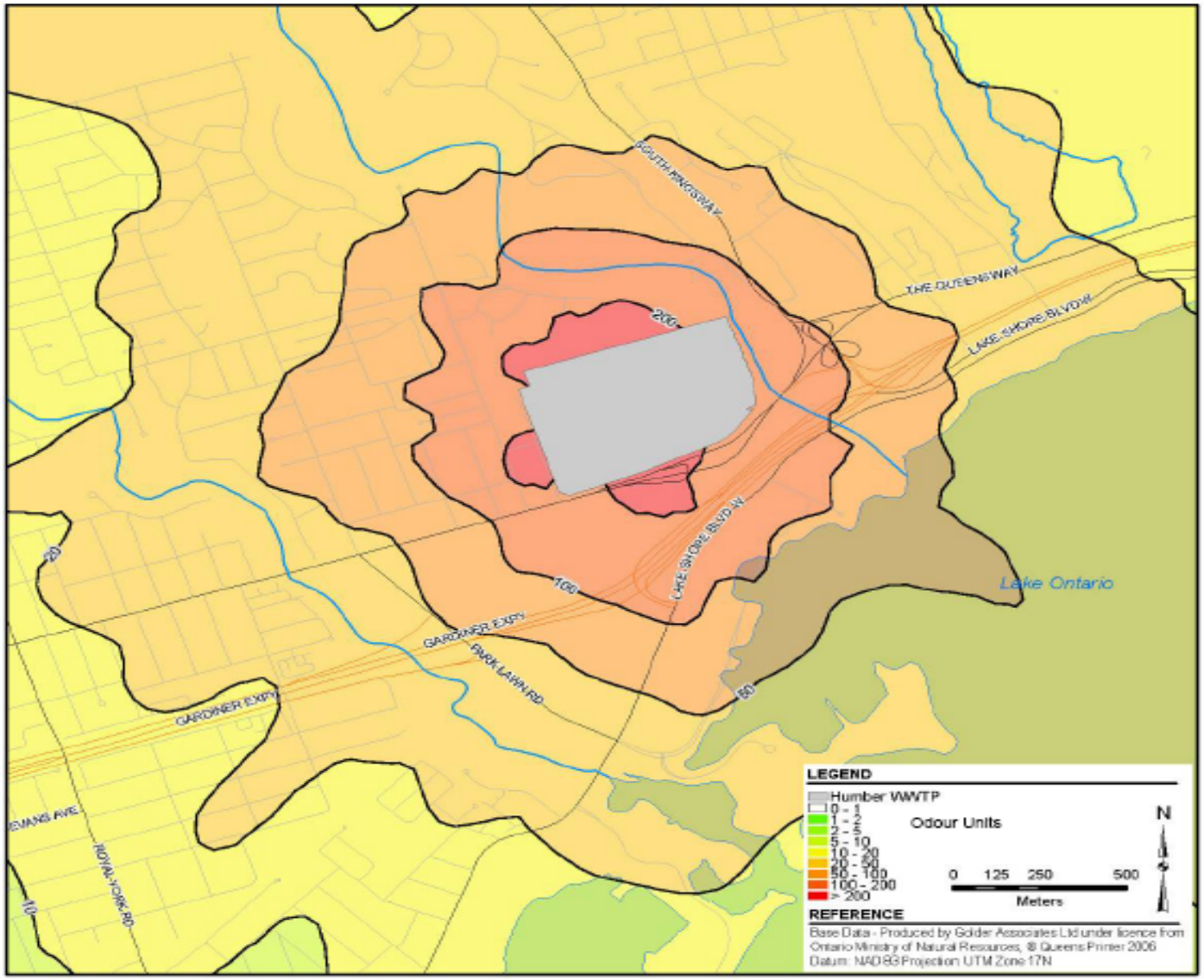
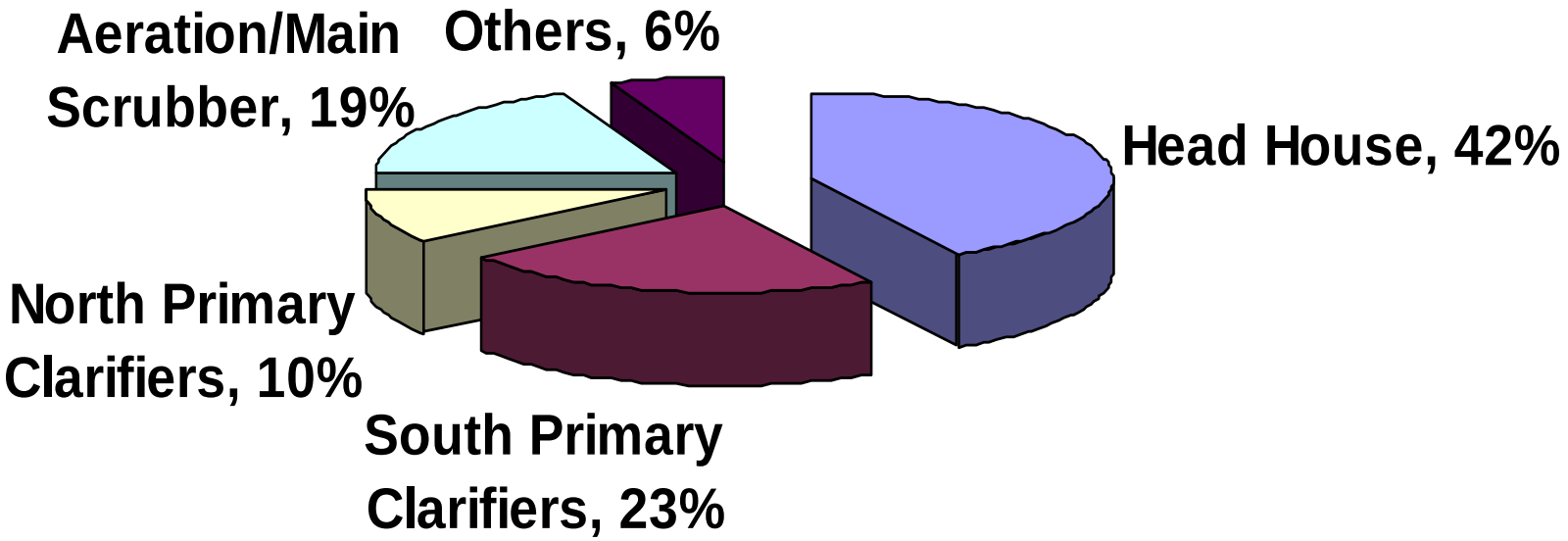
Current Worst-Case Odour Impact from Consolidated Data



Contribution to Total Odour by Source



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HTP Odour Control – Project Goals

- **Air management strategy optimizing volume of air to be collected, conveyed and treated**
- **Innovative, economical and sustainable odour treatment**
- **Regulatory compliance**

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HTP Odour – VE PLan

- **5-day Value Engineering Workshop**
- **Dispersion Modelling**
- **2-day Risk Management Workshop**

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Function Analysis

- **Higher Order Functions**
  - **Maintain C of A**
- **Basic Functions**
  - **Obtain C of A**
  - **Limit Complaints**
  - **Meet Air Quality Standards**

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VE Ideas

- **Generated – 155**
- **Developed – 42**
- **Created an alternative concept to baseline**

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VE Conceptual Ideas Phase 1 (2008-2011)

Headhouse/North Grit

- Process equipment upgrades
- Isolate inlet sewer
- Screen room air to carbon scrubber
- Process air to aeration or bioscrubber

Primary Tanks/Main Scrubber

- Primary tanks weir covers & biofilters
- Decommission wet chemical scrubber

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VE Conceptual Ideas Phase 2 (2008-2012)

South Primary Tank Upgrades

- Prepare tanks for covers
- Convert bridges to chain & flight
- Refurbish sludge & scum process equipment
- South primary tank covers & biofilters (2B)

VE Conceptual Ideas Phase 3 (2013-2016)

North Primary Tank Upgrades

- Prepare tanks for covers
- Refurbish sludge & scum process equipment
- Convert bridges to chain & flight (3B)
- North primary tank covers & biofilters (3B)

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VE Conceptual Ideas Phase 4 (2017-2018)

Aeration Tanks

- **Biofilter**

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Preferred Odour Control Technologies

Headhouse/North Grit

- **Process air – aeration tanks/bioscrubber**
- **Bar screen building air – activated carbon**

Digesters

- **Process biogas – thermal oxidation (via existing co-generation and flares)**

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Preferred Odour Control Technologies

North and South Primary Tanks

- **Process/building air – biofilter**

Aeration Tanks/Main Scrubber

- **Process air – biofilter**

Sludge Thickening Building

- **Process air – activated carbon**

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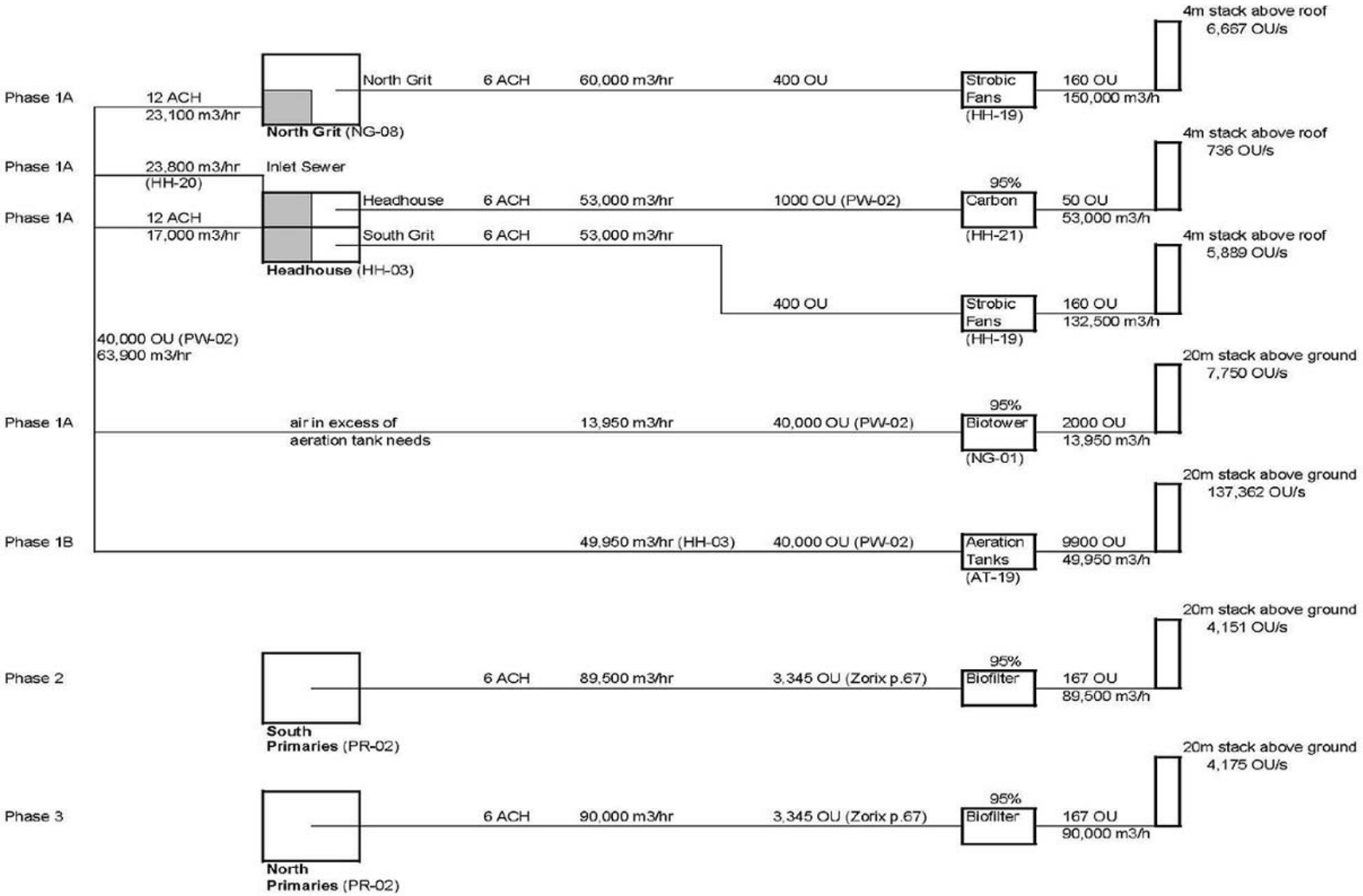
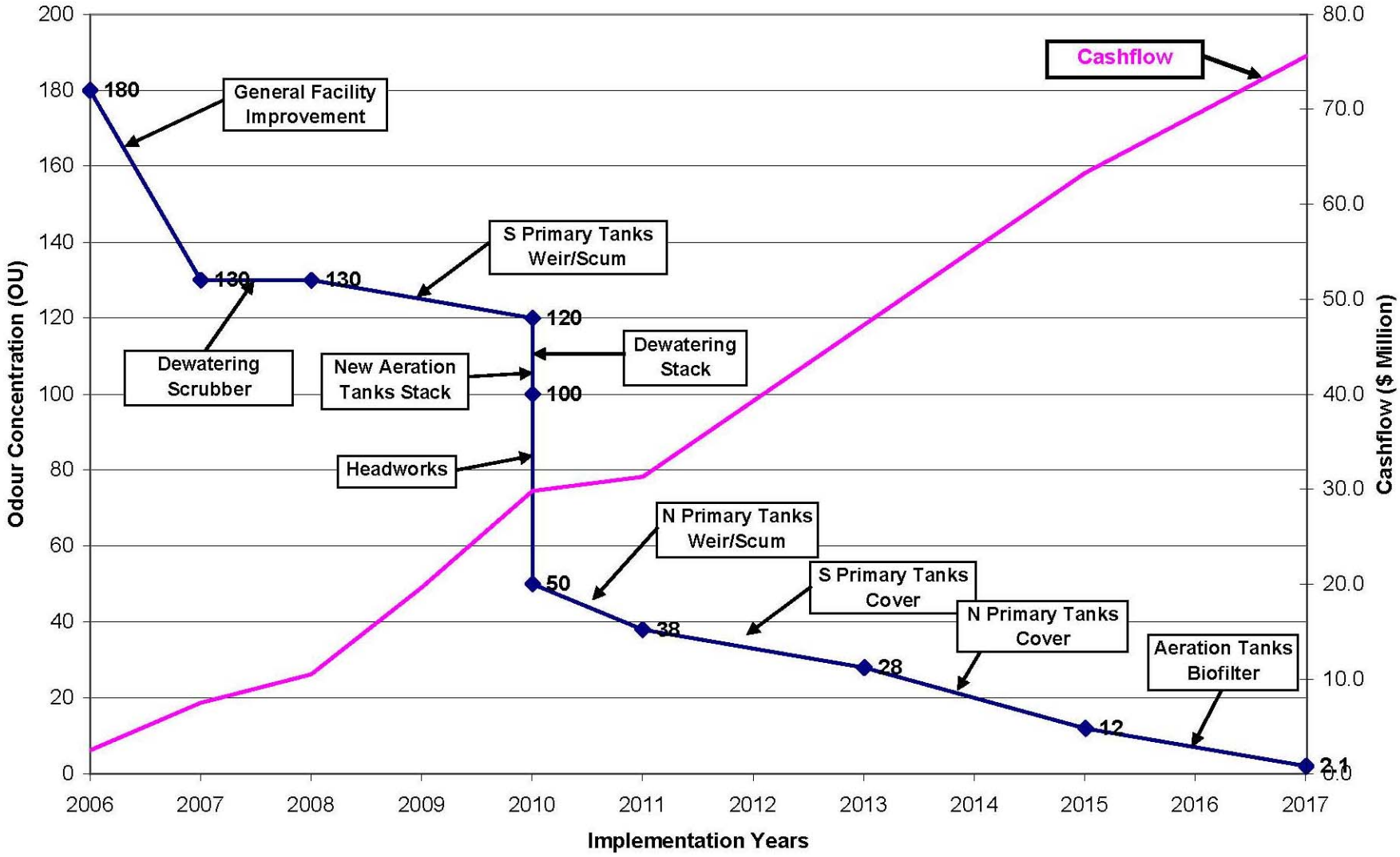
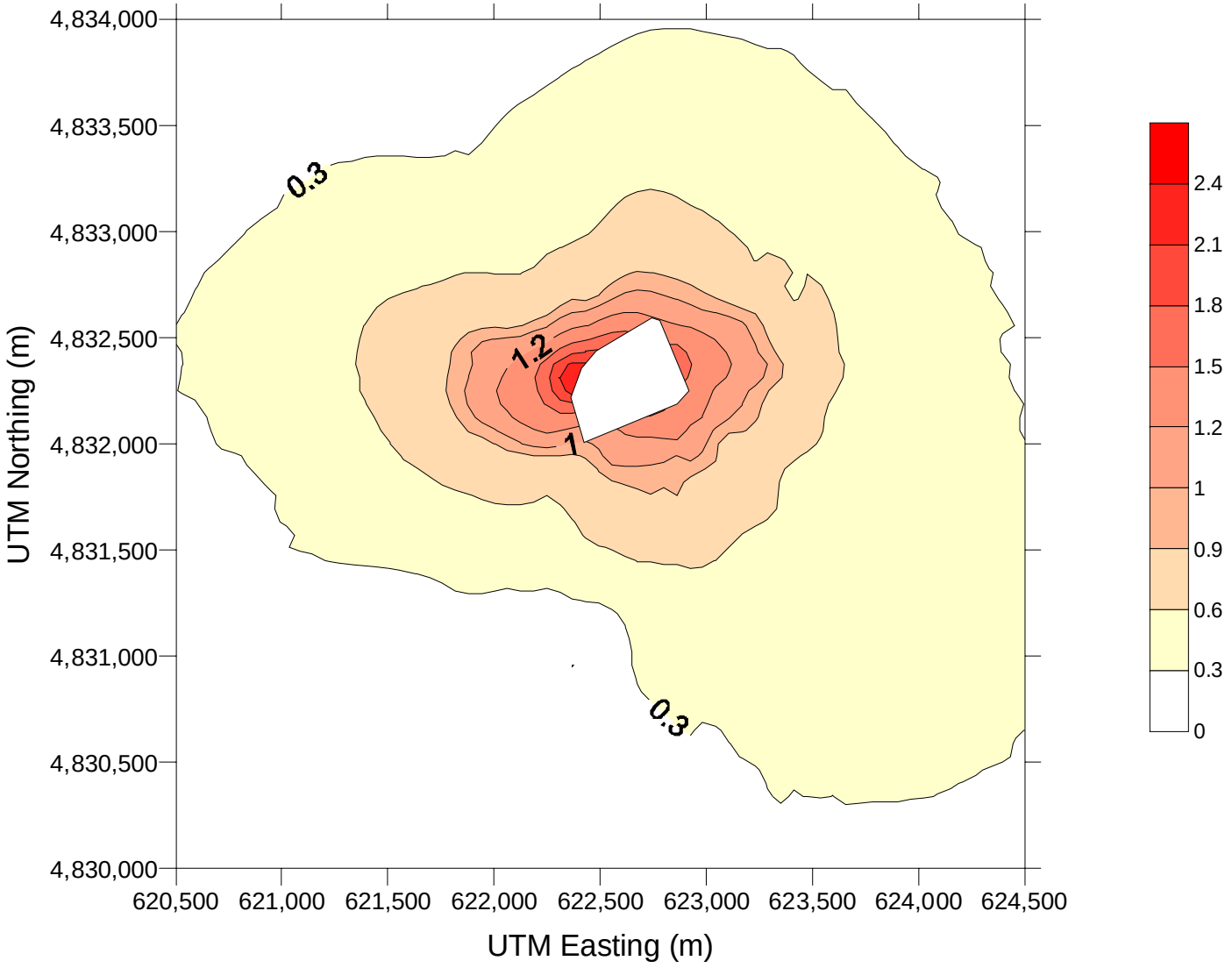
HTP Odour VE – Concept Strategy



Humber Odour Reduction Program



2017 Odour Impact (2.1 OU)



HTP Odour Control Program Highlights

- **Divides implementation into manageable Phases**
- **Scheduled around retooling needs**
- **Implements projects with ‘greatest odour reduction per dollar first**
- **Achieves ~70% OU reduction in first four years**
- **Phase 1 RFP and Phase 2 tender fast-tracked**

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HTP Odour Control Program Costs

- **Original Odour Study -18 Concept Designs**
- **Implementation costs -$85 to $145 million**
- **After Value Engineering - $75 million**
- **~12% cost savings or value added**

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Conclusions

- **Confirmed the benefit of undertaking VE studies early into the project's lifecycle**
- **Identified an excellent path forward for the City in both case studies**
- **Provided a reality check for the baseline scenarios**

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Acknowledgements

- **Tim Constantine – CH2M HILL Limited**
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Questions and Answers

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Thank you!

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