Brownfield Regeneration

Cork Docklands Challenges

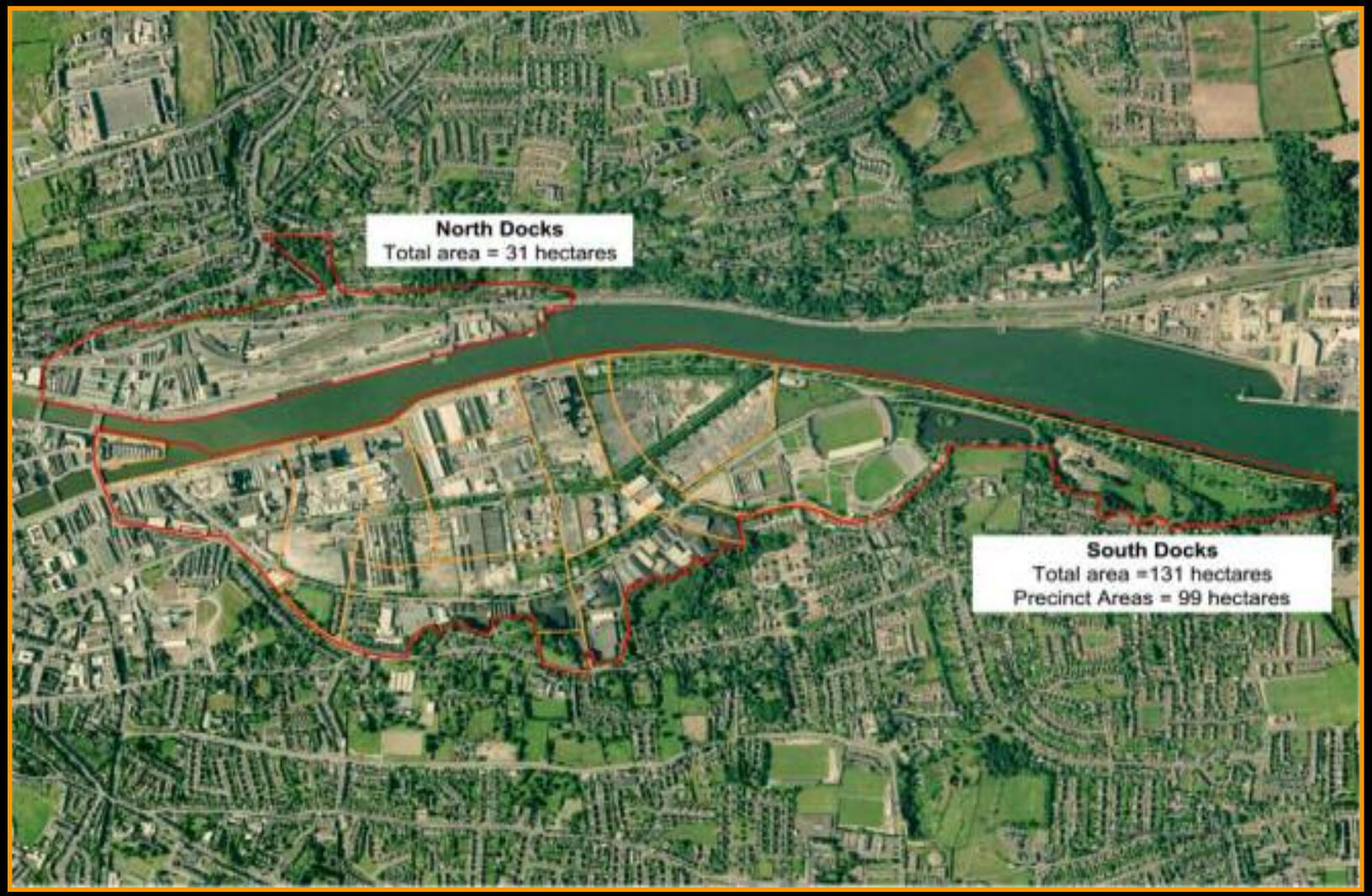
Engineers Ireland Seminar
10 March 2009

Seamus Coghlan, Docklands Directorate
Gerry Walsh, Environment Directorate
Cork City Council

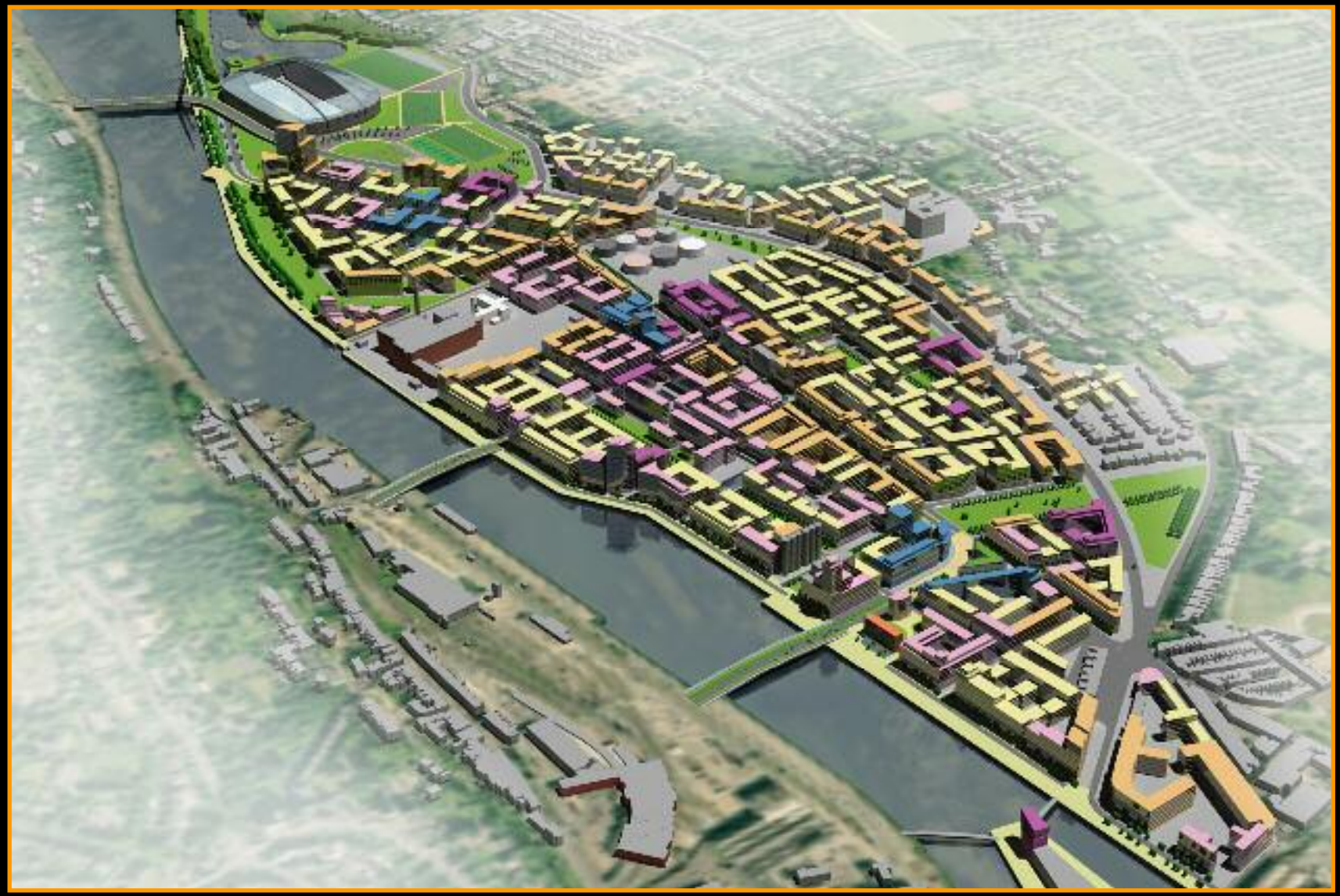
Presentation

- Introduction
- Docklands Development Overview
- Outline of Study
  - Methodology
  - General characteristics
  - Overview of contamination status
- Challenges
- Council Policy
- Conclusions

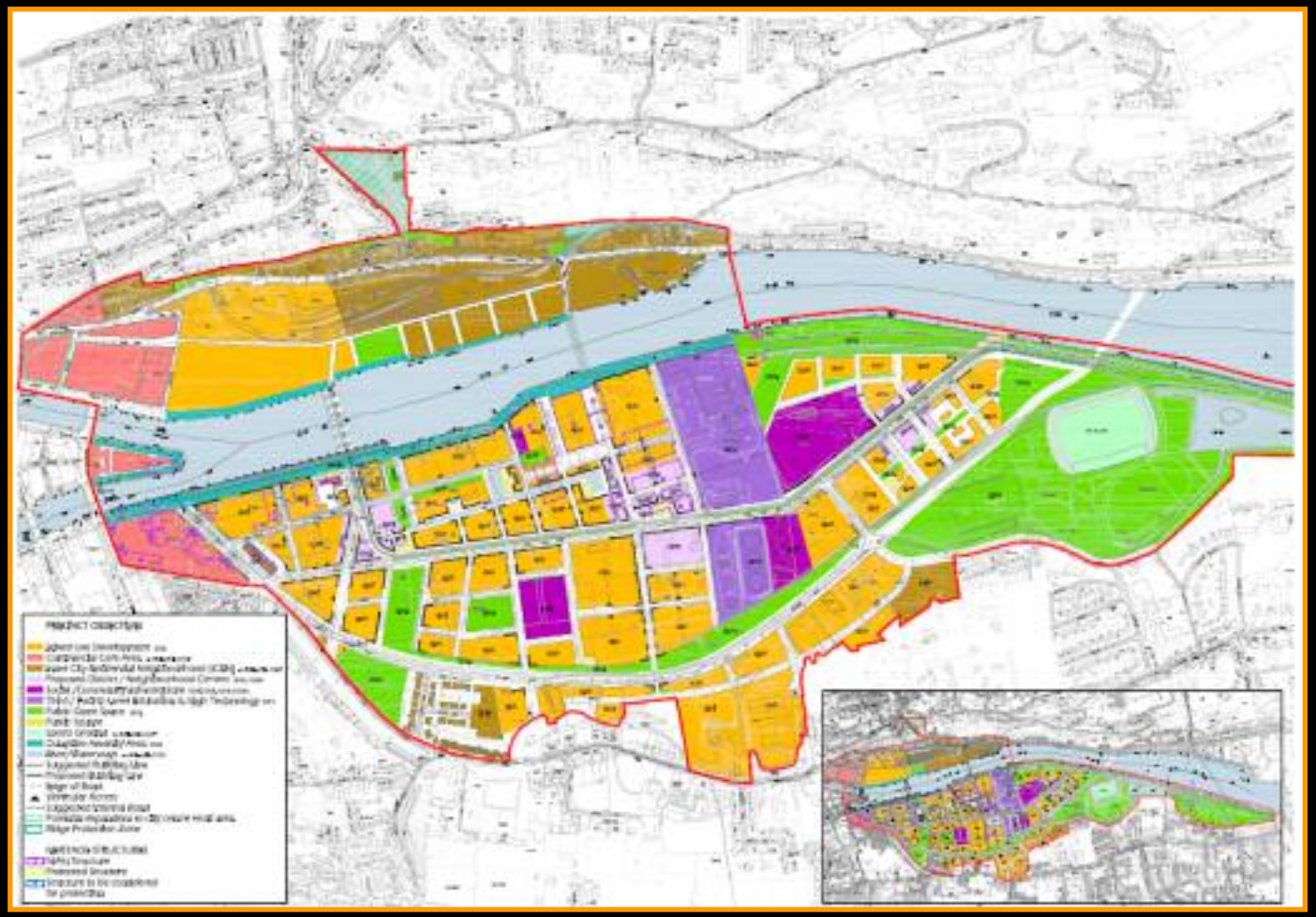
Cork Docklands
Local Area Plan Boundaries



South Docks Massing



South (and North) Docks Zonings



- Mixed Use
- Education and R&D
- District centres
- Commercial

Docklands Objectives

- 99 ha development land
  - 25,000 residents
  - 27,000 jobs
- 4km of Quay Amenity
- Marina Park 33ha
- Multiple opens spaces/pocket parks and plazas
- Primary and secondary schools
- Cultural and community facilities
- 3rd and 4th Level Education

Study Methodology

- Consultants : DHV & TJ O'Connor & Associates.
- 2 Phase Study
- Phase 1 – Desk Study
  - Risk Assessment Approach
  - Inform details of Phase 2
- Phase 2
  - Site Investigation
  - Modelling
  - Report

Phase 1 Study

- Phase 1 – Desk Study
- Historic Uses
- Uniform Source Classification (Dutch)
  - Scale 1 – 8 grade of risk (K)
  - Tracers
- Thematic Map of risks
- Dutch Standards (DIV)
- Possible solutions

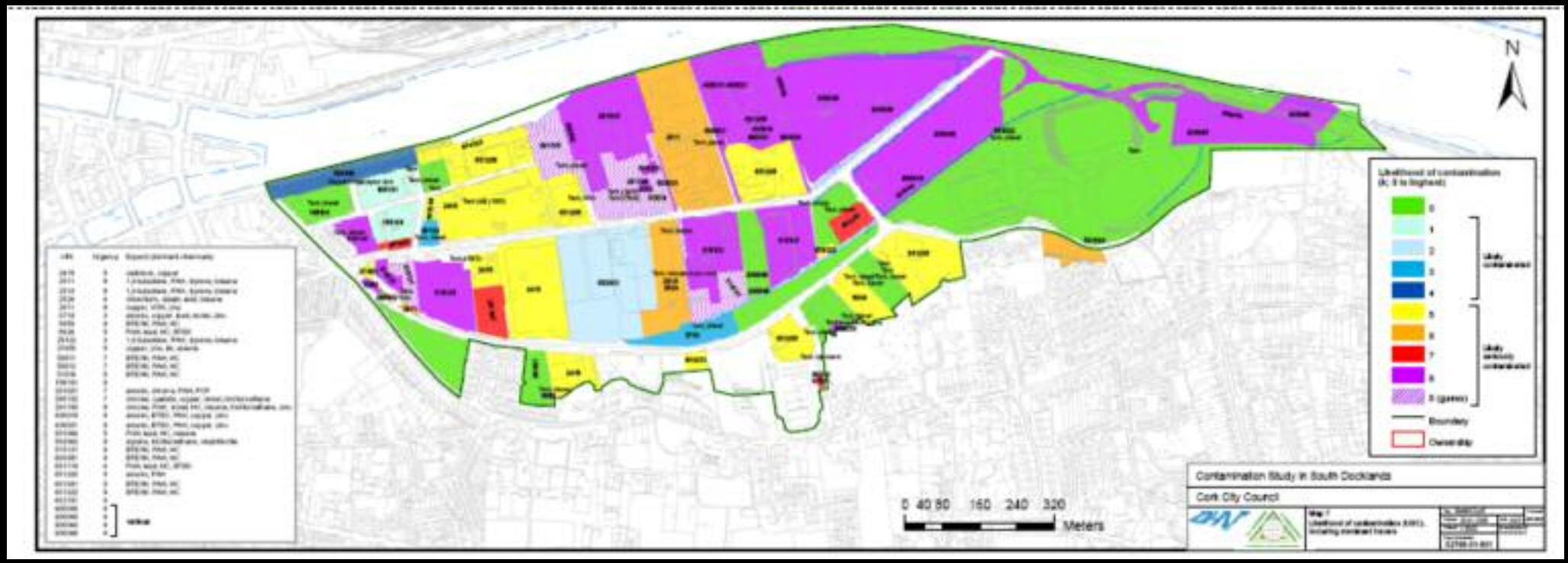
Phase 1- Assessment

Southern Milling

We have not been granted a site visit and interview. An aerial photograph in Shell's office from 1958 gave useful information.

Period	Activity	USC	K	Tracers
1958	Western half: Shell fuel storage, in two bulk tanks and in oil drums.	515121	8	HX, BTEXN
1963	Eastern half: building South-Eastern part: creosoting works	201021	7	As, Cr, PCP, PAH
1967, 1969	Bakery South-Eastern part: Creosoting works	201021	7	As, Cr, PCP, PAH
Current date	Western part: open storage yard; diesel tank Eastern part: flour mills	631305 156101	5 1	HC, BTEXN

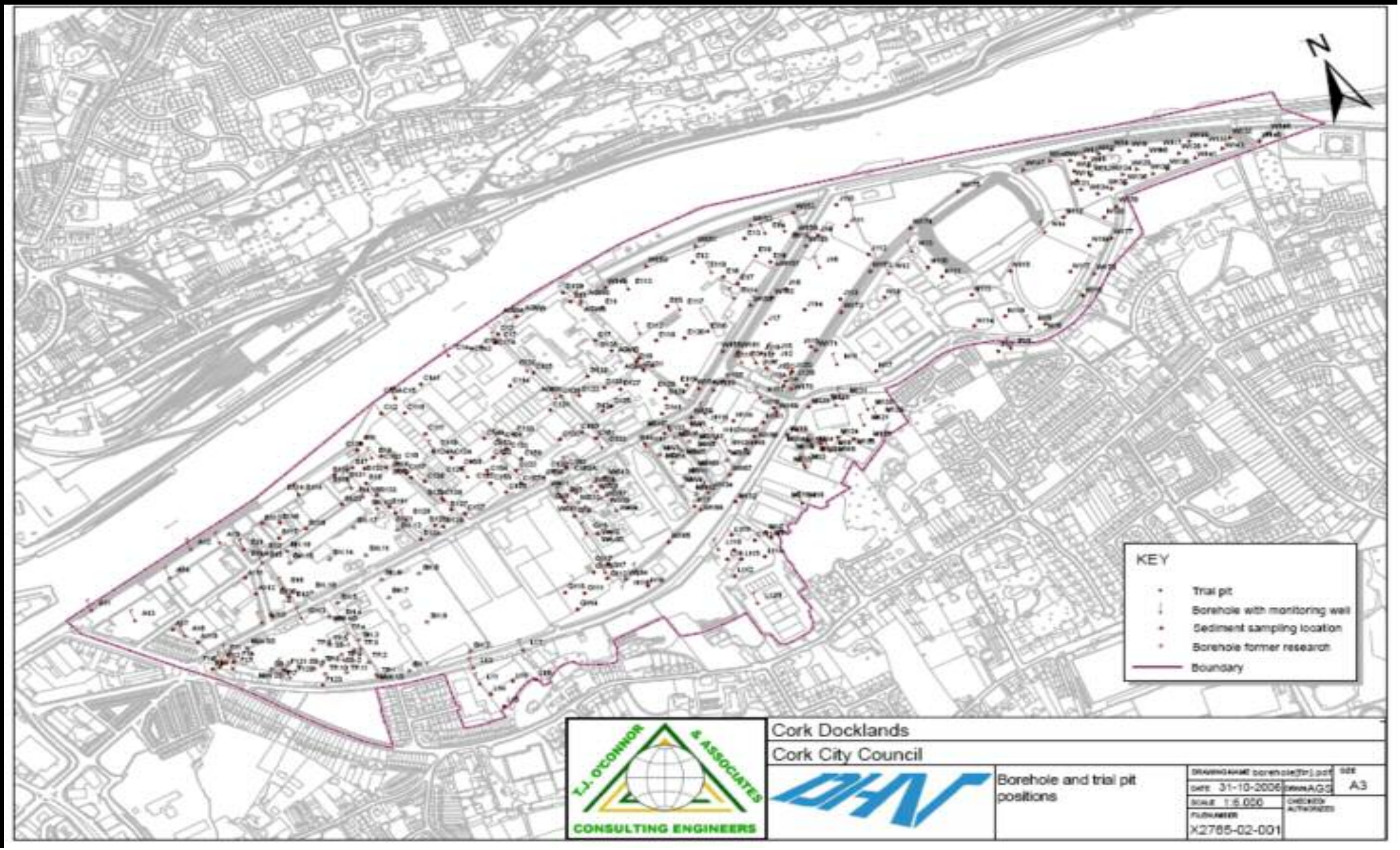
Phase 1 - Thematic Risk Map



Phase 2 Study

- Site investigation Contract
  - 92 Boreholes
  - 170 Trial Pits
  - 866 Soil Samples
  - 117 Water Samples
  - 253 Lab tests Laboratory analysis - Holland
- Previous Investigations
- GW Modelling – 3D MODFLOW
- Report

Test Locations



Historical Background

1774

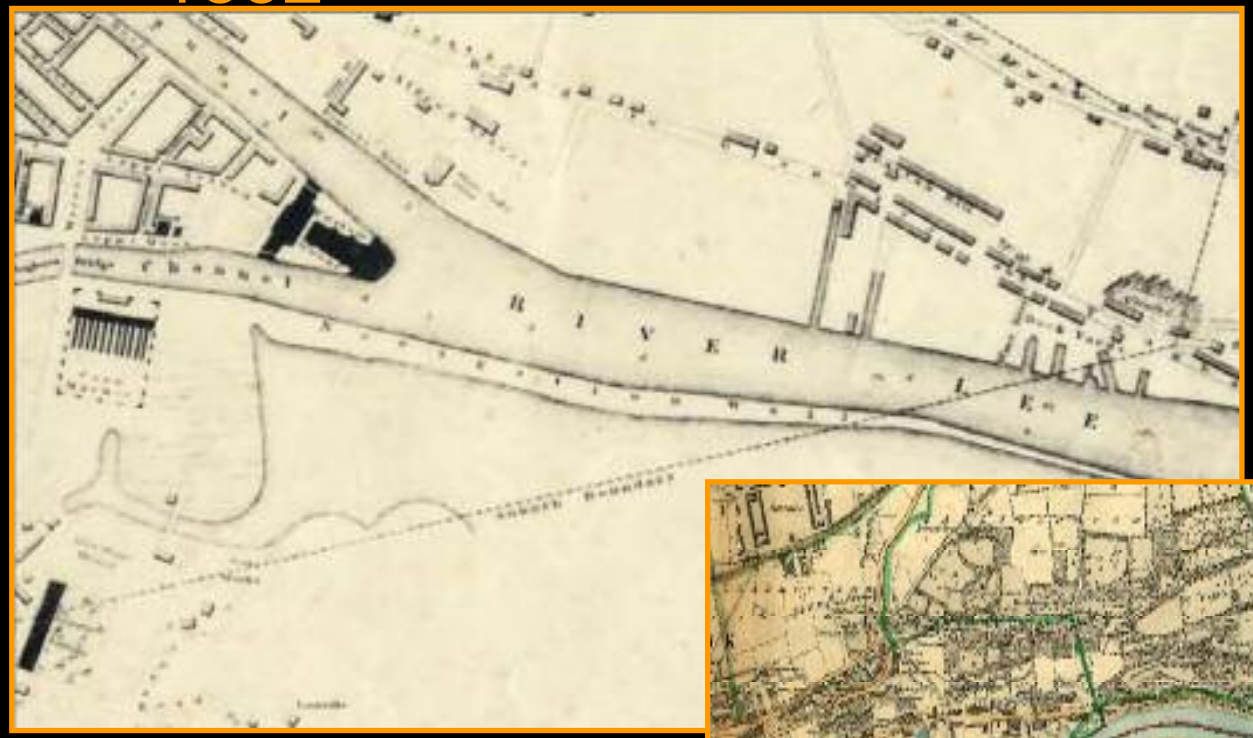
- Narrow Channel
- Scouring effect
- Facilitate port traffic

- Docklands is a polder

1801

Historical Background

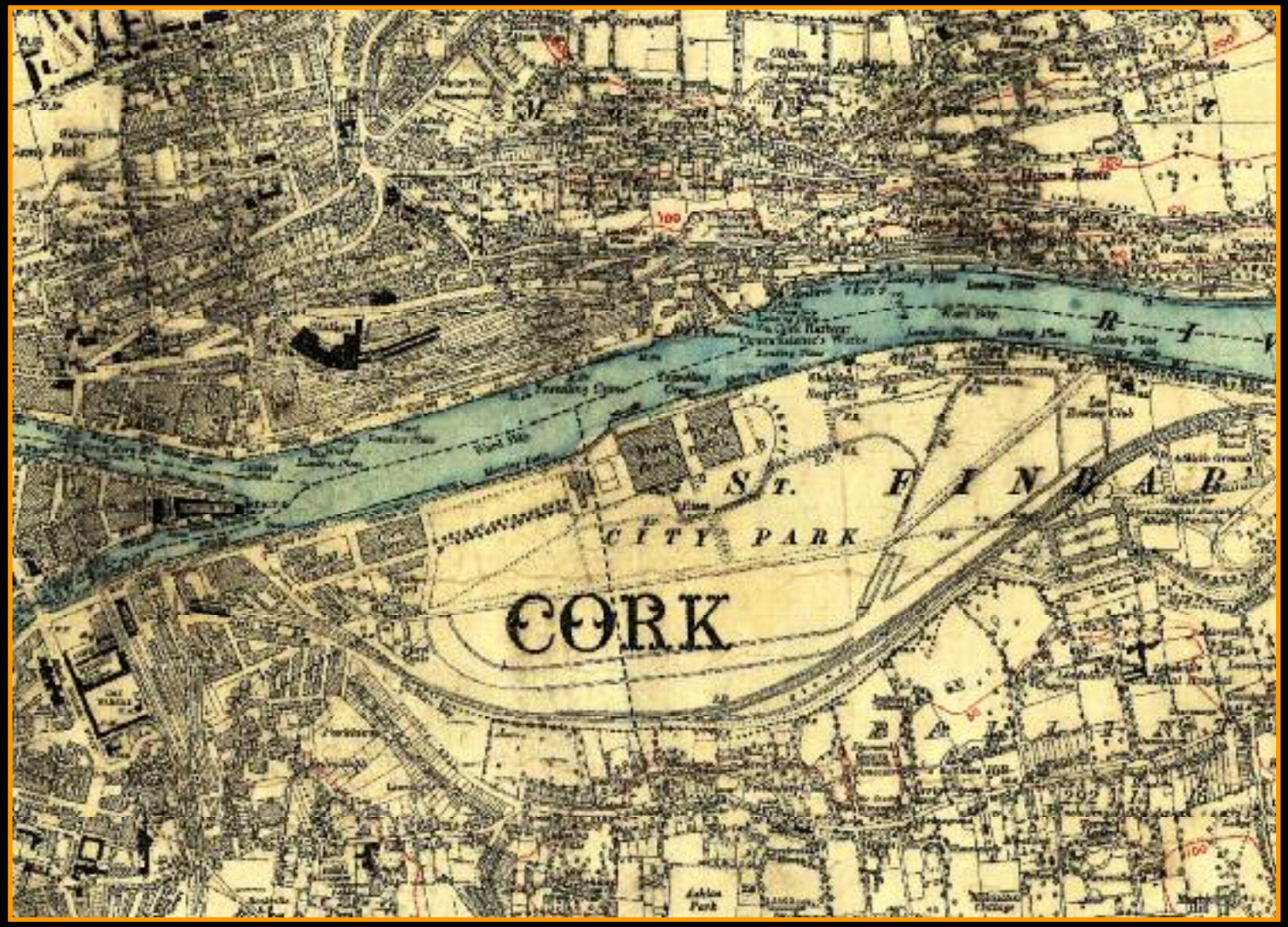
1832



1841

- City Park

Historical Background



- City Park
- Fords

1932

Geology

- Fill
- Clay layer
- Gravels
- Aquifer
- Perched Aquifer
- Geothermal
- Pump Testing

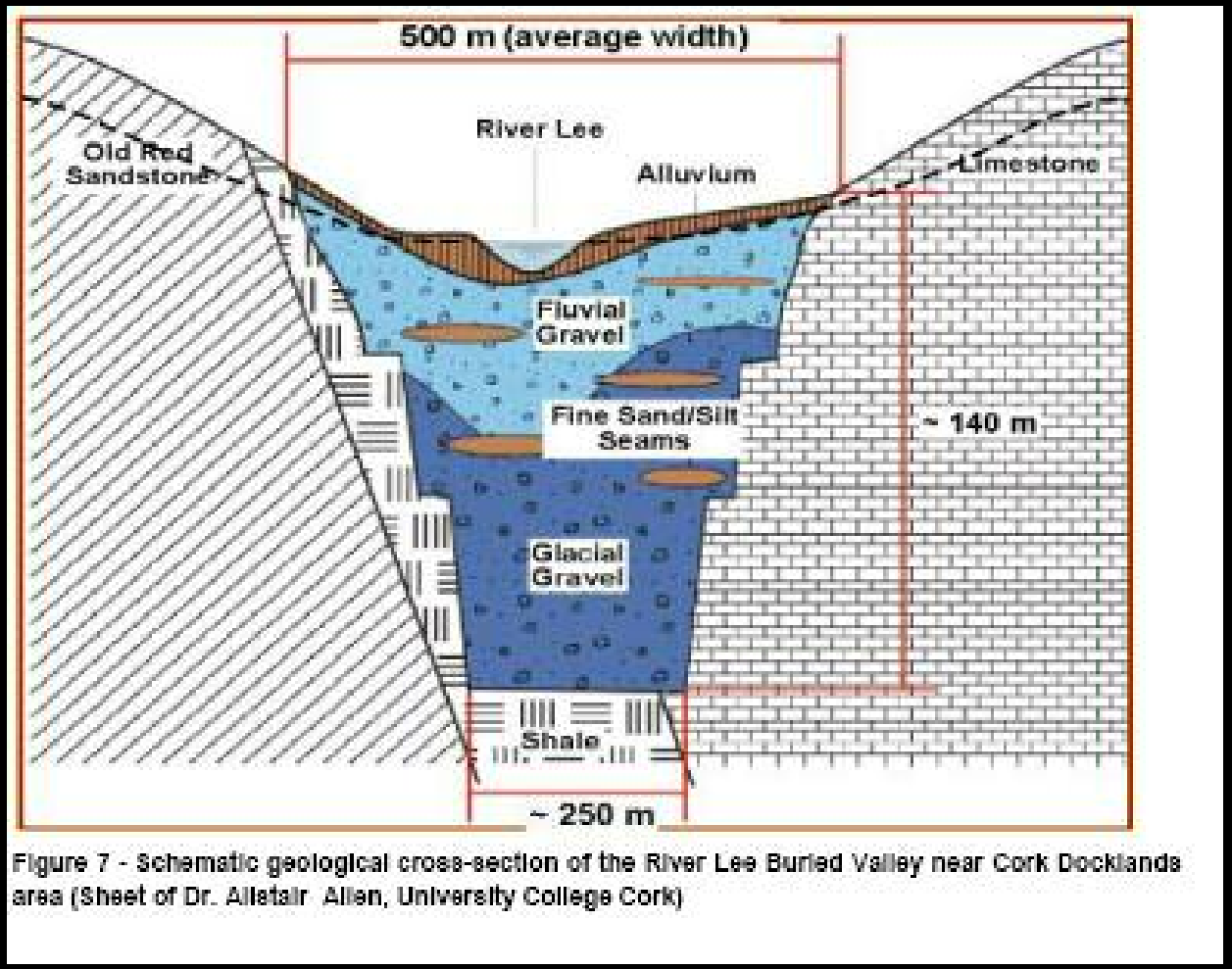
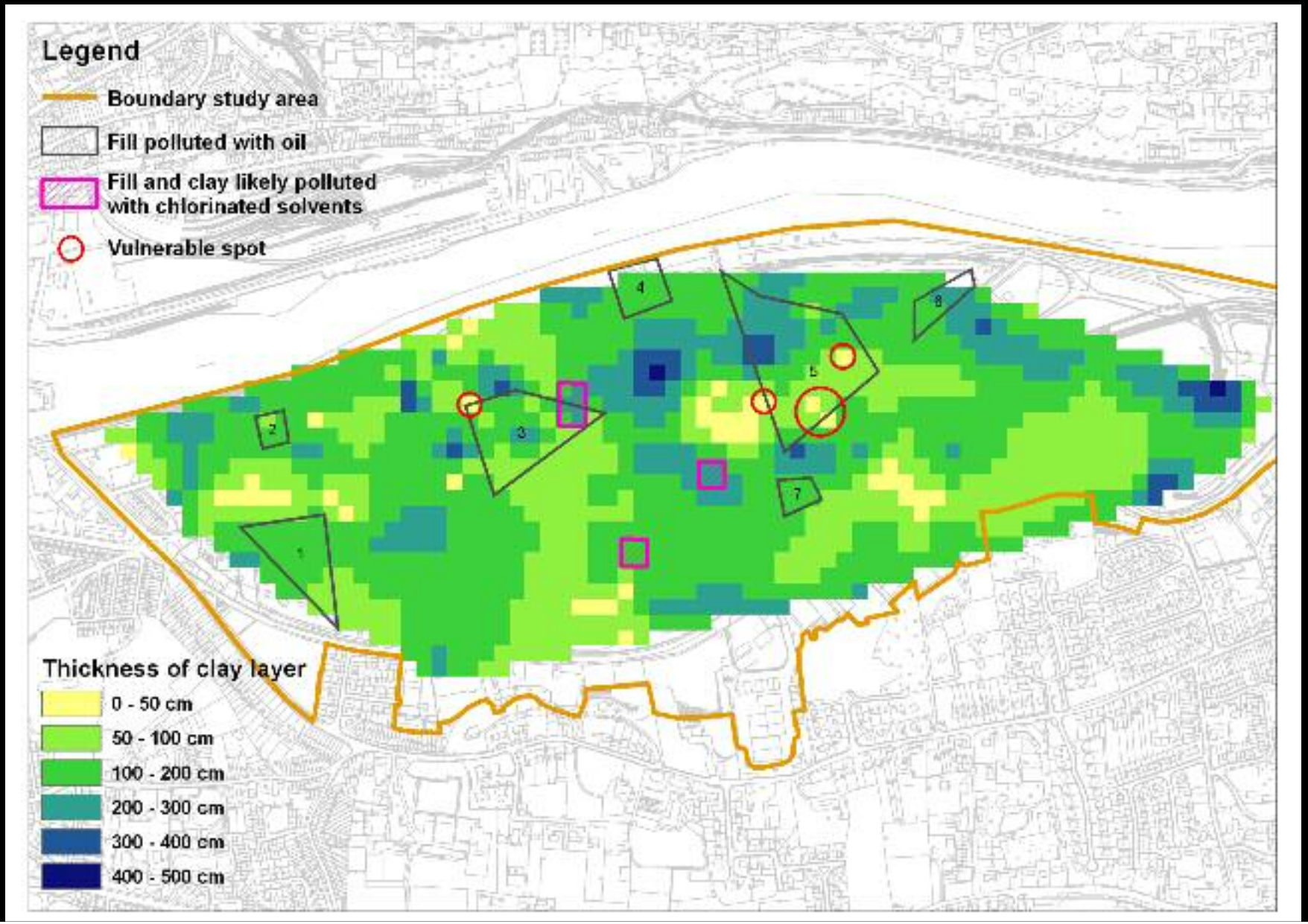


Figure 7 - Schematic geological cross-section of the River Lee Buried Valley near Cork Docklands area (Sheet of Dr. Alistair Allen, University College Cork)

Main Characteristics

- Geology – Fill on Clay on Gravel Aquifer
- Contamination predominantly in Fill Layer over substantially full extent of area
- Clay layer protecting Aquifer
- Aquifer in good condition (little or no contamination but vurnerable)

Key Contamination Areas identified



Main Contaminants

- VCH
  - Mobile
  - Serious risk to health
  - Need to be treated or removed
- Hydrocarbons
  - mobile
- Heavy Metals
  - non mobile
  - Barrier to pathway

Possible solutions

- On site treatment
- Treatment at agreed centralised location on Docklands
- Treatment off site in the City
- Limiting Criteria
  - Inert(?)
  - < 50k t pa
- Licensed Facility
- Treatment out of state
- Barriers – non mobile
  - Filling
  - Basement construction
  - Conservative approach

VCH Treatment options

- Excavation & Disposal of clay and fill
- Bioremediation
  - Stimulated breakdown
  - Injection of nutrients
  - Several years
  - Pump & Treat
- Groundwater and Soil

GW Modelling – Vinyl Chloride

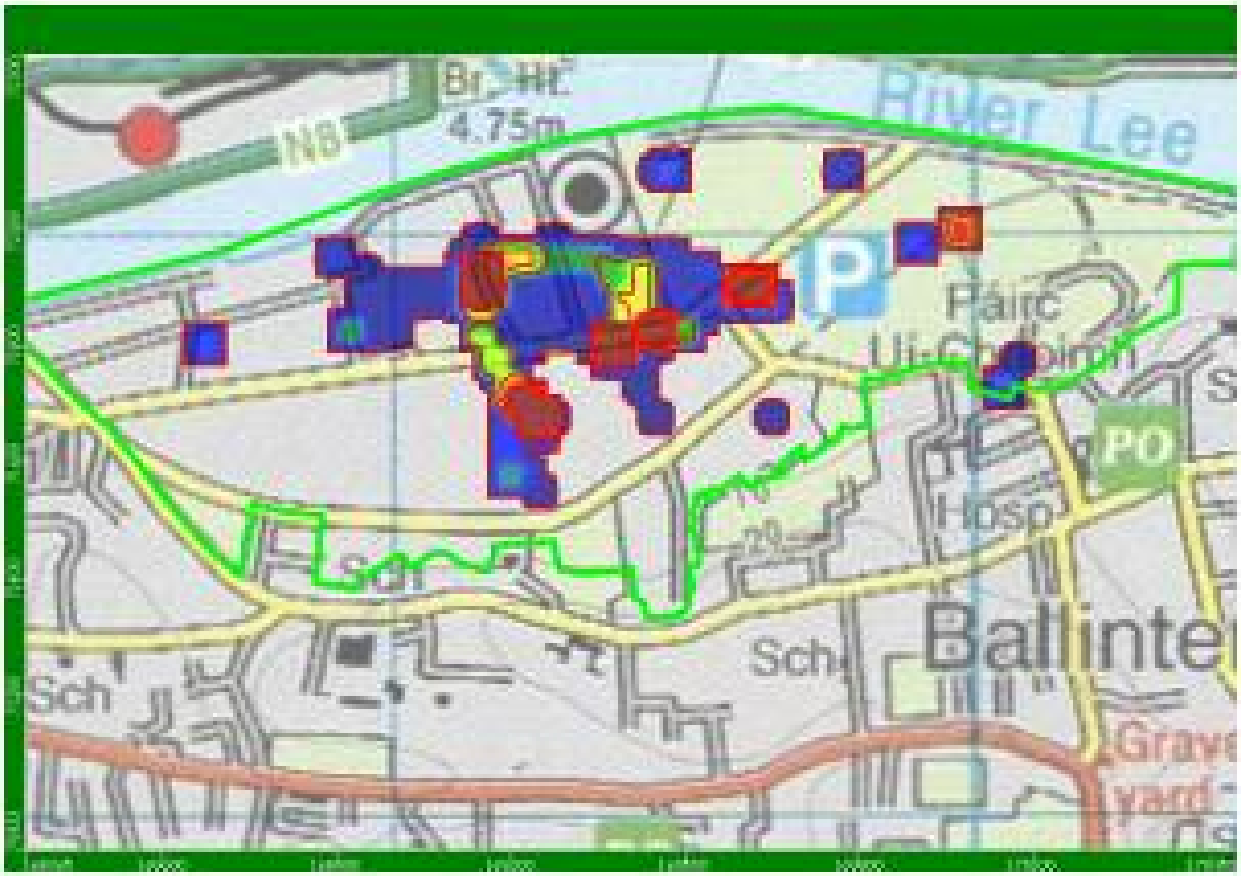


Figure 22 – Simulated concentration of VC after 0.5-year time in clay layer.

MODFLOW - 3D

Council Policy

- Land contamination will be dealt with as part of Planning process (as is currently) – G Walsh
- Further investigations required as part of planning application
- Cooperation encouraged
- Competent experts used in assessments and analysis
- Remediation proposals to be sustainable
- Permitting (LA) and licensing (EPA) as required
- Council will issue legal notice if required
- Conservatism

Challenges

- Scale of project
- Additional Site investigation and modelling
- Licensing
- Disposal
- Cooperation
- Groundwater mobile contamination
- Aquifer Protection
- Costs

Conclusions

- Large Scale Project
- Significant Volume of contamination
- non mobile (VCH) important to control
- Protection of Aquifer essential
- Cooperation essential
- Management important
  - Environmental officer and the planning process
  - EPA
- Manageable – Not a major constraint in comparison to other issues eg ground raising
- Disposal to foreign state most likely cost effective solution

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Email: docklands@corkcity.ie