

PRESENTATION ON NEW DEVELOPMENTS IN ON-SITE WASTEWATER MANAGEMENT

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PRESENTATION



- ◆ Background
- ◆ Developments in the Area of On-Site Wastewater Treatment
- ◆ Recent Developments
- ◆ Next Steps
- ◆ Final Comments

ON-SITE WASTEWATER MANAGEMENT

- ◆ All one-off rural houses and all new houses in ‘unsewered’ areas require some type of on-site wastewater management systems
- ◆ General classification of systems:
 - Septic Tank Systems
 - Secondary Treatment Systems
- ◆ Rural housing a major political issue
 - New DEHLG Policy Guidelines, 2005

COMPARISON: SEPTIC TANK v SECONDARY SYSTEM

Septic Tank

- ◆ 240 mg/l BOD
- ◆ 110 mg/l SS
- ◆ 50 mg/l Ammonia
- ◆ 20 mg/l Phosphorus
- ◆ 3×10^7 Coliforms
- ◆ Large Percolation Area

- ◆ Cost: **€750**
- ◆ Low Maintenance (no external power)
- ◆ No Monitoring

Secondary System

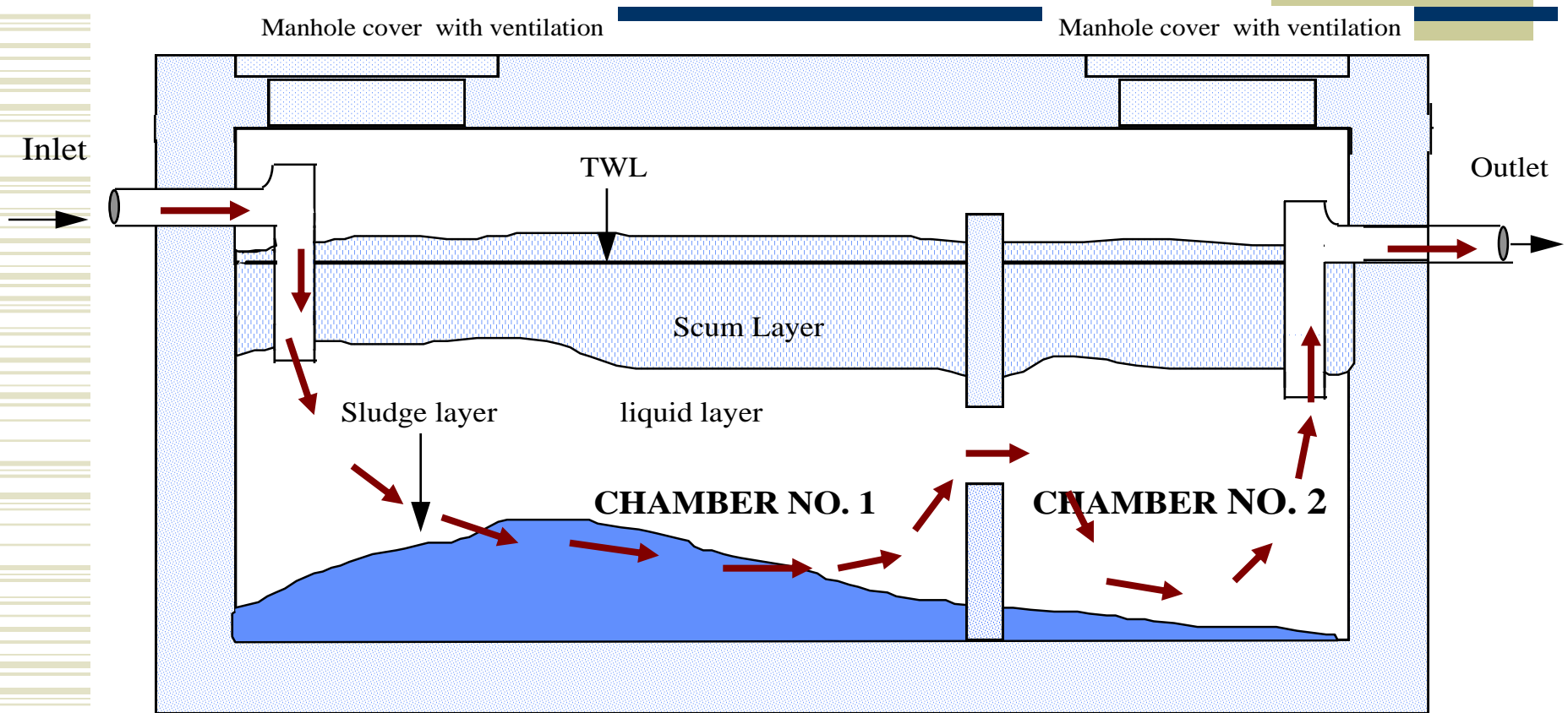
- ◆ 20mg/l BOD
- ◆ 30mg/l SS
- ◆ < 5 to 10 mg/l Ammonia
- ◆ < 5 to 10 mg/l Phosphorus
- ◆ 10^4 Total Coliforms
- ◆ Polishing Filter – smaller area with low ‘T’ values
- ◆ Cost **€3,000** to **€5,000**
- ◆ Significant (Pumps and blowers)
- ◆ Monitoring chamber

ON-SITE WASTEWATER TREATMENT SYSTEMS

Background

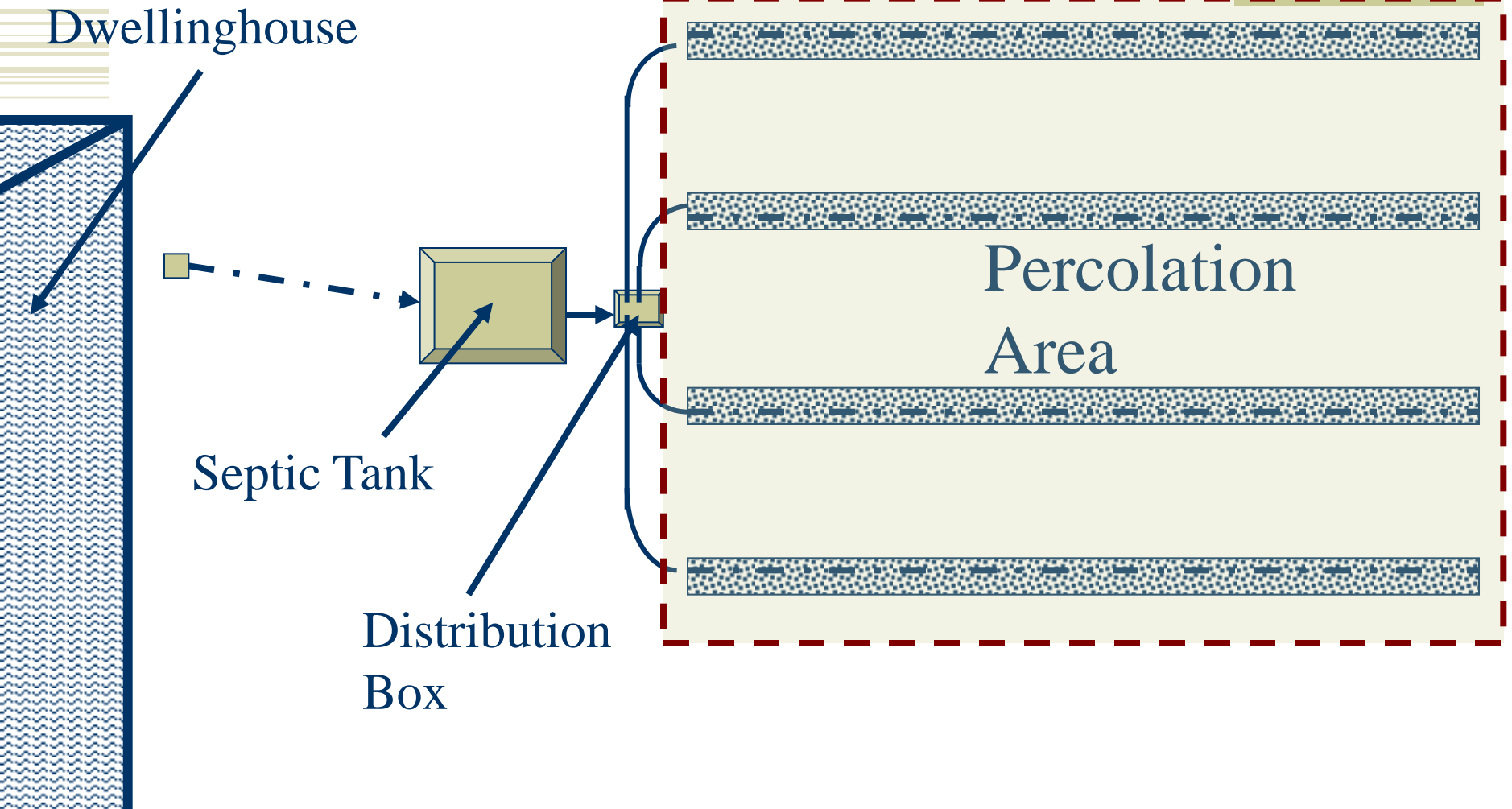
- ◆ Over 450,000 on-site systems in place with 3,000 ~ 5,000 new systems annually
 - Many systems not functioning properly
 - Pollution problems in many cases!
- ◆ Septic Tank Systems in approximately 90% of cases

THE SEPTIC TANK – TYPICAL LAYOUT



SECTION A - A

TYPICAL LAYOUT OF ON-SITE S.T. SYSTEM





PROBLEMS

PROBLEMS

- ◆ System installed on an unsuitable site
 - Poor percolation issue
- ◆ Site potentially suitable but lack of proper design of system
- ◆ Poor installation of system
- ◆ Lack of proper inspection and maintenance of system

CASE STUDY: LOUGH LEANE CATCHMENT, KERRY 1999

Summary of Findings

- ◆ Single chamber septic tank in 77% of cases;
- ◆ Discharge to a soakaway in 88% of cases;
- ◆ Tanks not de-sludged in 57% of cases;
- ◆ Problems experienced but not reported in 79% of cases

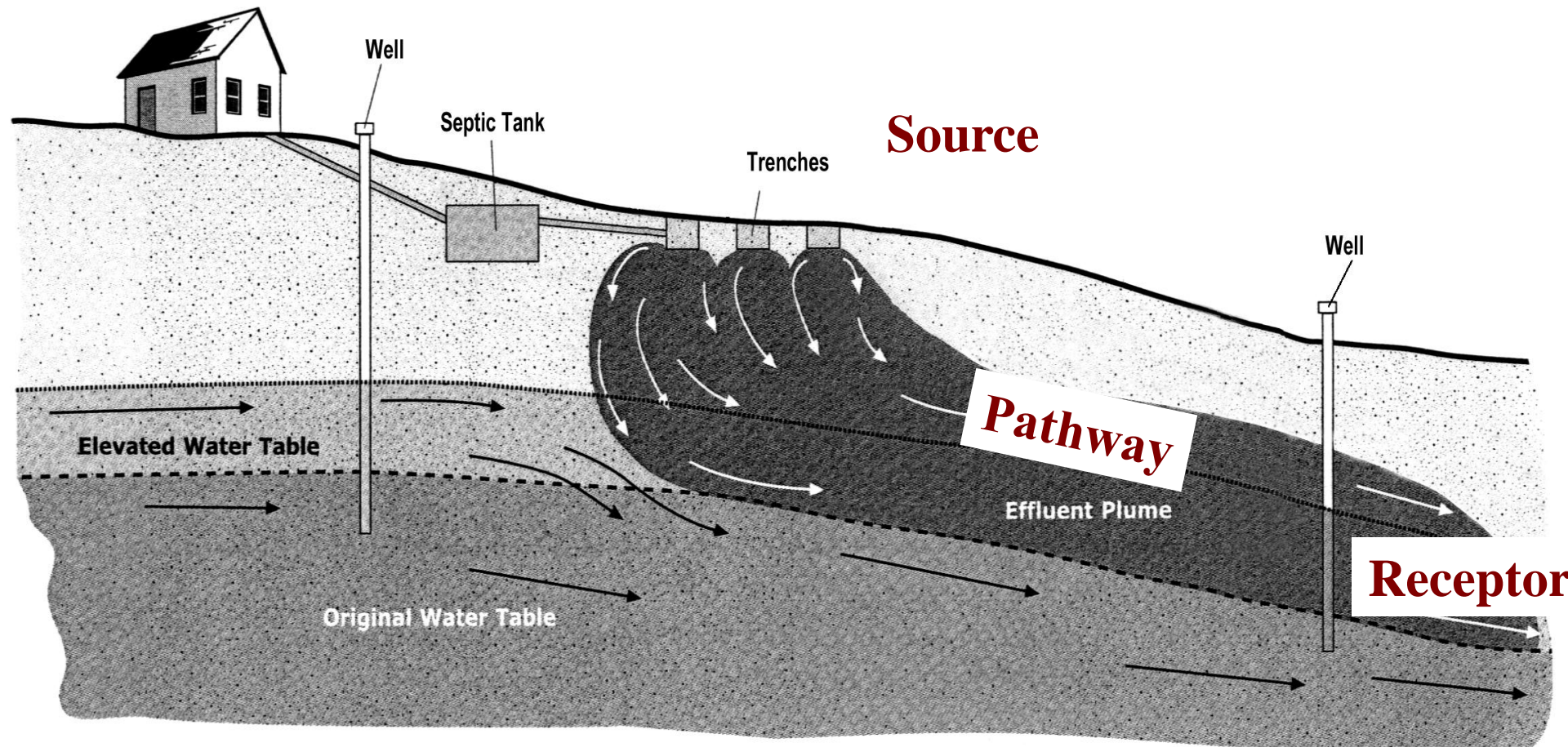
IMPACTS OF NON-FUNCTIONING ON-SITE SYSTEMS

- ◆ Contamination and pollution of groundwater
 - Public Health Implications
- ◆ Contamination and pollution of surface waters
 - Impact on Fish and on Beneficial Uses
- ◆ Ponding on site
 - Public Health Implications
- ◆ Litigation – High Court award of €310,000 in recent case against the builder and the certifying engineer (Irish Times 17.02.2010)



GROUNDWATER POLLUTION

RISK OF GROUNDWATER POLLUTION (SPR Model)





SURFACE WATER POLLUTION

**Proper Site
Suitability
Assessment**

**Proper Design
of On-Site System**

**Addressing the
Problems –
Closing the Loop**

**Proper
Installation
of System**

**Inspection,
Maintenance and
Monitoring**

COMPONENTS OF A SITE SUITABILITY ASSESSMENT

- ◆ Desk Study
- ◆ Visual Assessment – Site Inspection and Survey
- ◆ Trial Hole Inspection (BS 5930: 1999)
- ◆ Percolation Tests
- ◆ Integrating Results – Site Characterisation Form
- ◆ Addressing the Three Critical Questions -
Conclusions and Detailed Recommendations, based on evidence

TRIAL HOLE - DESCRIPTION

Depth of trial hole (m) ^{Note 3:} 2.10		Date and time of excavation: 11/08/2005	Date and time of examination: 13/08/2005		
Depth from ground surface to bedrock (m) (if present): > 2.1		Depth from ground surface to water table (m) (if present): 2.0m			
Depth below ground surface (m) to the nearest 0.1m	Soil/Suhsoil Texture & Classification**	Results of Thread, Ribbou and Dilatancy tests	Density/ Compactness	Colour	Preferential flowpaths
Top Soil 0-200mm	Top Soil Loam Material	_____	Uncompact	Brown	Root system to 300mm
200mm – 900mm	silty, CLAY Granular Material	3 Threads Ribbon 120mm No Dilatancy	Compact	Brown	
900mm – 2.10m	CLAY Blocky Material	3 Threads Ribbon 120mm No Dilatancy	Compact	Brown with pockets of grey	
	Water table issues, @ 2.0m				
	No mottling visible.				
	No bedrock				

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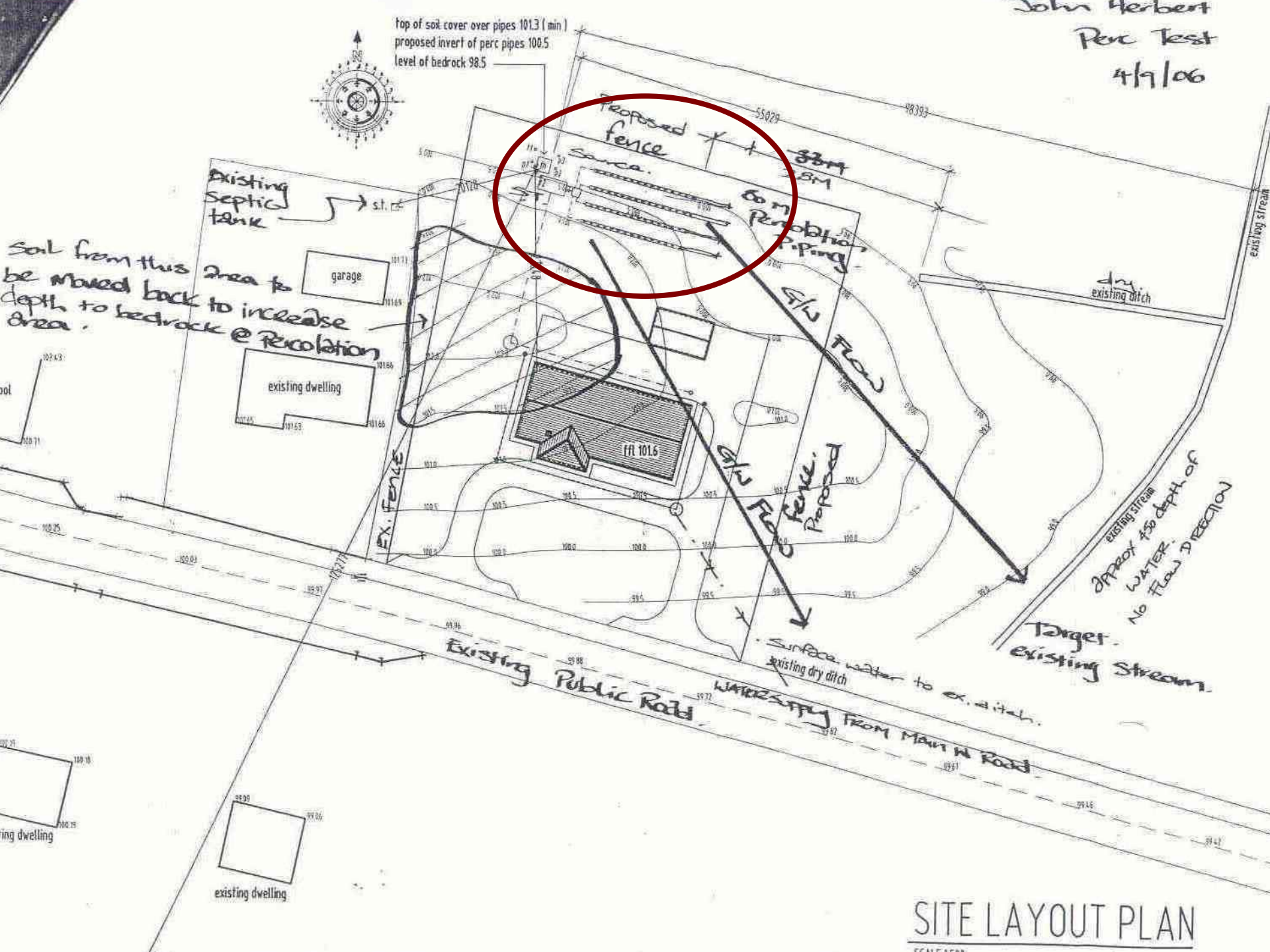
3.5(a) Percolation (“T”) Test for Deep Sbnsoils and/or Water Table

Percolation Test

Percolation Test Hole				1	2	
Depth from ground surface to top of hole (mm) (A)				750mm	730mm	
Depth from ground surface to base of hole (mm) (B)				1150mm	1150mm	
Depth of hole (mm) [B - A]				400mm	420mm	
Dimensionous of hole [length x breadth (mm)]				300*305	300*300	
Each hole mnst be pre-soaked twice before the test is carried out (from 10.00 am to 5.00 pm and from 5.00 pm to next morning)						
Date of test				13/08/05	13/08/05	
Date pre-soaking started				12/08/05	12/08/05	
Time filled to 400 mm				10.45	10.45	
Time water level at 300 mm				11.26	11.33	
Percolation Test Hole No.		1			2	
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	11.26	12.16	50	11.33	12.25	52
2	12.20	1.10	50	12.25	1.19	54
3	1.10	2.02	52	1.20	2.23	53
Average Δt			50.66	Average Δt		53
Average Δt/4 = [Hole No.1] __12.66__ (t ₁)				Average Δt/4 = [Hole No.2] __13.25__ (t ₂)		
T value ^{Note 4} = (t ₁ + t ₂)/2 = __12.955__ min/25 mm)						
Result of Test : T = 13						
COMMENTS:						
Result as expected with sub-soil conditions						

John Herbert
Peric Test
4/9/06

Top of soil cover over pipes 101.3 (min)
proposed invert of perc pipes 100.5
level of bedrock 98.5



Soil from this area to be moved back to increase depth to bedrock @ Percolation

Existing septic tank

garage

existing dwelling

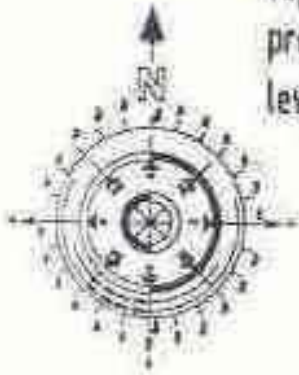
FFI 101.6

Existing Public Road

existing dwelling

SITE LAYOUT PLAN

top of soil cover over pipes 101.3 (min)
proposed invert of perc pipes 100.5
level of bedrock 98.5



Test Hole



T1



P1



P2



T2



Proposed fence

Garage

60' Percolation Piping

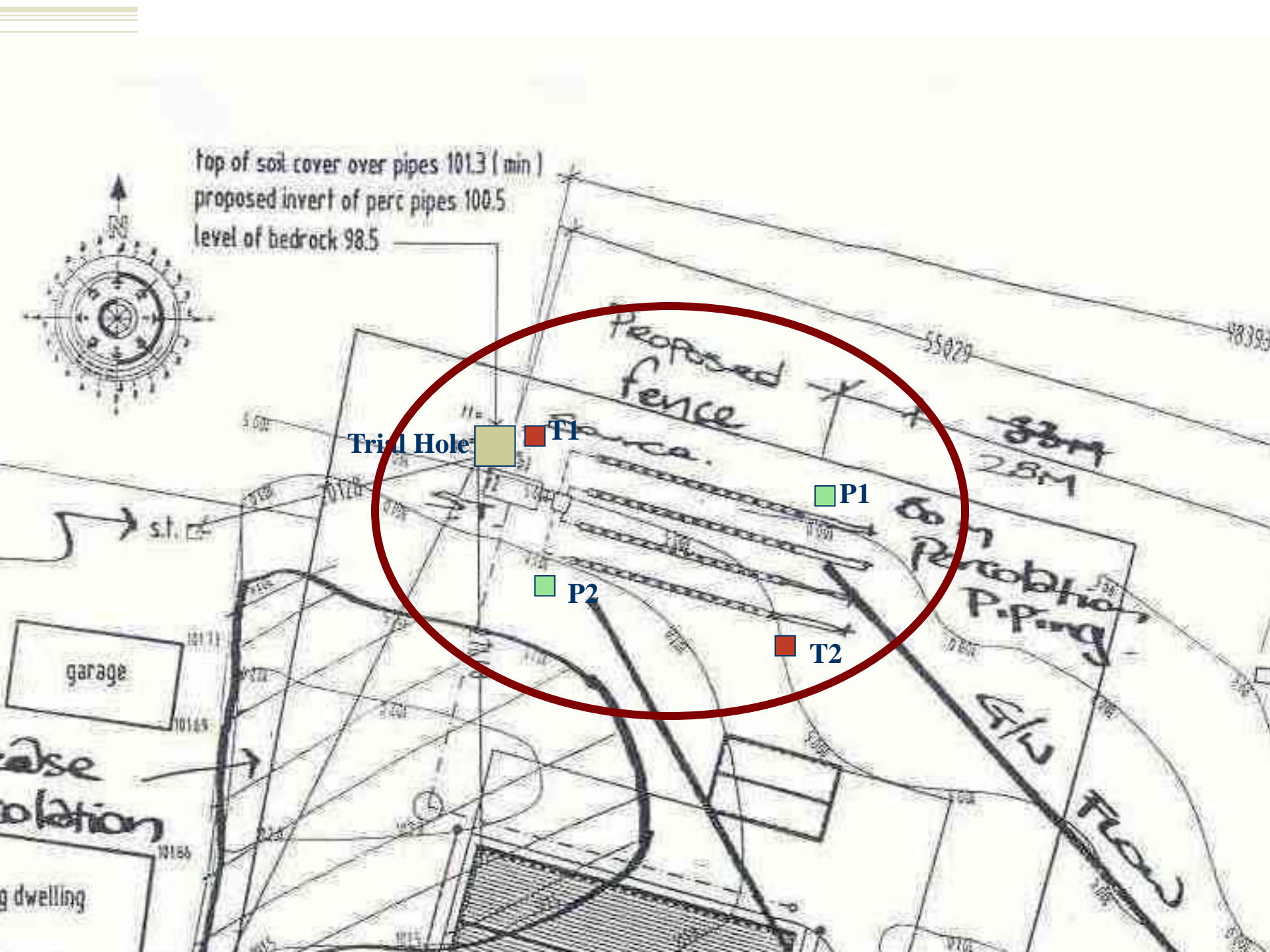
4 1/2"

Flow

garage

base
olation

g dwelling





SSA: 3 CRITICAL QUESTIONS

SSA: THE THREE CRITICAL QUESTIONS

- 1) Will the effluent get away underground without ponding at the surface?
(i.e. **Hydraulic Issue**)
- 2) Will the effluent be treated adequately before a relevant receptor is reached?
(i.e. **Attenuation or Treatment Issue**)
- 3) Will all minimum separation distances be complied with?
(i.e. **Site Restrictions Issue**)

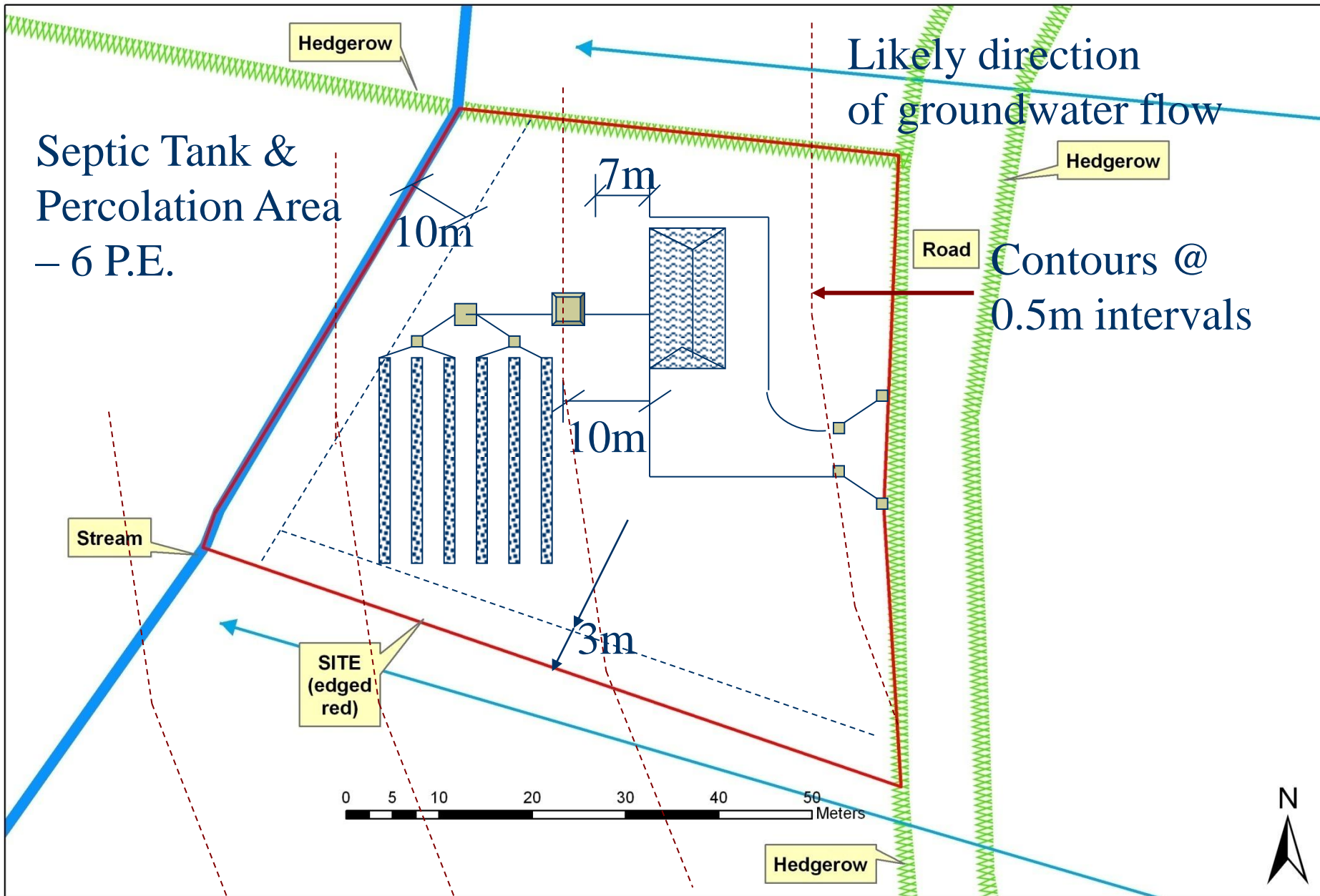


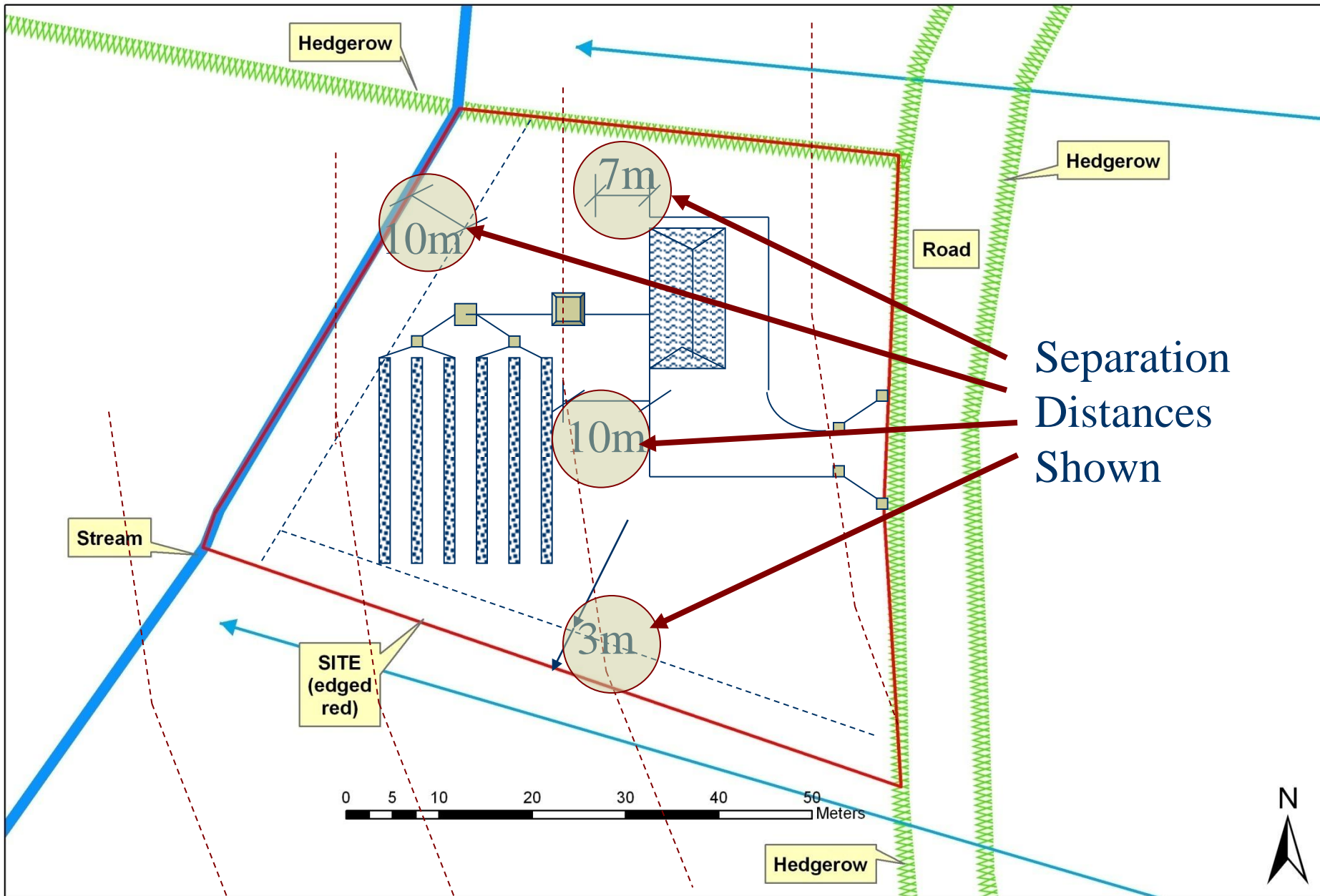
CONCLUSIONS AND RECOMMENDATIONS

PROPERLY
DESCRIBED
DESIGN SOLUTION

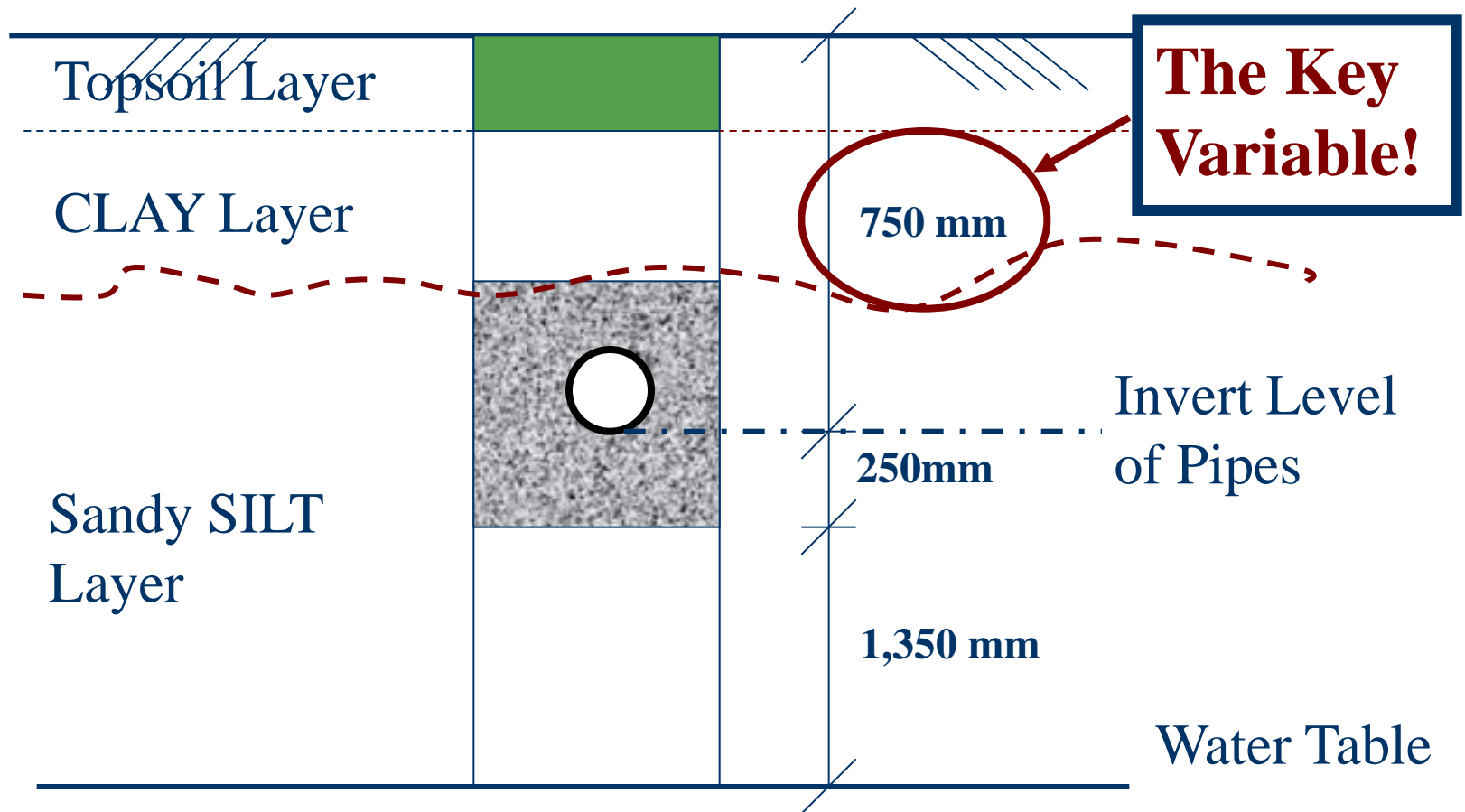
RECOMMENDATION

- ◆ Design Solution to be fully described
 - Should be based on evidence from site characterisation
 - Must be fully described in 3 dimensions
 - Site Layout Plan (1: 500 Scale suggested)
 - Cross-Section (1:50 Scale suggested)
 - Longitudinal Section in the case of sloping sites or where ground must be made up





CROSS-SECTION



LEGAL FRAMEWORK

- ◆ The Public health (Ireland) Act, 1878
 - Nuisances injurious to health
- ◆ Local Government (Water Pollution) Acts, 1977 and 1990
- ◆ Building Control Acts 1990 – 2007 and additional provisions
- ◆ Planning & Development Acts 2000 – 2006
- ◆ Litigation – Civil Law



DEVELOPMENTS IN ON-SITE WASTEWATER MANAGEMENT

CHRONOLOGY OF EVENTS

- ◆ Planning & Development Act, 1963
- ◆ SR6: 1976
- ◆ SR6: 1991
- ◆ EPA Manual 2000
 - DEHLG Circular Letter 2003
- ◆ S.I. 286 of 2006
- ◆ ECJ ruling on 29 October 2009
- ◆ EPA Code of Practice 2009
 - DEHLG Circular Letter 2010

PLANNING & DEVELOPMENT ACT 1963

- ◆ In operation from 1st October 1964
- ◆ Planning permission required for ‘development’
- ◆ Development means, save where the context otherwise requires, the carrying out of **any works on, in, or under land** or the making of any material change in the use of any structures or other land
- ◆ Installation of on-site wastewater treatment systems considered to constitute ‘development’



SR6:1976

- ◆ Published by the NSAI
- ◆ Septic Tank Systems – Recommendations
- ◆ Aim of achieving satisfactory practice in the design, construction and maintenance of septic tank systems

SR6:1991

- ◆ Published by NSAI
- ◆ Title: Septic Tank Systems – Recommendations for Domestic Effluent Treatment and Disposal from a Single Dwelling House”
- ◆ Replaced soakpit with percolation area and reserve percolation area. Size of percolation area related to ‘T’- value.
- ◆ Introduced concept of over-rapid percolation (i.e. ‘T’-value < 5)
- ◆ Length of percolation trench related to ‘T-value’

EPA MANUAL 2000

- ◆ To provide guidance on the design, operation and maintenance of on-site wastewater treatment systems for single houses
- ◆ Followed research study carried out from 1995 to 1997
- ◆ $1 \geq T \leq 50$: Suitable for S.T system
- ◆ Length of percolation trench related to P.E.

DEHLG CIRCULAR LETTER

05/03

Groundwater Protection & Planning System

- ◆ Information on location and vulnerability of groundwater resources
- ◆ Effective regimes for the proper assessment of site conditions & the design, installation & maintenance of on-site systems:
- ◆ EPA Manual & Site Characterisation Form
- ◆ FÁS Training Course
- ◆ Appropriate monitoring & enforcement mechanisms

PLANNING & DEVELOPMENT REGULATIONS, 2006 (S.I. 685)

Article 22(2)(c)

- ◆ Planning application shall be accompanied by
“*Where it is proposed to dispose of wastewater from the proposed development other than to a public sewer, information on the on-site treatment system proposed and evidence as to the suitability of the site for the system proposed*”

ECJ RULING 2009

- ◆ Ruling that Ireland failed to fulfil its obligations under Directive 75/442/EEC (‘Waste Directive’)
- ◆ Waste Waters classified as ‘Waste’
- ◆ Serious damage to the environment in connection with the use of septic tanks
 - Incorrect construction, unsuitable siting, insufficient capacities, lack of maintenance and inspection and inactivity of competent authorities
- ◆ Pointed to the lack of a satisfactory system of inspection of the efficacy of IWWTS

EPA CODE OF PRACTICE 2009

- ◆ Code of Practice to provide guidance
- ◆ Incorporates requirements under CEN 12566
- ◆ Based on EPA research
- ◆ Will replace SR6: 1991 in the Building Regulations
- ◆ $3 \geq T \leq 50$: Suitable for S.T system
- ◆ **Site with 'T-value' > 90 unsuitable!**

DEHLG CIRCULAR LETTER

01/10

Implementation of EPA CoP

- ◆ Guidelines for Sustainable Rural Housing, 2005
- ◆ Greater consistency of approach among Planning Authorities, use of Groundwater Protection Schemes
- ◆ From 8.01.2010, Planning Authorities to ensure rigorous site suitability assessment to CoP
 - “expert and verifiable evidence”
 - Precautionary approach to be taken
- ◆ Design of the appropriate on-site system
- ◆ Arrangements for periodic checks and maintenance
- ◆ Part H/TGD H to be revised

EMERGING LOCAL AUTHORITY MODEL

- ◆ Panels of ‘Approved’ Assessors
 - Screening of candidates
 - Competence Issue FAS Course and FETAC Certificate
- ◆ Policing by Local Authority
 - Crucial issue – sanctions applied!
- ◆ Comprehensive Code of Conduct/Set of Conditions
- ◆ Good Communications
 - With approved assessors
 - With Elected Members and the general public



NEXT STEPS

NEXT STEPS

- ◆ EPA Workshops to Local Authority Staff to explain changes in CoP
- ◆ DEHLG to incorporate CoP in the Building Regulations (Part H)
 - Draft Part H/TGD H issued for consultation
- ◆ FAS Refresher Sessions in relation to CoP
- ◆ Greater consistency of approach within L.A. system

LOOKING FORWARD

- ◆ New FAS Training Programme on “Installation, Inspection and Monitoring of On-Site Wastewater Treatment Systems”
- ◆ Permit or Tracking System for all on-site systems (NCT model?)
- ◆ Dealing with installed systems
 - Introduction of Bye Laws, (e.g. Cavan Co. Co., 2004 – inspection every 7 years)

TYPICAL SCHEDULE OF INSPECTION & MAINTENANCE

System	Certificate of Installation	Frequency of Inspection	Frequency of Maintenance	Frequency of Monitoring
Septic Tank Systems	'Competent Person' [A]	Every 12 months [A]	Desludging every 24 months	Not Applicable
Secondary Systems	System Supplier [B] or [A]	Every 12 months [A] or [B]	Every 12 months [A] or [B]	Every 24 Months

DEALING WITH 'PROBLEM' SYSTEMS

- ◆ Proper protocol for inspection of IWWTs, particularly in relation to percolation areas/polishing filters;
- ◆ Development of criteria for rehabilitating 'problem' systems
 - Addressing the 3 critical questions
- ◆ Development of pragmatic solutions
 - Reduce the hazard: Use of S.T (with outlet filter) + Mechanical Aeration System
 - Use of tertiary treatment – soil polishing filters, sand polishing filters and constructed wetlands
 - Coppice planting (e.g. willow) for absorption, evapo-transpiration, etc.

FINALLY – SOME FIGURES!

- ◆ Approximately 3,000 to 5,000 new installations per year – down from approximately 20,000 to 30,000 in 2006
- ◆ Approximately 450,000 IWWTs in Ireland
- ◆ If say $\frac{2}{3}$ ^{rds} of IWWTs are not functioning:
 - Say **300,000** systems x an average rectification cost of **€10,000 = €3billion**
- ◆ **WHO WILL PAY???**