

The Aftermath...

December 2013 to March 2014



TRANSPORT INFRASTRUCTURE





Hemsby, Norfolk

6 December 2013



Environment Agency



Boston, Lincolnshire

6 December 2013



Environment Agency

The stats...

December 2013 to March 2014



64 severe flood warnings

5-6 December 2013

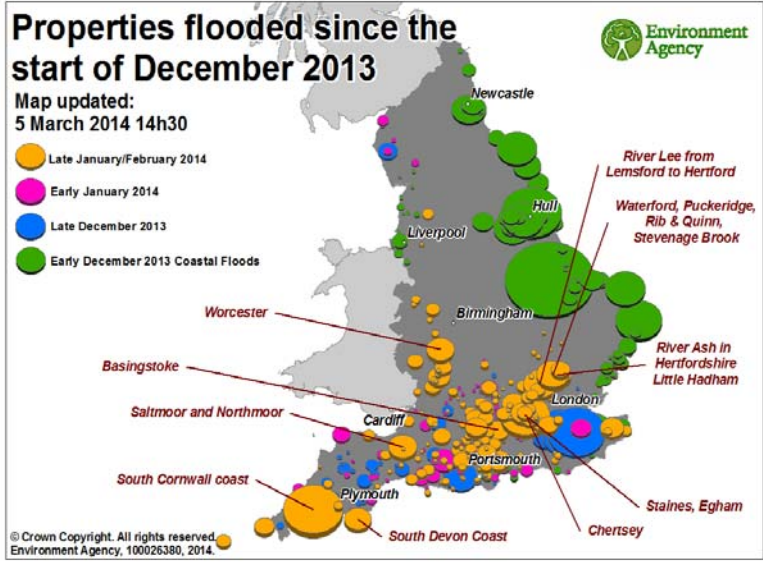


155 severe flood warnings issued in total



Status	Andean	Midlands	Northeast	Northwest	Southeast	Southwest	Wales	Totals
Severe Flood Warning Severe flooding. Danger to life	0	3	0	0	0	14	4	21
Flood Warning Flooding is expected. Immediate action required	2	28	0	30	20	61	54	195
Flood Alert Flooding is possible. Be prepared.	13	32	8	17	91	50	19	230





	Number of properties flooded	Number of properties protected
Late Jan/ Feb 2014	2,320	207,000
New Year 2014	720	240,000
Christmas 2013	1,400	80,000
Early Dec 2013 coastal surge	2,600	800,000

	1953	December 2013
Breaches	1200 different locations	Under investigation
Properties flooded	24,000	2,600
Deaths	307	2 but not flood related
Agricultural Land	65,000 hectares	6,800 hectares
People evacuated	32,000	18,000
Infrastructure	2 Power stations 12 Gas Works 100 miles of roads 200 miles of rail	Major impacts at Immingham Port No power stations and major gas works/services affected Road and rail tbc
Flood Warnings	0	71 severe flood warnings Over 160, 000 warning messages sent directly to homes and businesses

Comparison of early December tidal surge to 1953



MATT



*'We've had a month's worth
of abuse in less than 24 hours'*



Flooding & Contamination – Examples of Effects

December 2013 to March 2014





SEWERAGE SYSTEMS:

**GW Inundation
& Overflow**

**Biological
Contamination**



FUEL STORAGE:

**Damage to
underground
tanks**

**Relocation of
above ground
Tanks!**

**Chemical
Contamination**





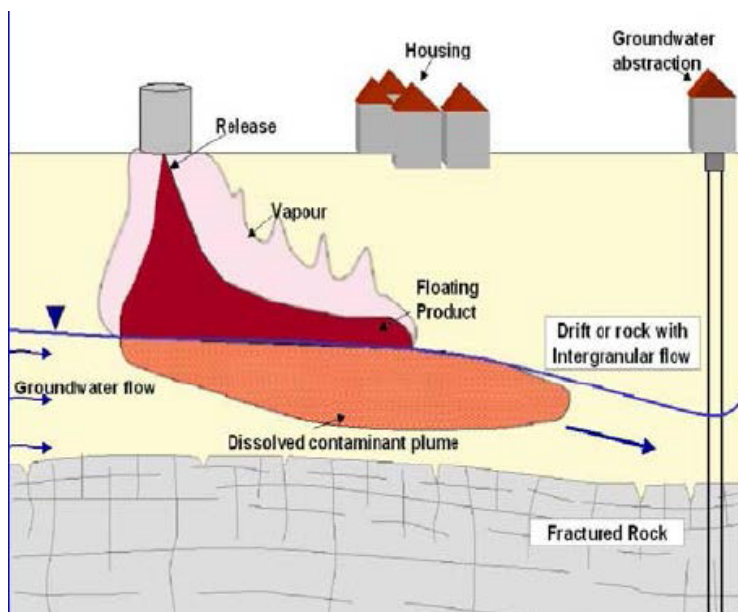
POLLUTION PREVENTION – THREATS

Seal Sands, Teesside

December 2013



Environment Agency



Changing GW Levels:

Remobilisation of existing contamination

Now you see it... Now you dont...

- Fate & Transport
- Dilution
- Dispersion



Environment Agency



WATER SUPPLY :

Remobilisation
of existing
contamination

Examples:

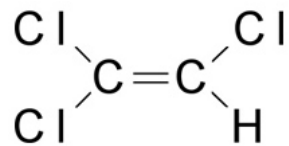
- Nitrates
- Atrazine*



AIR QUALITY:

Remobilisation
of existing
contamination

Harwell/Chilton:



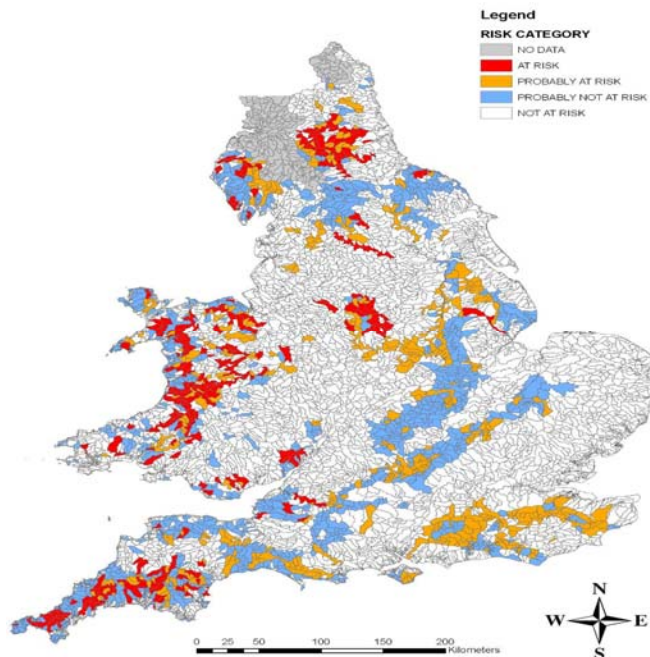
- TCE
- Existing plume
- Springline
- Volatilisation
- PHE





MINEWATER BREAKOUT

River Holme
W.Yorks



Catchments
Sensitive to
Metal Mining
Contamination





Flooding & Contamination – Challenges for the Future

December 2013 to March 2014



Risk Assessment

- ➔ Integrity of existing assets
- ➔ Land use & design of future structures
- ➔ Design of future remediation schemes
 - ➔ Reasonable worst case conditions (gw)
- ➔ Verification of past remediation schemes?
- ➔ Implications for permitting of discharges
 - ➔ Unsaturated zone effects



Liability

- ➔ Past schemes – suitable for use?
- ➔ Offsite migration and damage
- ➔ Legal Compliance
 - ➔ Part2A “continuing to enter” for POCW



Thank you & questions

Matt Whitehead – Technical Advisor

