

GREENFIELD, BLACKFIELD & FIFTY SHADES OFBROWN

Matt Gardner | 4th October 2016



Incorporating

EC HARRIS
BUILT ASSET
CONSULTANCY

Hyder 

Arcadis – who we are?

- 28,000 people in 40 offices around the globe
- ~4,500 people in the UK: from Plymouth to Edinburgh and London to Douglas
- Single Arcadis brand since September 2015; combining: EC Harris, Hyder, Christal, AYH, Vectra and Geraghty & Miller.
- Steady integration to coordinate our commercial, engineering and environmental services.
- The Environment Team ~450 includes a full environmental planning capability through to contaminated land investigation & remediation

**Over a century of experience in protecting the Dutch coast
now applied to the design of flood mitigation in New York**

Purpose

Brownfield development is here to stay; is it really that bad & how can the challenges be overcome?

Schedule

- Brownfield first!
- How brown is brown and what is “Blackfield”?
- Typical brownfield development pitfalls
- Technological Advances:
 - High resolution investigation
 - Cutting edge remediation
- Close



Definitions & Pipeline Context

National Planning Policy Framework

Core Planning Principle #8:

“encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value”

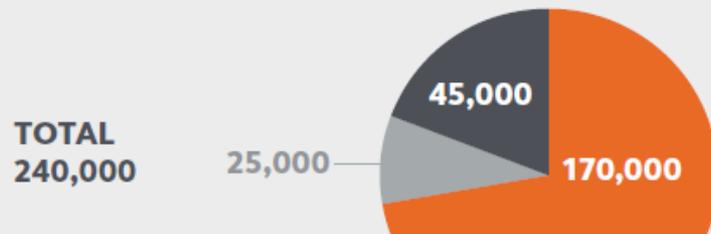
Previously Developed Land

Land which is or was occupied by a permanent structure, including the curtilage of the developed land (although it should not be assumed that the whole of the curtilage should be developed) and any associated fixed surface infrastructure. This excludes:

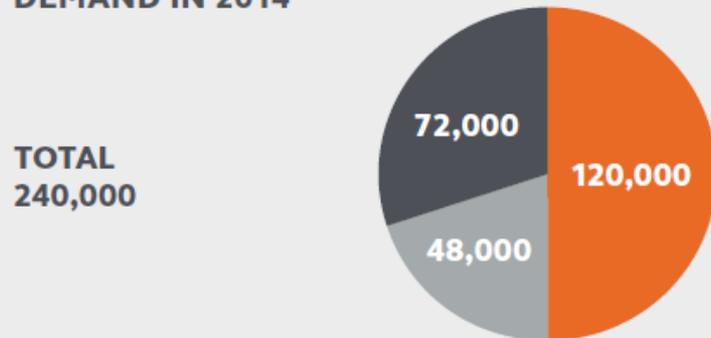
- land that is or has been occupied by agricultural or forestry buildings;
- land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures;
- land in built-up areas such as private residential gardens, parks, recreation grounds and allotments; and
- land that was previously-developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time.

A housing crisis

GOVERNMENT HOUSING SUPPLY TARGET AND TENURE DEMAND IN 2007

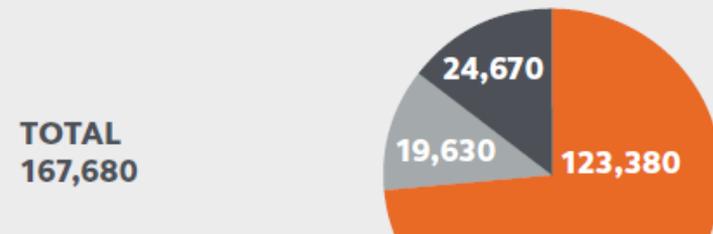


OVERALL HOUSING NEED AND TENURE DEMAND IN 2014

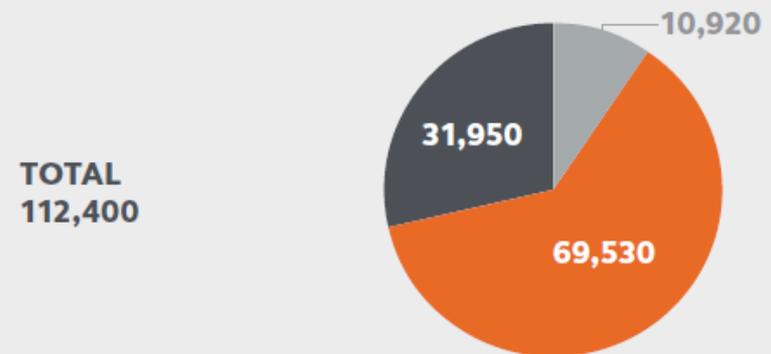


In 2014, Shelter researched and published *'In the mix: the need for diverse supply of new homes'* which stated that of the 240,000 homes needed annually, half needed to be market housing, 20% intermediate housing and 30% social rented housing

ACTUAL HOUSING DELIVERY IN 2006/07



ACTUAL HOUSING DELIVERY IN 2013/14



Only 112,400 new homes were delivered in 2013/14 (gov.uk statistics), a shortfall of 127,400 against annualised need figures. No segment target was met. Market housing accounted for 62% rather than the 50% share suggested by Shelter's needs analysis

Supply and Demand

The UK is simply not producing enough new housing, either in number or tenure type, to meet the demands of a growing and ageing population.

Current outputs are broadly half of what is needed to keep up with household formation and demographic and migration challenges.

Filling the deficit of under-production is going to take some effort; however this is hindered by:

- Skills Shortage
- Perceived difficulties around planning
- Shortage of suitable land supply

Housing & Planning Act 2016

Introduced 13th October 2015 - became law 12th May 2016

.....will give housebuilders and decision-makers the tools and confidence to provide more homes and further streamline the planning system to accelerate their delivery.

..... will increase housing supply alongside home ownership building on the biggest affordable house building program since the 1970s

.....will unlock brownfield land to provide homes faster, requiring local authorities to prepare, maintain and publish local registers of specified land

.....will reform the compulsory purchase process to make it clearer, fairer and faster

.....will simplify and speed up neighbourhood planning

.....will get the nation building homes faster!!

Brownfield First

10th March 2016: “*Pioneering councils are to help lead the way in bringing forward derelict and underused land for new homes*”:

- Cherwell
- County Durham
- Huntingdonshire
- Leeds
- **Liverpool**
- **Manchester**
- Medway
- Newcastle upon Tyne
- Peterborough
- Selby
- Sheffield
- South Cambridgeshire
- Sunderland
- Tonbridge and Malling
- **Wigan**

Brownfield Registers = Planning in Principle

Government Vision - Yesterday

"We need to keep the lid on day-to-day spending, we need to make government more streamlined and efficient but I do think there is a case that we should look very carefully for targeted, high-value investment in our economic infrastructure."

- £2bn to support the "Accelerated Construction" scheme, which aims to get houses built on **publicly-owned "brownfield" land** available for swift development.
- £3bn Home Building Fund to provide loans to stimulate projects, which the government said would build more than **25,000 homes by 2020**, with a long-term goal to build more than 200,000.
- Cash will encourage new developers to build up to **15,000 homes** in this Parliament.

Mr Javid announced the "largest state-backed" housing programme since the 1970s - We will publish a housing white paper later this year with further significant measures all helping us towards our ambitions of **a million new homes by 2020**.



Is this enough?

Tackling Brownfield Development

Pitfalls...the usual suspects

Contaminated Soils

Contaminated Groundwater

- Risk Management
- Waste Management
- Geotechnical Constraints

Landfill and Gas Emissions

Soft/compressible ground (peat, alluvium, etc)

Mining legacy

Asbestos

Japanese Knotweed (and others)

Colonisation

Waste Soils Disposal or Soils Re-use

Any one or all of these could affect previously developed land

The solutions need to take a holistic approach to be cost effective

Costs via risk management and programme delays

How “Brown” is Brown?

Heavy Industry Site?

....but they only manufactured toothpaste and all raw products were pretty much benign.



- Small legacy landfill area – proved to be OK
- Tallow works investigated - again no issues
- Soils assessed for future waste disposal and all Non-Hazardous.

Well scoped site investigation

How “Brown” is Brown?

Innocent looking car-park?



Could be a case of:

- Reusable scalplings
- Layer of reusable MOT Type 1
- Shallow bedrock good for foundations, and a
- Large volume discharge consent

...or:

- Buried fuel storage tanks
- In a groundwater protection zone
- Thick compressible alluvium, in a
- Flood zone

Site Specific and Development Specific

How “Brown” is Brown?

Public Open Space?



- Nob End
- Galigu Tip
- Geotechnically Poor
- High metal concentrations
- All waste would be “hazardous”
- SSSI status because of waste

Undevelopable?

When Brown is really Black

Circa 1995, ICI established "project pathway" to investigate the legacy of more than 160 years of industrial activity in and around its Runcorn site.

Parliamentary Debate from 13th June 2000:

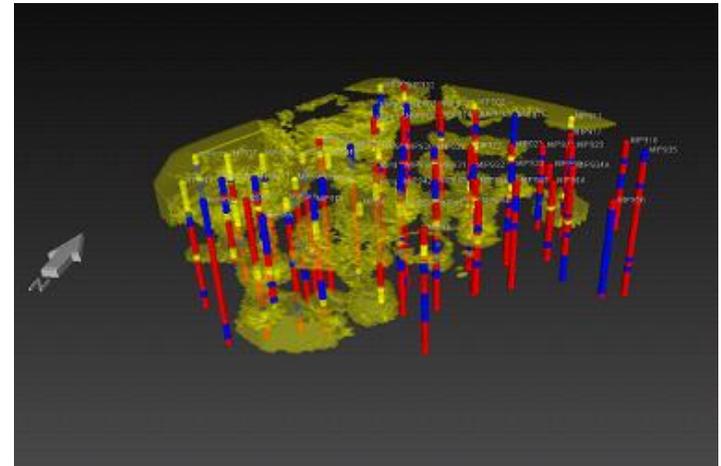
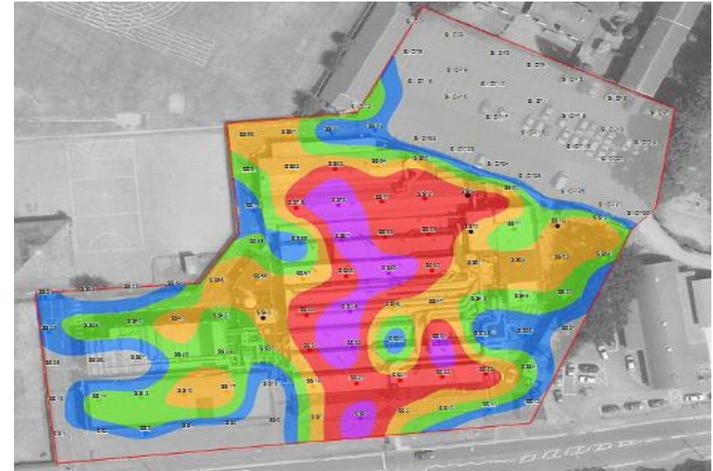
*“....The Environment Agency's rules are designed for brownfield sites surrounded by greenfield sites, but Halton has **blackfield** sites surrounded by **blackfield** sites.”*

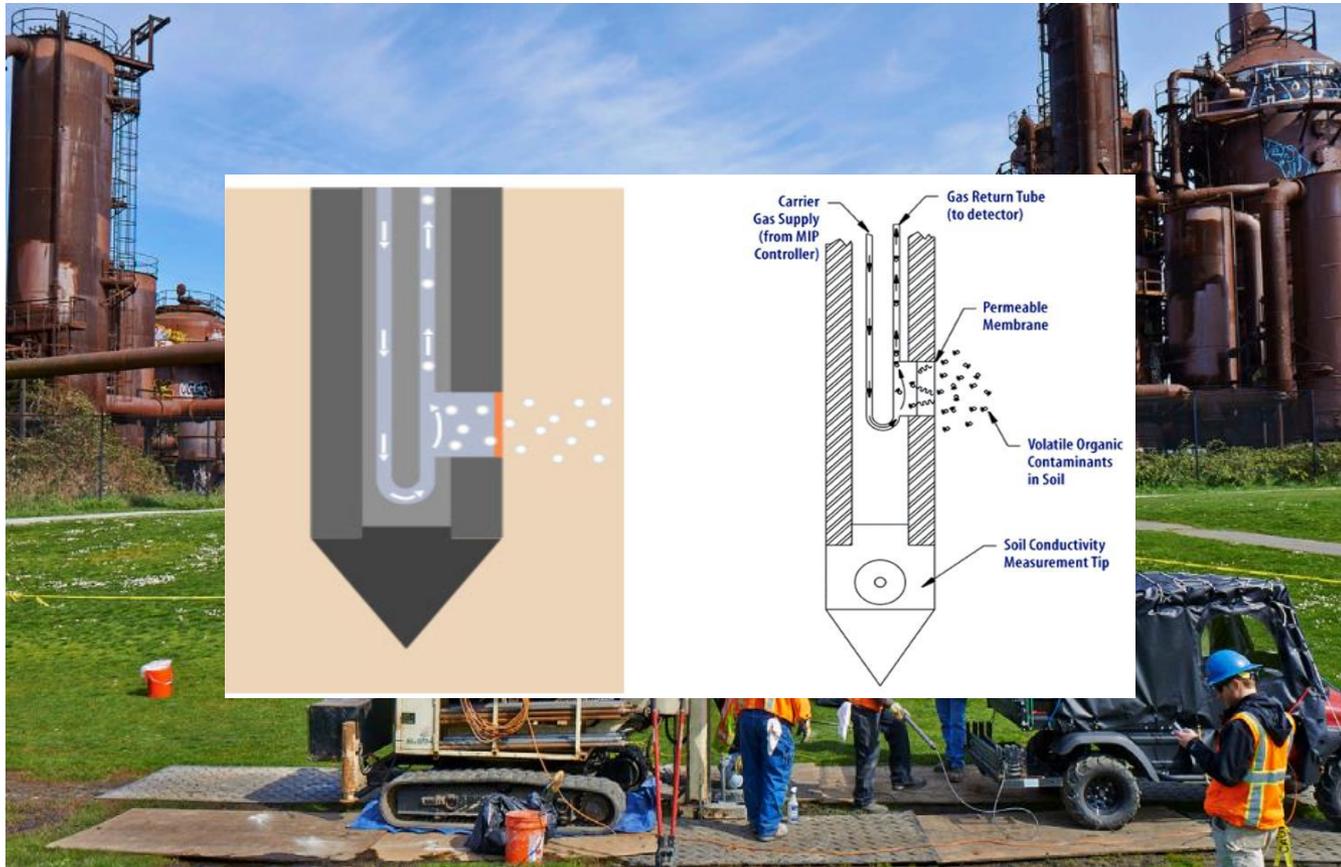
*“.....some brownfield sites are not suitable for development—they are, in effect, **blackfield** sites, on which houses should never be built.”*

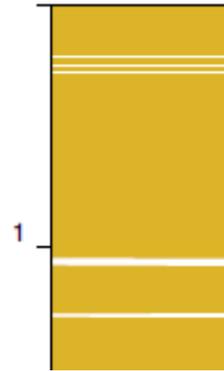
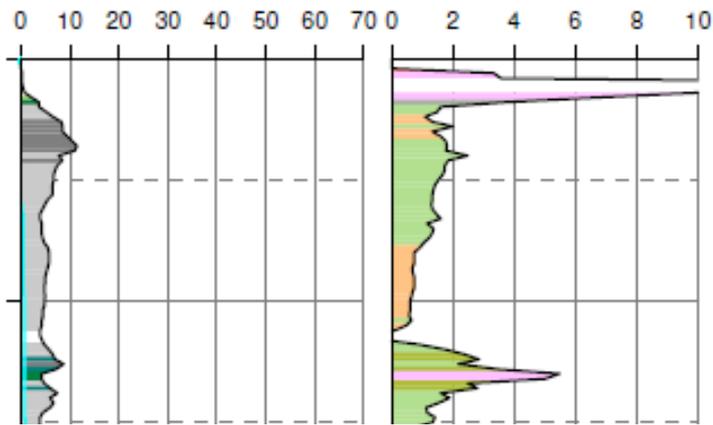
Technological Facilitators

High Resolution Site Investigation

- Arcadis operates 3 Geoprobes
- Membrane Interface Probe (MIP)
- Laser Induced Fluorescence (LIF)
- In-situ testing that gives real-time results:
 - Steers the investigation on-site
 - Reduces the effects of “smear”
 - Radically reduces volume estimates.







Case Study

Bitumen Site Investigation: LIF using TarGOST

The use of the TarGOST technology helped to collect **10x the data in a third of the time**, in comparison to traditional technologies.

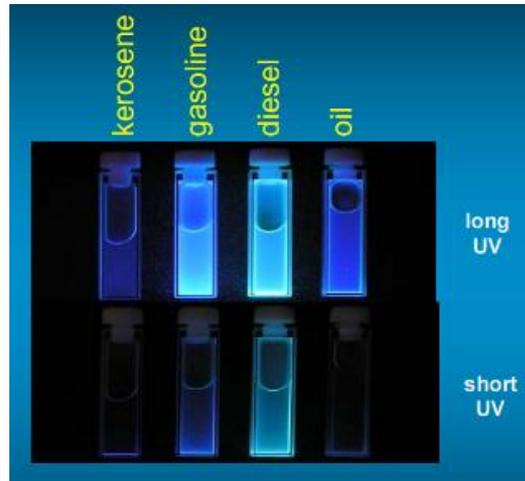
Greater resolution at lower cost.

The perceived extent of the contaminant plume was reduced such that the assessment of risk was down-graded and operations could continue.



Bespoke, Award Winning Remediation

- Contaminant Specific
- Environment Specific
- End-use Specific
- Results driven

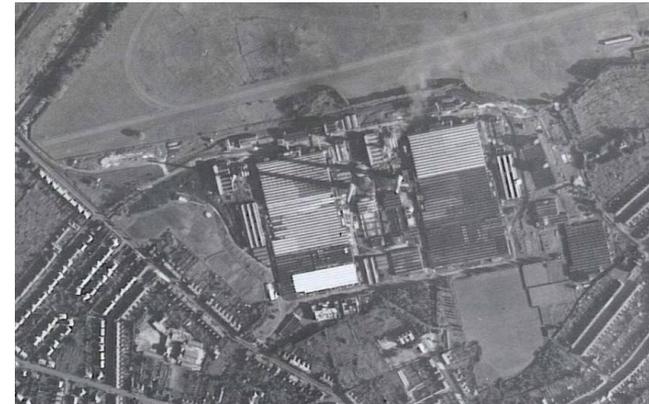


Case Study

Housing Estate, Wolverhampton

- Housing estate built on former chemical works site
- Not appropriately remediated prior to construction – tanks and chemicals left *in situ*
- Remediation solution before ARCADIS – demolish houses, stabilise soils and dig and dump with estimated cost of **>£20M**
- ARCADIS approach – *in situ* remediation
- But – contaminant Carbon Disulphide (CS₂)
 - CS₂ is a volatile flammable liquid which has a wider explosive range in air than hydrogen.
 - Therefore, CS₂ compound poses multiple technical difficulties for *in situ* remediation

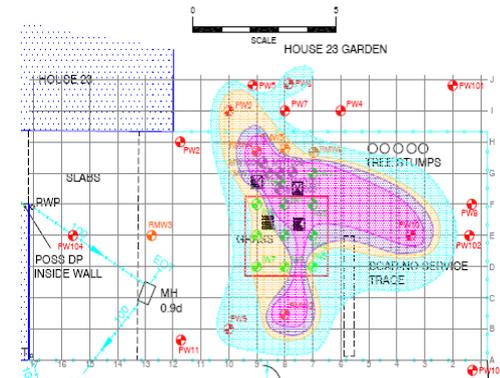
ARCADIS developed a **completely novel** remedial approach for destruction of CS₂ using *in situ* chemical oxidation with **activated persulfate**



Case Study

Housing Estate, Wolverhampton

- Laboratory treatability and feasibility studies
 - No prior academic research
 - Determined whether S_2O_8 can degrade CS_2
 - Identify Appropriate Activator
 - CS_2 destruction with no measureable off-gas or temperature increase
- High resolution source delineation - Novel high sensitivity MIP with flame photometric detector (FPD) for CS_2
- Field Trials undertaken – proof of concept
- Novel application approaches developed including:
 - Field test kits developed to measure oxidant concentrations
 - Soil mixing technology under vacuum
 - Use of dry ice to create ‘inert atmospheres during mixing’
- Full scale remediation delivered under fixed price contract – cost certainty
- Stakeholder engagement key throughout process



Case Study

Housing Estate, Wolverhampton

- Groundwater CS₂ concentrations decreased from a maximum of 13,000µg/l, prior to remediation, to a maximum of 12µg/l following remediation
- Concentrations of CS₂ in soil reduced from max. >400 mg/kg to <10 mg/kg with one application of activated persulfate
- Mean soil concentration reduction (at the 95% confidence limit) from 4.9mg/kg and 2.3mg/kg, for the two remediation areas of the site, to 0.64mg/kg and 0.082mg/kg following remediation.
- Full closure obtained with all stakeholders
- Approximate saving to client **£14M**
- *Implementation of more cost effective, sustainable in situ*, remediation approach: reduction of impacted material disposed to landfill.
- Delivered with cost certainty.



Close - What's next?

Is More Greenfield Development Inevitable?

Brownfield focus is here to stay – at least for now.

The contaminated land issue isn't necessarily a showstopper.

There are more approaches and methods to enable cost-effective brownfield regen than ever before.....keep an open mind.

.....but is all this “immediate” brownfield focus just to allow a greenbelt review that won't lose votes?

Is greenbelt development that much better....?

- Greenfield still needs to drain – flooding risk will only become greater.
- Ecological mitigation will likely be greater – loss of habitats a significant issue.
- More extensive infrastructure requirements – wider needs for remote sites.

Try a different approach

**Thank you for
listening....**

**...and any
questions?**



www.arcadis.com