# Creating value through sustainable remediation of tar lagoons at Grassmoor Country Park, Chesterfield, UK

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# Objective and contents

Provide an insight into how sustainable remediation adds value and some of the challenges we faced during the transitory land uses


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- added value of remediation

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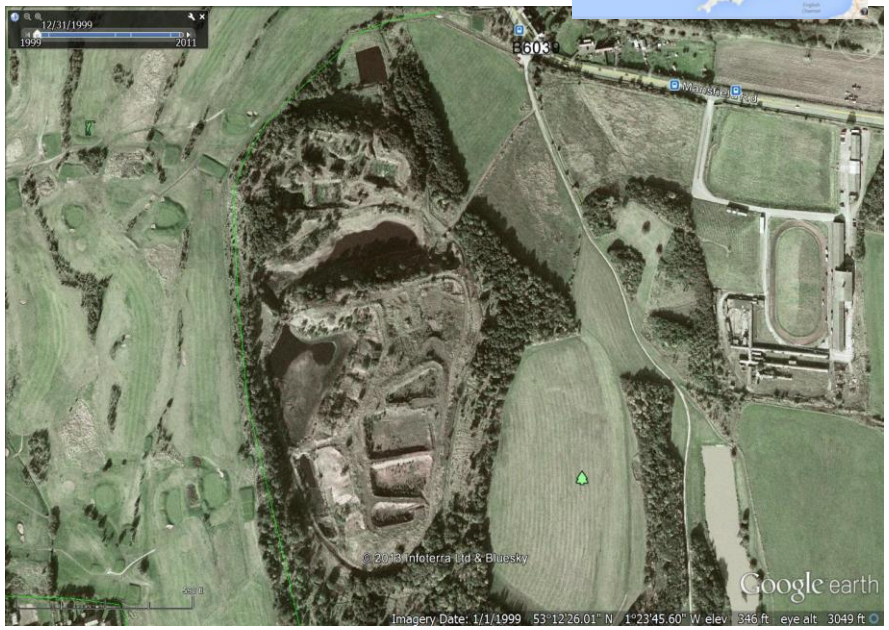
- what we did
- challenges of wetland construction

Concluding remarks



# Project overview

## Transitory land use

## Value of remediation

# From this……..


Open land in 1800s

Grassmoor colliery 1840s to 1967

# Then effluent treatment……..

Comprised 15 tar lagoons over 14 Ha formed within former colliery spoil tips

Lagoons treated effluent from the Avenue Coking Works before discharge to Grassmoor Brook

# To this…….derelict with colonisation

# From mid 1990s……hope!

In 1993, Derbyshire County Council commenced site management, started pumping the effluent to foul sewer and had a vision to return the land for the benefit and enjoyment of the community

Client objectives in 2007 bid:

- remove the acute risk posed by the lagoons to trespassers
- robust, affordable solution for treating estimated 50,000m$^3$ tar for £5 million including planning, EIA, remediation and verification
- avoid the economic cost associated with pumping discharge to foul sewer
- use risk-based remediation to maximise re-use of material

# Project award

A joint statement from Councillor Baxter and NEDDC Councillor Betty Hill, who was also Chair of the parish council said: "*We are delighted that at long last the government has agreed to do something about reclaiming the lagoons at Grassmoor which are in the middle of a country park*.

"*Both the District and the Parish Councils have campaigned together to have this work carried out since the Avenue Coking Plant closed 12 years ago*.

"*The lagoons are highly contaminated with toxins from the former Avenue Coking Plant. In wet weather the lagoons give off a vapour which causes a stinging sensation to eyes and throats. There is also the danger of children playing near the lagoons which are sometimes covered in a thin crust*."

# 2009 ..... short term + and - impact

2007 – 2009 remediation procurement & additional site characterisation

Stakeholder engagement

By 2009, colonization of the area by fauna and flora had commenced

Badgers and reptiles relocated to facilitate remediation

Short term employment

Bioremediation commenced

Public car park re-located which they love so much they want it kept!

2017, lagoon area due to open

# And now ....social and environmental benefits

# Clearly, there were some challenges!

| Challenge | Solution |
|---|---|
| 10-15 years of data in paper format | Excel spreadsheet and typing! |
| Would the regulators accept bioaccessibility testing? | Justification and convenient timing of CL:AIRE publication! |
| Could risk-based targets be met through bioremediation? | Detailed bench scale trials and field trials |
| Regulatory acceptability for controlled waters assessment | Additional pathway conceptualisation and verification |
| Alternative remedial options such as thermal desorption at the Avenue | Detailed options appraisal and sustainability assessment |
| Obtaining planning permission that led to a 1 year delay | Stakeholder engagement |
| Funding and real life application - various technical challenges | Well informed project team & stakeholder engagement |

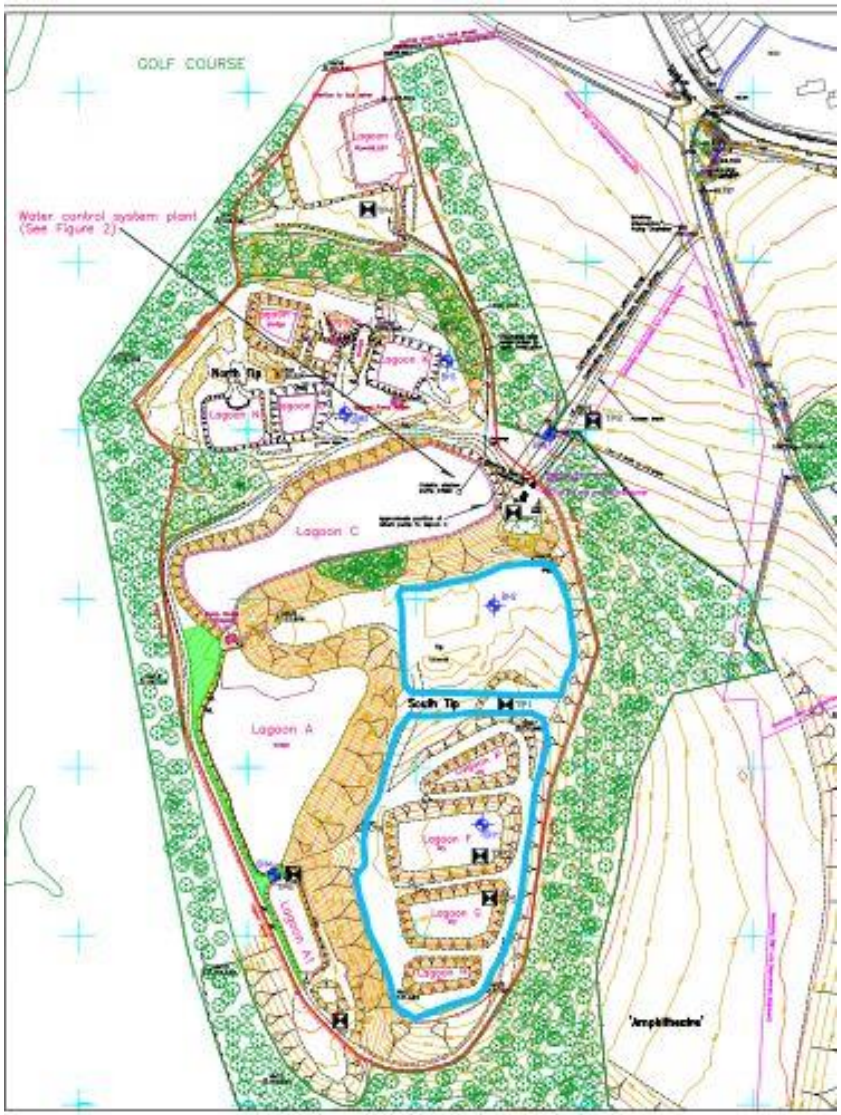
# Sustainable approach for long term management of surface water run off and groundwater seepage

# Lagoon L



- Historically a balancing pond for site water runoff
- Original scope of works was to backfill Lagoon L
- Client was keen to retain a wetland
- Hence, work commenced but 500m$^3$ tarry sludge was found
- Programme and scope of works extended to treat the sludge

# Landform pre-remediation

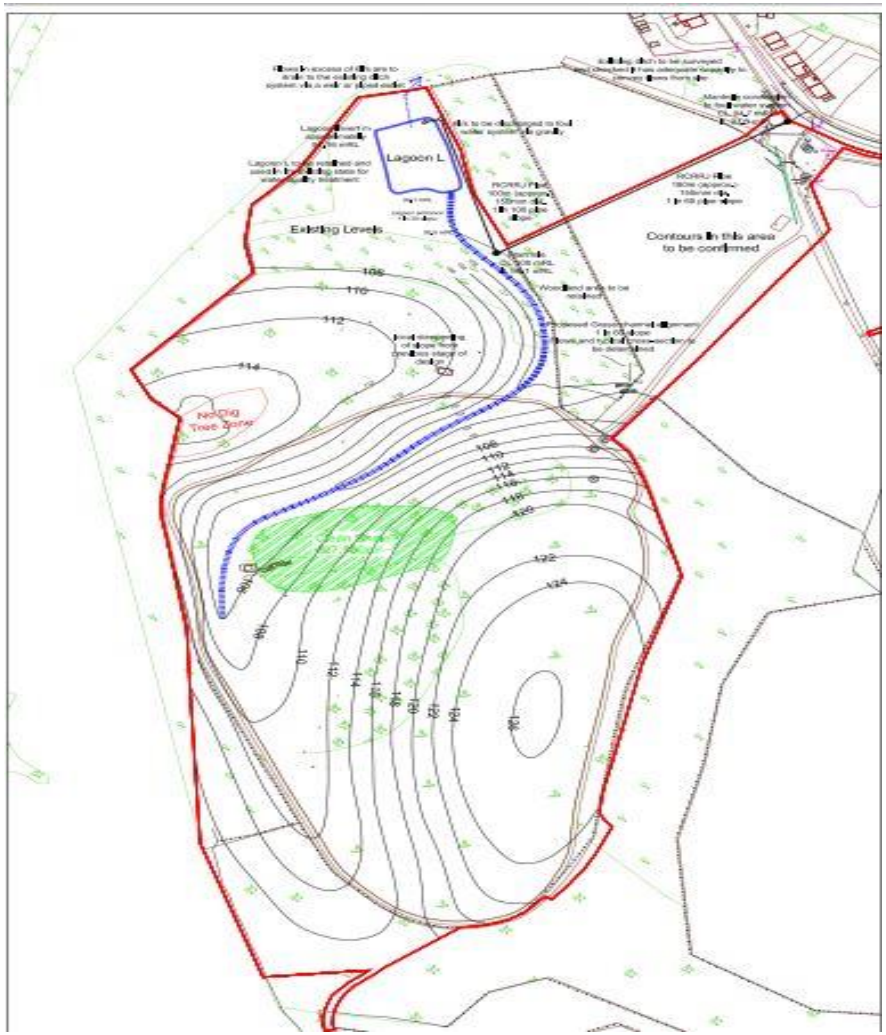



15 lagoons

Required active dewatering of lagoons via return pump

Lagoon L used as balancing pond before discharge to foul sewer under license

# New landform




Final landform to fit in with initial valley feature and surrounding landscape

Creation of 2 mounds with valley for carrying surface water

Resulted in creating natural discharge point for groundwater at Lagoon L

In order to alleviate active treatment a solution was sought to treat groundwater that issues via reed beds

# Groundwater issuing

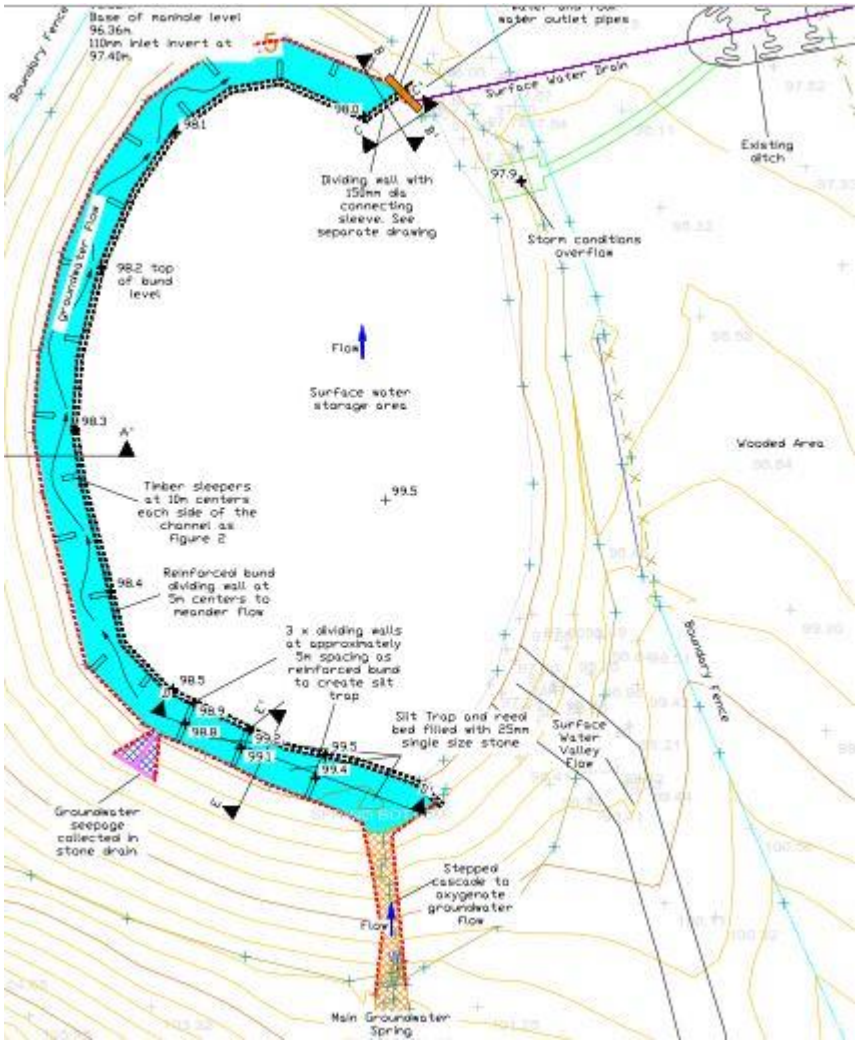
Post remediation of Lagoon L a spring of groundwater occurred at the edge

Iron rich with ammonium

To separate surface water and groundwater a design change was proposed

Created a separate channel for the groundwater and constructed reed beds for passive treatment

# Design – plan view




Reed bed channel diverts ochreous water around the perimeter of the wetland through a series of reed beds

Anticipate reed bed will reduce iron and ammonia

Monitoring currently underway

To aid aeration, a fall was engineered to reduce ammonia concentrations

Both water bodies discharge to foul sewer

Ultimate aim is to discharge to Grassmoor Brook

# Site and reed bed

# Concluding remarks

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Value added:

- removed acute hazard
- benefits that occur from the open space
- residents happy that the odour is removed and visitors have a better car park
- wild flower meadow attracting bees and butterflies
- reed bed establishment will avoid foul water discharge

http://www.grassmoorlagoons.info/index.html

Finally, we'd like to pose some questions:

1. How can we learn from past land use?
2. None of us have a crystal ball. Who knows what this land might be used for in the future? Can we make our developments more flexible?
3. How do we learn intelligently from each other?


RSK