



The Coal
Authority

Resolving the impacts of mining



The Coal
Authority

Sustainability report

2016-17

Foreword

2016-17

Foreword



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Since joining the board in April 2017, I've been overwhelmed by the passion and commitment of our people in seeking to improve the environment and the natural capital in the areas in which we work while protecting the safety of the public, our colleagues and those who work with us.

Managing the legacy of mining and resolving its impacts is an important issue and doing so sustainably is critical to our success. Our sustainability framework focusses on the areas that are important to us, our stakeholders and to society as a whole.

This year we've made good strides in meeting the goals we set ourselves in 2016, which were to:

- establish a base level for our key sustainability measures to drive a culture of continual improvement
- improve efficiency and generate income through being innovative and researching solutions to make our organisation more sustainable

- continue to develop our culture so that the responsibility for protecting the safety and wellbeing of our people, customers, stakeholders and the public is shared by everyone in our organisation

Significant progress has been made this year with our innovation and research and development programmes which all support our overall goals and I'm looking forward to building on the success this coming year.

Steve Wilson

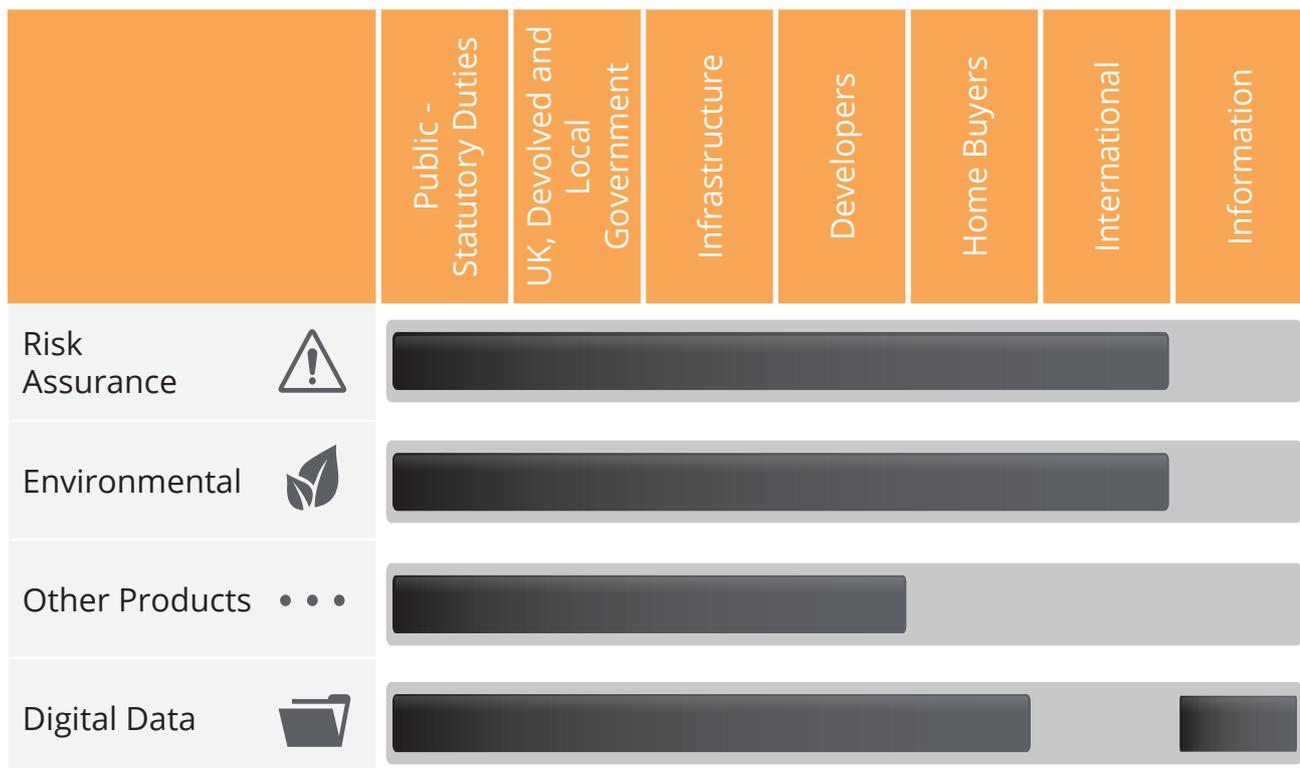
Chair of Safety, Health and Environment (SHE) Committee

About us

2016-17

What we do

Our services help protect the public and the environment in mining areas and are delivered across a wide range of our chosen market sectors.



Risk assurance

- operate a 24-hour emergency help line which responds to all incidents relating to coal mining and repair properties that have been damaged by coal mining subsidence
- inspect and maintain coal mines entries and waste tips to make sure they remain safe and secure

Environmental

- operate a mine water treatment programme to help to clean up or safeguard our rivers and coastal waters from the effects of coal and metal mine water
- support flood risk management in areas affected by historic coal mining



Other environmental products

- extract the heat and the ferric oxyhydroxide (ochre) from the mine water for beneficial use by our customers
- our grid access connection is also a valuable asset for energy generation and load balancing which will deliver income for renewable grid customers

Digital data

- manage our coal mining data sets to enable other organisations, under license, to use the data
- our interactive map viewer allows anyone to view selected coal mining information on a smart phone or tablet. Last year we had 2.5 million hits

Why we do it

The UK's long history of coal mining has resulted in a legacy of public safety risks and environmental pollution.

This impacts directly on our physical environment and the public and represents a significant liability to the public finances, with over £3 billion for coal mining and a significant amount more for other forms of mining.

The Coal Authority



Environment

mine water pollution adversely affects biodiversity and availability of water for beneficial use



Health and safety

ground collapses, gas and water emissions create risks to the public



People and economy

mining dereliction and water pollution lead to loss of amenity and recreation, reduce wellbeing and present significant cost to the economy

For the above reasons, it's vital that in carrying out our work we do so sustainably.

This year's highlights

September 2016

made our first sale of ochre to a large re-development site to enable them to treat contaminated soil. This enabled the developer to reuse the soil on site, avoiding landfill. As well as saving significant time and cost, it provided a far more sustainable solution

October 2016

installed frequency responses at a couple of our sites enabling the electricity to be turned off at peak demand times to help generating companies to improve energy efficiently

December 2016

achieved electricity savings of up to 1.9GWh by constructing a passive mine water scheme that doesn't require electricity to operate. This will significant reduce overall costs and save up to 800 tCO₂e per year

February 2017

launched our preplanning advice and coal mining risk assessment service. These provide expert advice to house holders and developers so they better understand and manage mining risk on their developments, reducing the safety risks to construction personnel and future occupiers

March 2017

installed 324 KW of solar generation at 2 of our sites which will help government meet its targets and reduce reliance on power generation from fossil fuels

March 2017

achieved level 2 of the Department for Environment, Food and Rural Affairs (Defra) flexible framework for sustainable procurement

March 2017

supported the Environment Agency's Environment and Business, Land and Contamination Management team to win the prestigious Better Place Award. The award recognises the contribution made to the local environment and communities in treating pollution from the Saltburn Gill abandoned ironstone mine

Our
performance

2016-17

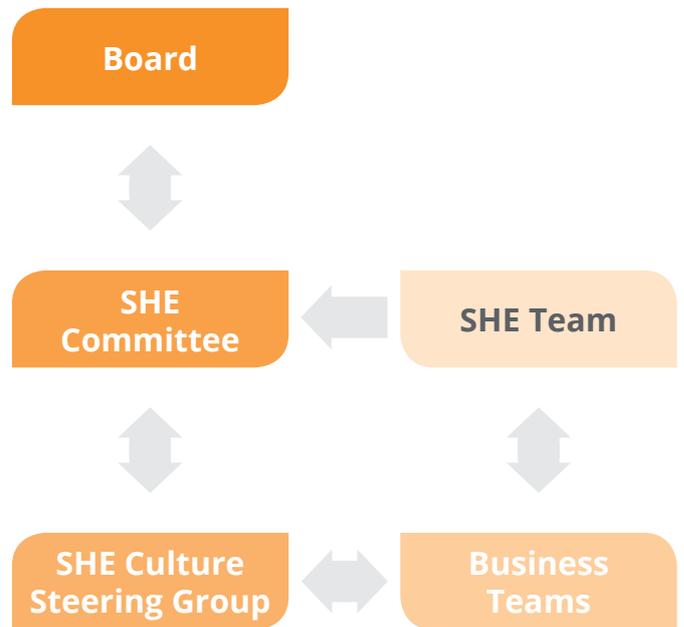
Sustainability Governance

Governance

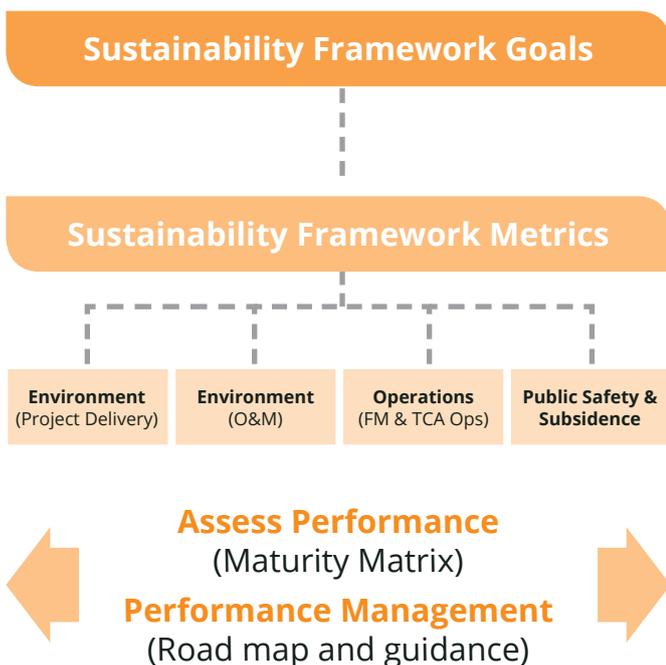
Our board delegates responsibility for the development and delivery of our sustainability goals to the SHE Committee, which is chaired by a non-executive director and is attended by the chief executive and members of the senior management team.

The committee provides strategic direction and is supported by the SHE Culture Group. The group includes representatives from across the business and is responsible for supporting the delivery of our sustainability goals, including health and safety, environmental and social issues.

To support the collation of metrics and drive performance improvements we have also developed a database that captures all the key data that underpins our sustainability goals.



Our mine water programme is an important sustainability area so in addition to our committee and culture group we also have a sustainability working group under our Confluence contract. This working party brings together the main delivery partners and innovation team and ensures a co-ordinated approach to enable our sustainability goals to be delivered.



Systems

We operate an integrated health and safety and environmental management system (SHE) which is continually reviewed and updated to reflect changes in the organisation and the work we do.

Review of the year

Health and safety

Occupational health and safety

The health and safety of those that work for us, both employees and contractors, is of paramount importance and our goal is to prevent harm and maintain wellbeing.

Our strategy is to adopt a proactive approach. We want to understand the risks that could lead to accidents or health issues and take positive actions to manage them.

This relies on having robust management arrangements and a culture where we all look out for each other. Our recent objectives have been to simplify our procedures, invest in training and develop a positive health and safety culture.

During the year, we've:

- further developed our quarterly staff newsletter

- completed a series of workshops attended by all employees on the theme of role models with the aim of everyone being a role model when it comes to health and safety
- run our annual wellbeing event, which included a number of activities aimed at keeping it at the forefront of everyone's mind
- continued to support the EU Healthy Workplaces Campaign by having a week dedicated to supporting the current theme, healthy workplaces for all ages

The health and safety culture of the organisation has also improved. In a recent survey our employees, based on the Bradley Curve, rated us between independent and interdependent.



Public safety

It has been a challenging year in which we've dealt with a number of major coal mining subsidence events that have impacted a large number of properties.

Our experts have worked tirelessly to ensure that public safety is maintained and to minimise the impact of the works on the public and local communities.

Sustainable working - All angles

When we were alerted to an occurrence of widespread coal mining subsidence affecting numerous properties at a housing estate in north east, we were mindful that as well as protecting public safety, we needed to consider all angles in order to deal with it sustainably.

In addition to ensuring the works were carried out safely, we implemented a number of measures to deliver a sustainable outcome, including:

- engaging the local community to keep them fully involved of progress and worked closely with individuals to consider their specific needs
- undertaking work in a way that minimised disruption by carefully designing the layout of site offices and sequencing activities so they would be completed as quickly as possible
- taking steps to reuse and recycle as much of the waste materials generated as part of the works
- employing local contractors, focusing on small to medium enterprises (SMEs) to maximise support for the local economy



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By working closing with our framework contractors, our experts are able to adopt a sustainable approach at the start of any project

Kirsten Marsh
Regional Project Manager

Dealing with complex works - Inventive

Following the report of a substantial ground collapse on a busy highway at Clydebank, north east of Glasgow, we made it safe and then our experts began to investigate the cause.

Using specialist laser scanning techniques we were able to quickly establish that the cause was a 56 metre deep unrecorded coal mine shaft. The collapse had created a very large void below the highway.

To further complicate matters, the collapse had disturbed a number of highway utility services including high voltage power cables, sewer and surface water drains which would need to be protected whilst work was completed. Work also required careful coordination with stakeholders including the local authority and utility companies.

The shaft was filled with 140 tonnes of stone and injected with 217 tonnes of pressurised grout before a reinforced cap was constructed.

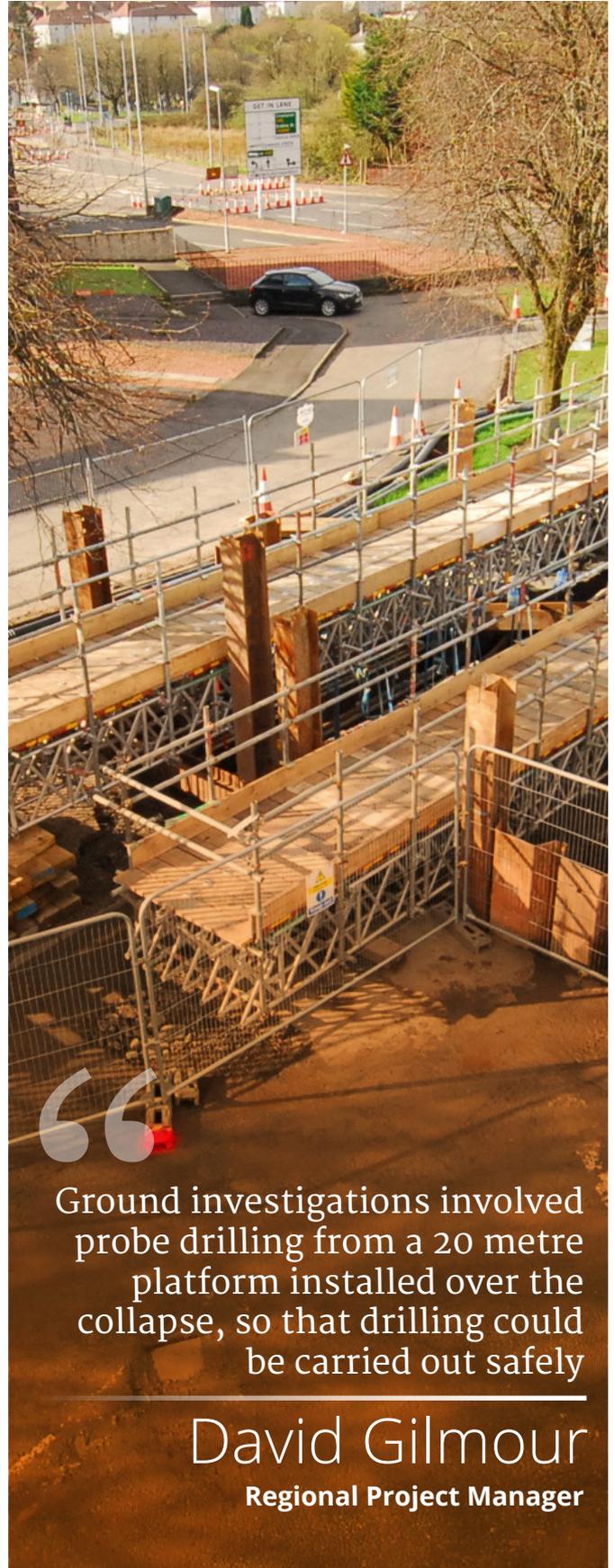
This year has also seen us provide our expertise to a wider range of customers, helping them to manage difficult and complex issues safely.

140 tonnes

of stone used to fill the shaft

217 tonnes

of pressurised grout injected



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Ground investigations involved probe drilling from a 20 metre platform installed over the collapse, so that drilling could be carried out safely

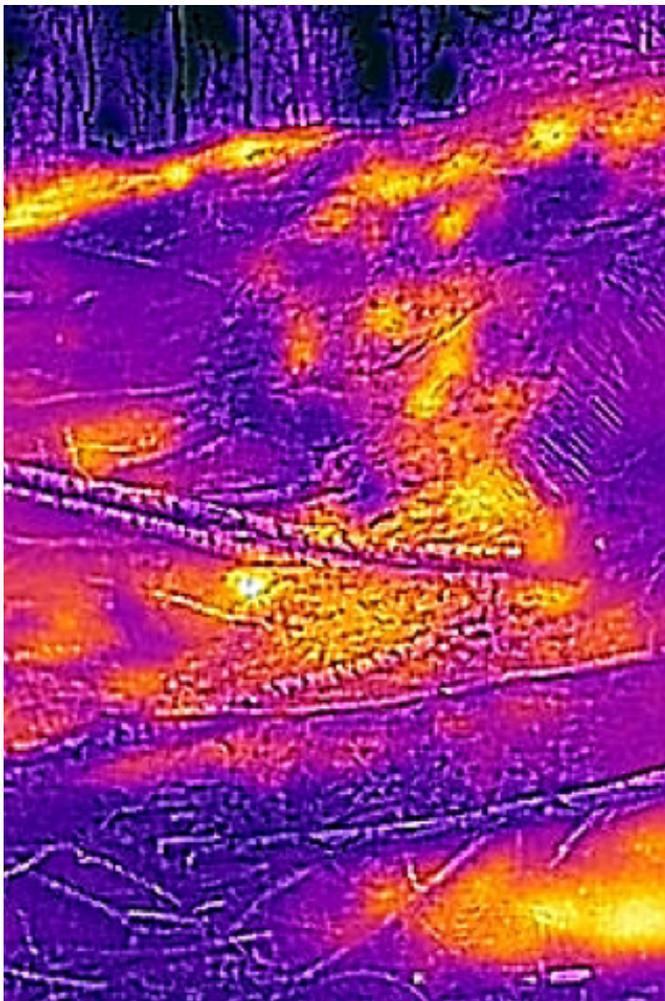
David Gilmour
Regional Project Manager

Overheating coal tip - Agile

We were approached by Midlothian Council about a burning tip (known in Scotland as a bing). The coal tip had begun to overheat and posed a significant risk to the local community and adjacent infrastructure.

Using heat seeking equipment to identify the extent of the fire, our experts worked with contractors to develop a safe way to dig out the fire and extinguish the burning material. The work required careful management of the risk posed, particularly from smoke, to nearby residents and the main highway and railway line adjacent to the site.

Once extinguished the tip was sealed with clay to prevent any future outbreak and the vegetation removed to facilitate work, was used to restore the site sustainably.



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This was a real success story. Midlothian Council were extremely pleased with our approach to the work and the outcome

Eric Burgess

Principal Project Manager -
Commercial Delivery

Environment

We have continued to mitigate the impacts of coal and metal mine water pollution through the operation of our mine water treatment programme. The programme provides a vital contribution to help the UK meet its Water Framework Directive obligations.

The year has focussed on the development of future schemes and the innovation and R&D programmes and includes the new coal scheme at Kimblesworth in County Durham and a scheme extension at our site in Strafford in Yorkshire. We have also expanded the work we do for Defra on the metal mine programme.

Following the installation of solar panels at our Dawdon scheme near Sunderland last year, panels have been installed at Chester South Moor pumping station and Deerplay mine water treatment scheme. This brings our renewable generation capacity to 372kW saving in excess of 200 tCO₂e per year.

Work on the coal mine water treatment programme has provided significant quality improvements over many years. The metal mine water programme is still relatively new, but we're already starting to see the benefits.

Water quality improvement - Expert

Force Crag in Cumbria is Europe's first zero chemical, zero power mine water treatment scheme and began operating in 2014. Two locations (Bassenthwaite Lake and Newlands Beck) have been monitored by the Environment Agency and are beginning to show the benefits to surrounding rivers.

Under the Water Framework Directive, UK waters are required to reach good ecological status by 2027. The status is defined by comparing against the Environmental Quality Standard (EQS) for the various pollutants that exist.

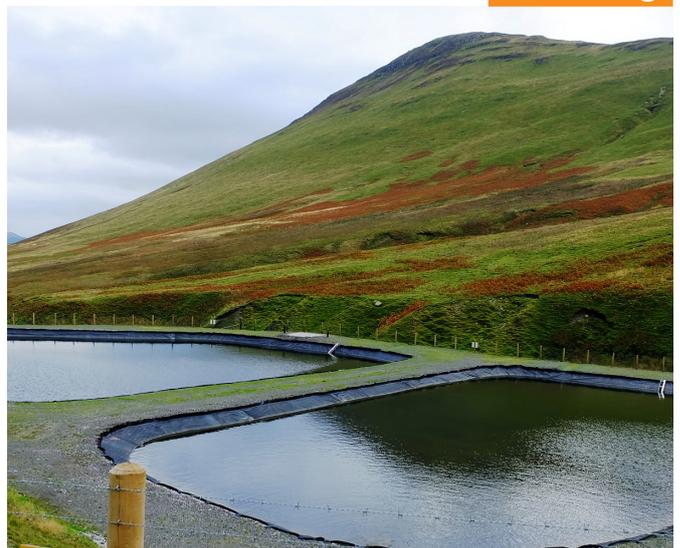
Strafford



Kimblesworth



Force Crag



Comparing the concentration of metal pollutants before and after the scheme began operating, has shown that the EQS has now been achieved at Bassenthwaite Lake and concentrations have reduced by more than 50% at Newlands Beck.

Further monitoring continues with the expectation that further quality improvements will be achieved over the next few years.

Focus on innovation

We have continued to work hard in delivering our innovation strategy and have made excellent progress in developing opportunities for the utilisation of water, heat and ochre for beneficial use. In addition to making our first ochre sale, markets for our treated mine water and its inherent heat potential have been identified and are being pursued.

These all contribute to maximising the sustainability of our mine water programme. In addition to beneficial utilisation of resources, we consider resource efficiency in all that we do.

Re-use of river sediment

Many rivers are impacted by heavy metals, mainly cadmium, lead and zinc from historic mine workings and abandoned metal mines that accumulate in sediment, especially behind weirs and other structures.

Once such river is Nenthead in Cumbria. In taking steps to remove the metal pollution, we identified that most of it was contained in the finer particles within the sediment and so by screening it, were able to reduce the amount requiring landfill by 75%. The remaining coarser material was used on site for bank stabilisation and as sub-base in other projects.

The benefits of this project were that it:

- cut costs by 60%, making the removal of sediment a viable remediation option

- reduced the need to import new material other projects such as flood defence
- minimised haulage and transport
- reduced waste to landfill
- removed metal loading to the river and downstream watercourses

This sustainable approach will help maximise our support for the Environment Agency's River Basin Management Plans.

Waste characterisation

We've been working to identify sustainable, low impact treatment for metal contaminated mine water to improve water quality. Current treatment uses a lined vertical flow pond (VFP) containing a bio-bed consisting of compost, wood chippings and limestone underdrain to remove zinc. Eventually the bio-bed will need to be replaced requiring the existing material to be disposed of appropriately as hazardous waste.

Using a new extraction technique, which makes it easier to identify the type of zinc, we were able to ascertain that most of it (85%) was in a form that could be very concentrated before it became classified as hazardous. This knowledge will help us on existing and future schemes to minimise the disposal of used bio-bed, meaning less material is used, less waste is landfilled, making it more sustainable.

Focus on Research and Development (R&D)

We have a strong focus on R&D, which is closely aligned to our innovation programme. Together these programmes underpin our future work and will ensure we continue to deliver in the most efficient way possible.

A number of R&D projects have been undertaken, looking at a diverse range of subjects related to our delivery:

Improving tip flood resilience

Weather and flow monitoring stations installed on tip sites in South Wales have provided vital data on rainfall, site water flows and groundwater levels to produce an accurate picture of the impact of significant rainfall. This has demonstrated that flood management infrastructures performing well on existing sites and will help us with flood risk modelling at other sites in future.

Assessing the impacts on metal bioavailability

The University of Durham have researched the impact of our mine water treatment schemes on metal bioavailability in receiving water courses. Dissolved organic carbon directly affects bioavailability and so the University tested the levels at 35 of our schemes. The results will help us improve our understanding of the environmental impact of our schemes on receiving water courses and catchments and potential impacts of new schemes. This work will support continual improvement in environmental monitoring and ensure we can meet future environmental standards.

Environmental impact of sea outfalls

Working with the University of Hull's Institute of Estuarine and Coastal Studies, we have monitored coastal discharges of mine water in central Scotland. The study has investigated the impact on the water quality and sea life around the discharge point.

The results are helping us to assess the suitability of their future use as part of our strategy to manage mine water in coastal areas and will help us in planning future schemes.

Assessing innovative treatment technologies

We are investigating a range of low footprint, low electricity use water treatment technologies to allow us to treat mine water in areas where land availability is limited or use for electricity for treatment is not cost effective.

These include the use of:

- a high speed turbine for precipitating ochre more rapidly
- high surface area media to precipitate ochre over a smaller area

The aim of these studies is to demonstrate the treatment performance of these systems on a small scale and identify any issues for further full scale trials.

Co-treatment of mine water and waste water

We're currently investigating the potential to co-treat mine water and waste water in municipal treatment works. Iron in mine water has the potential to reduce the phosphate levels in treated waste water. Phosphates levels are a known issue in many water catchments and co-treatment offers the potential to reduce the overall costs and footprint of treatment whilst creating additional environmental benefits through phosphate reduction.

The aim of our current study is to investigate the ability of various mine waters to reduce phosphate levels in waste water. This will help us in determining the viability of co-treatment with a view to undertaking pilot trials if initial testing is successful.

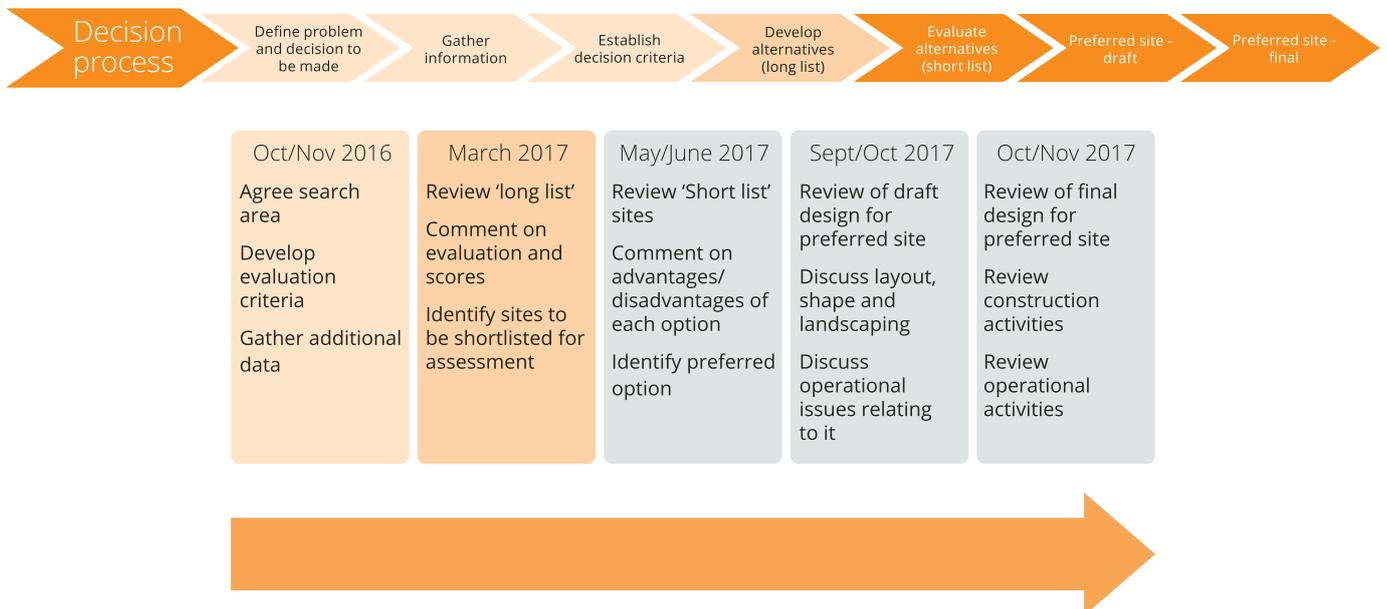
People and Economy

As an organisation, we're committed to engaging with local communities whenever we're considering environmental improvements or undertaking emergency or subsidence works in their local area. We have further improved how we work with communities to keep them informed and engaged about projects that affect them.

An example of this approach is our recent work on the potential treatment site in the Nenthead area in Cumbria. Our team, which includes staff from the Environment Agency and stakeholder engagement consultants Wilson Sherriff, have consulted closely with the community on all aspects of the project through holding local events, meeting directly with local interest groups and close liaison with local councillors.

We have adopted this approach as best practice and will be training all of our teams working on similar projects to follow this method as well as fostering this approach with all of our partners.

It is expected that this community-first approach will lead to better engagement and over time, reduce costs by gaining the support of the local community at an early stage.



In addition, the increase in reporting of good practice and by contractors is further evidence that our SHE culture is maturing.

The benefits of this are shown clearly in the bird triangle, which indicates that as the number of unsafe practices and conditions has increased the number and severity of accidents has decreased.

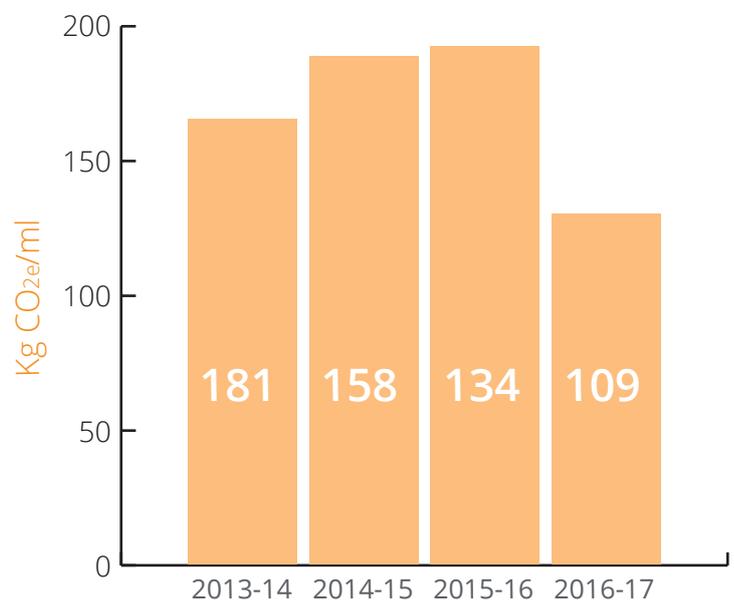


Environment

Greenhouse gas emissions (GHG)		2013/14	2014/15	2015/16	2016/17
Non-financial indicators (tCO _{2e})	Scope 1	91	107	82	122
	Scope 2	14,277	13,918	15,155	10,458
	Scope 3	43	33	44	49
	Total	14,411	14,058	15,281	10,692
	Emissions per FTE (tonnes)	104	87	88	55
Financial Indicators (£)	CRC Gross Expenditure	c £205,000	c £219,000	c £245,000	c £233,450

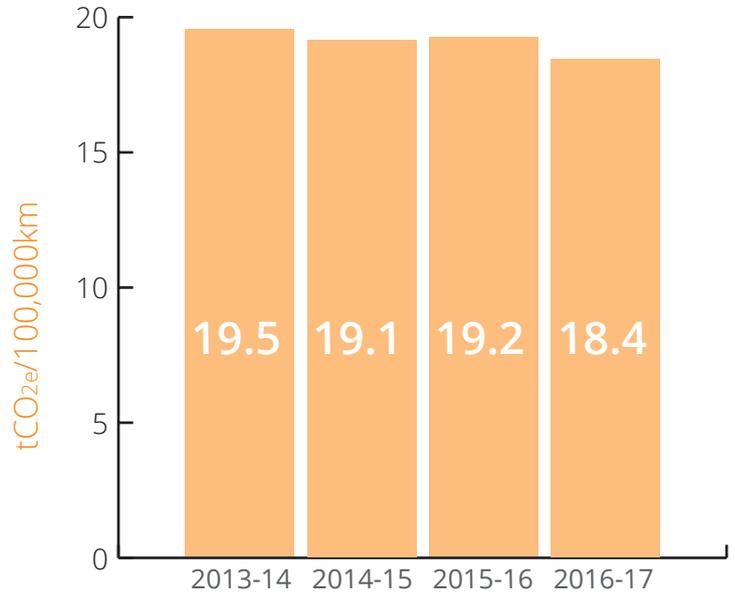
Mine water treatment sites

After taking into account changes to the carbon conversation factor for electricity generation our overall carbon footprint has reduced by approximately 5% since 2013/14, which is a tremendous achievement given that we have actually increased the number of operational sites in that same period.



Business travel

Through the use of lower emission vehicles, implementing video conferencing facilities and encouraging public transport use, we have seen a continued reduction in the carbon intensity and amount of business travel undertaken per employee. Similarly, there has been an increase in the proportion of travel using public transport.

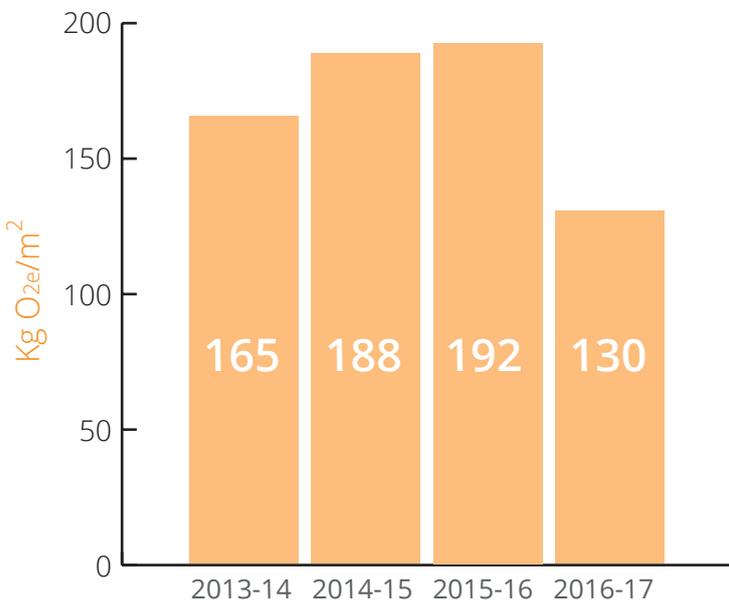


Head office

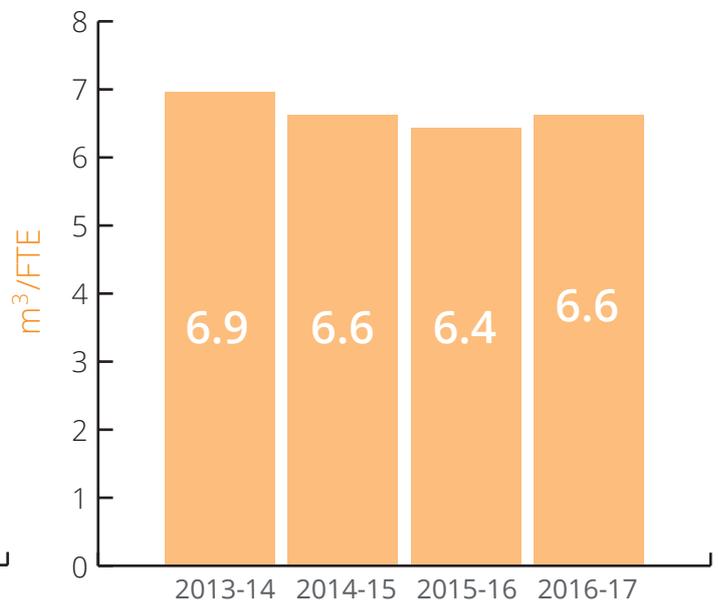
To provide a better measure of how well we have done in reducing our carbon footprint we use a normalised metric of carbon intensity. This is measured for our office headquarters and mine water sites and shows that since 2013/14, we have reduced the carbon intensity by 40% and 22% respectively, which is a tremendous achievement.

Water intensity has remained broadly the same as previous years and remains higher than the government good practice benchmark of 6m³/FTE. As part of the sustainability strategy for our head office, further measures are planned to meet this standard.

Carbon intensity



Water intensity



Parameter	2013/14	2014/15	2015/16	2016/17
Non-recycled	1,040	1,165	670	661
Recycled	0	0	5	7
Reams/FTE	7.48	7.2	3.89	3.45

Our paper use has continued to reduce significantly over time, particularly as a result of our mining reports business becoming fully electronic. However, further reductions have been achieved through the introduction of secure printing and the replacement of individual printers with multiple function devices.

Head office	2013/14*	2014/15	2015/16	2016/17
General /tonnes		18.9	6.5	10.2
Recycled /tonnes		12.3	12	4.6
Closed loop /tonnes		4.4	10.6	8.1
Total		35.7	29.2	22.8
% Reduction from 2014-15		NA	18%	36%
% Recycled		47	78	55

The amount of waste we produce at our headquarters has continued to reduce substantially, due in part to the closure of the onsite catering facility. However, continued efforts to influence behaviour have seen further increases in the level of recycling resulting in less than 8% requiring landfill.

People and the Economy

	2013/14	2014/15	2015/16	2016/17
% SME Spend	17.4%	14.6%	27.2%	34.2%

This is an important target for the government and whilst there is more we can continue to do, it is a great achievement to have already met the target for 2020.

The
year ahead

2017-18

The year ahead

Continual improvement is a business priority and improving the sustainability of our activities is very important to us. Next year we will:

- further engage with our people and contractors to make sure they're fully aware of standards and expectations and understand what we expect of them
- improve our risk assessment processes so that everyone takes time to stop and consider their health and safety before beginning a new task
- raise awareness of stress and mental health to build resilience and improve the wellbeing of our people
- continue on our journey to develop and implement our sustainability framework
- continue with our vision to resolve the impacts of mining in a way which doesn't cause harm to, and where possible, improves the environmental or social-economic standing of the areas in which we work

