MINIMISING THE ENVIRONMENTAL IMPACT

**APPROACH**

Our environmental management team, guided by internationally recognised principles, including ISO 14001:2015, the International Council on Mining and Metals (ICMM) and the United Nations Global Compact, focuses on the execution of environmental initiatives aligned with Sibanye-Stillwater’s strategic objectives, vision and purpose. Mechanisms to give effect to these principles are embedded in our systems and approaches to the environmental challenges we face. Environmental challenges are considered in our core business and compliance risk management plans. We proactively address compliance while simultaneously promoting greater environmental responsibility leveraging technologies.

We have integrated and aligned environmental functions across our SA operations in terms of our Vision 2020 environmental management strategy illustrated below. In-depth alignment with the US PGM operations, although initiated, will conclude in 2019. The five pillars and focus areas of our Vision 2020 create value for all stakeholders. The strategy and structure of our environmental department, and the setting of strategic goals and objectives, and associated performance measures for 2018 and beyond, are premised on our Vision 2020.

“Environmental challenges are considered in our core business and compliance risk management plans”

**PILLARS OF VISION 2020**

- **Verifiable compliance**
  - Understanding and implementation of, and verifiable compliance with, internal and external regulations
  - Meeting environmental standards and challenging where appropriate

- **Cost and risk management**
  - Effective use of technology and innovation to deliver environmental purpose
  - Delivering administrative and contract management efficiencies
  - Optimal use of water resources and deployment of water conservation and demand management practices

- **Awareness, stewardship and communication**
  - Aligning and adhering to internationally recognised policies, guidelines and principles to protect and grow environmental reputation
  - Influencing legislation and policy-making
  - Engaging in research, producing publications and contributing to knowledge

- **Environmental footprint management**
  - Accurate determination and reporting of closure obligations and commitments
  - Responsible concurrent rehabilitation planning and execution
  - Effective socio-economic closure planning
  - Designing and implementing strategies to reduce carbon footprint and improve energy efficiency
  - Responsible use and management of water resources
  - Proactive management of environmental risks to secure licence to operate
  - Proactive management of land, air and waste

- **Community engagement and buy-in**
  - Engagement with key stakeholders and communities
  - Raising awareness of environmental issues to minimise impact on the environment
The environmental management system (EMS) adopted by Sibanye-Stillwater is broadly aligned with the principles of the international environmental management standard, ISO 14001:2015.

In line with the strategic goal to strengthen Sibanye-Stillwater’s position as a leading international precious metals mining company, we have begun working towards renewing and enhancing our ISO 14001-compliance across the Group. ISO 14001 certification is expected by 2022 and a comprehensive gap analysis at all operations is planned for 2019.

US AND SA OPERATIONS: SYSTEMS SUPPORTING ENVIRONMENTAL MANAGEMENT

We use technologies for proactive environmental management to make informed decisions for the benefit of all stakeholders:

- **Pivot**: system to capture and manage environmental incidents and complaints
- **Syncromine**: an audit system for the management of environmental non-conformances – the environmental module has been customised to schedule audits at planned work places based on these standard environmental checklists
- **Qlikview**: a data analysis tool for water flow and air quality compliance to enable trend analysis and decision-making
- **Continuous emissions monitoring system (CEMS)**: online hourly monitoring of SO₂ emissions
- **ARC GIS**: platform where environmental water and air quality data is stored in the system, tools to determine compliance
- **Zednet**: automated system to monitor water flow, consumption, quality and critical reservoir levels with a view to integrating all SA operations to identify anomalies and critical trigger parameters, thereby minimising water losses and risks against regulatory licences as well as provides tools to do trend analysis

IN LINE WITH SUSTAINABLE DEVELOPMENT GOALS

We continue to make progress in aligning our environmental management strategy with that of the United Nations (UN) Sustainable Development Goals (SDGs), focusing particularly on:

TARGETS

SA operations

**To reduce/achieve by year-end 2018**

- Scope 1 and 2 carbon emissions by 27.3% by 2025, equivalent to an average annual decrease of 2.1%
- Level 3 incidents by 20% year-on-year
- Zero level 4 and higher incidents
- Overall purchased water consumption by 15% year-on-year

**Achieved by year-end 2018:**

- 3.9% average annual reduction in Scope 1 and 2 carbon emissions (on track to meet and exceed target)
- 58% reduction in level 3 environmental incidents
- Zero level 4 and above environmental incidents
- 3% decrease in the consumption of purchased water

**In addition, the following was achieved:**

- At the SA operations, an energy intensity of 0.52 GJ per tonne of ore processed (2017: 0.60)
- Overall improvement of 3% in discharge water quality compliance year-on-year with overall average of 73.7%

**Note:** The energy intensity factor takes into consideration purchased electricity and direct fuels used, which includes petrol, diesel, liquid petroleum gas, acetylene, coal and paraffin.

US PGM operations

**Achieved in 2018**

- Completed written long-term environmental management strategies for all three US sites
- Secured air permit modifications to enable expansion efforts at the East Boulder mine and Columbus Metallurgical Complex
- Received various permit approvals for Stillwater expansion efforts
- Implemented traffic management procedures at the Stillwater mine to ensure traffic counts remain in accordance with the Good Neighbor Agreement of 110 vehicles per day (currently 90-100 vehicles per day)
- Began closure efforts for original tailings storage facility at the Stillwater mine

In addition to monitoring performance and ensuring compliance with the relevant legislation in each jurisdiction, and inspections by relevant government departments and agencies, environmental performance reports are submitted to executive management, with ultimate oversight by the Social and Ethics Committee and the Board. Refer to the Social and Ethics Committee’s report on page 167 and regulatory compliance in Corporate governance from page 153.
MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

“Sibanye-Stillwater’s environmental function has firmly embraced the challenge set by the Board and Executive Committee to effectively reduce costs”

PERFORMANCE

The CDP, formerly the Carbon Disclosure Project, which runs the global disclosure system that enables companies, cities, states and regions to measure and manage their environmental impacts, has rated Sibanye-Stillwater as A- for the second consecutive year. This is within the leadership band and higher than the global metals and mining sector average of C, and higher than the Africa regional average of B.

A significant change in 2018 was the inclusion of Stillwater in our submission and the incorporation by the CDP of recommendations made by the Task Force on Climate-Related Financial Disclosures in their questionnaire, which included multi-disciplinary categories, governance, targets, energy, risks and opportunities.

COST SAVINGS

Sibanye-Stillwater’s environmental function has firmly embraced the challenge set by the Board and Executive Committee to effectively reduce costs through proactive management of environmental incidents, water conservation, carbon footprint management and reducing our reliance on Rand Water at the SA operations. Several cost-savings initiatives have been identified while others remain work-in-progress. Those identified and implemented do not compromise on legal compliance or our ability to deliver an efficient service to internal and external stakeholders.

SA gold and PGM operations

Our cost-savings initiatives include:

- Improved efficiencies in contract management including checking and verification of invoicing for goods and services delivered
- Reducing reliance on Rand Water through the treatment of water in compliance with the water use licence
- Roll-out of water conservation and water demand management initiatives including leak detection and repairs
- Engagement with the Department of Water and Sanitation to correct water resource management strategy changes

In 2018, the closure liability for the SA operations was reduced through concurrent rehabilitation and transfer of assets following the DRDGOLD transaction.

We have encouraged the South African government to extend the implementation date for the proposed Financial Provisioning (FP) Regulations to 20 February 2020, which, among other proposals, includes the potentially mandatory inclusion of 15% value-added tax (VAT) in all closure provisions.

A preliminary costing model has been developed to determine the potential impact of the proposed legislation, and all its aspects on our operations and Sibanye-Stillwater at large, and for only the 15% VAT component of the new FP Regulations. Our total closure provisions could increase by as much as just over R1 billion. The impact of, among others, the inclusion of latent and residual liabilities are still to be determined, as the proposed FP Regulations are not clear on this aspect.

Refer to page 150 for details

US PGM operations

Cost savings and efficiency initiatives include:

- Maximising tailings backfill volumes to extend the operating life of our surface tailings storage facilities
- Minimising underground water inflows to reduce the volume of water treated and managed
- Concurrent reclamation to reduce long-term closure liability
- Initiated closure of the original tailings storage facility at the Stillwater mine to reduce long-term closure liability
- Ongoing water-treatment optimisation to improve treatment efficiency
- LED lighting changes to improve lighting efficiency and reduce costs
- New product reviews to reduce hazardous waste generation and related costs
WATER MANAGEMENT

Sibanye-Stillwater acknowledges that water is a critical resource, and considers an integrated approach to the management of its water footprint and its water systems infrastructure as a key component of its business strategy. Efficient water management is vital in terms of preservation, consumption and cost. We are therefore committed to the responsible use of water in a manner that is sustainable for production and host communities. We respect the environment, our host communities and employees with whom we share water, and strive to improve and ensure the safety and security of this precious resource.

Our water conservation and water demand strategy consists of various components:

- using alternative available underground water sources to replace purchased water in line with the conditions of our water use licences
- identifying and reducing wastage of water through the implementation of improved metering, water balance management, leak detection and repair initiatives

### Water use

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2017</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group</td>
<td>US PGM operations</td>
<td>SA operations</td>
</tr>
<tr>
<td>Total water withdrawn² (ML)</td>
<td>125,844</td>
<td>4,073</td>
<td>121,771</td>
</tr>
<tr>
<td>Water discharged³ (ML)</td>
<td>70,791</td>
<td>3,580</td>
<td>67,211</td>
</tr>
<tr>
<td>Water used⁴ (ML)</td>
<td>55,773</td>
<td>1,213</td>
<td>54,560</td>
</tr>
<tr>
<td>Total water purchased⁵ (ML)</td>
<td>20,278</td>
<td>120.66</td>
<td>20,157</td>
</tr>
<tr>
<td>Water purchased from water services authorities (%)</td>
<td>36</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td>Volumes treated⁶ (Mt)</td>
<td>41.37</td>
<td>3.5</td>
<td>37.87</td>
</tr>
<tr>
<td>Intensity⁷ (kL/tonne treated)</td>
<td>1.35</td>
<td>0.35</td>
<td>1.44</td>
</tr>
</tbody>
</table>

¹ For eight months from May to December 2017
² Total water withdrawn: water abstracted from groundwater sources and total purchased
³ Water discharged into environment at licensed discharge points
⁴ Water used: Total withdrawn minus water discharged
⁵ Total water purchased: potable water purchased and waste water purchased at Rustenburg operations
⁶ Volumes treated: Dry tonnes processed in Sibanye-Stillwater metallurgical plants and concentrators
⁷ Intensity: Water used/tonne treated

¹ SA PGM figures restated to include purchased water at compressors, sewage works and villages, and a portion of groundwater abstraction, which was previously under-estimated

### WATER USE MONITORING

At our SA operations, the Zednet automated water monitoring system was successfully extended to include all SA operations. More than 300 potable water meters are now being used to monitor water consumption continuously and to identify the location of water leaks. The monitoring system is also used to monitor water quality and critical reservoir levels.

The strategy to monitor and manage our water footprint is aligned with our strategy to be more independent of municipal water in order to improve our water security and reduce our dependence on external suppliers of potable water.

While Sibanye-Stillwater advances its critical water independence strategy, water cost saving initiatives continue.

### WATER COST-SAVING INITIATIVES

In 2018, R245 million (2017: R231 million) was spent on the purchase of potable water, which was 4% less than it was in 2017. The cost of purchased water increased by 6.2% due to an average 10.3% annual tariff increase.
MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

POTABLE WATER CONSERVATION AND WATER DEMAND MANAGEMENT

A key success factor to achieve independence from external water suppliers, is to reduce water demand by minimising leakage and losses. The table that follows compares 2018 potable water consumption with that of previous years and indicates the savings achieved.

<table>
<thead>
<tr>
<th>Potable water purchased (ML)</th>
<th>Gold operations</th>
<th>2018</th>
<th>2017</th>
<th>2016¹</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrix</td>
<td></td>
<td>2,863</td>
<td>2,881</td>
<td>2,758</td>
<td>3,201</td>
</tr>
<tr>
<td>Cooke</td>
<td></td>
<td>1,790</td>
<td>2,123</td>
<td>2,692</td>
<td>4,112</td>
</tr>
<tr>
<td>Driefontein</td>
<td></td>
<td>1,603</td>
<td>2,210</td>
<td>1,657</td>
<td>1,726</td>
</tr>
<tr>
<td>Kloof</td>
<td></td>
<td>4,872</td>
<td>4,688</td>
<td>5,247</td>
<td>5,755</td>
</tr>
<tr>
<td>Gold – Total</td>
<td></td>
<td>11,128</td>
<td>11,902</td>
<td>12,353</td>
<td>14,794</td>
</tr>
</tbody>
</table>

| PGM operations²             | Kroondal        | 1,917| 1,744| 2,333 | –    |
|                            | Rustenburg      | 4,557| 4,637| 4,977 | –    |
| PGM – Total                |                 | 6,474| 6,382| 7,309 | –    |

| SA operations              |                 | 17,602| 18,284| 19,663| 14,794|

¹ Includes Kroondal and Rustenburg operations for the full year
² SA PGM figures include purchased water at compressors, sewage works, villages and a portion of groundwater abstraction, previously under-estimated

The SA gold operations reduced water purchased by 774ML (7%) despite the increase in the volume of water purchased for Kloof – 3% more as a result of several pressure surges at the Libanon supply point, causing increased leakage. This increase was offset by substantial decreases in water volumes purchased at Cooke and Driefontein. At Cooke, the decrease (333ML or 16% year-on-year) reflects the success of initiatives to reduce water leakages and losses. At Driefontein, a decrease of 607ML or 27% year on year reflects stable production of potable water from the Driefontein water-treatment facility and, to a lesser extent, the operational disruptions.

Consumption at the PGM operations increased by 1%, largely attributed to the water purchased at the Kroondal operation (173ML or 10% year on year) as a result of extremely dry conditions in the final quarter of 2018, necessitating an increase in the volume of potable water required to sustain production.
We operate in complex surface water catchment areas, which have numerous water users, including the communities, farmers, other industrial users and mining houses. Although water resources are monitored extensively, limited information is available in terms of quantification of residual and latent liabilities.

Project to quantify residual and latent liabilities
The aims and objectives of the project to quantify residual and latent liabilities are to:
- Quantify the potential liabilities associated with our mining activities
- Provide recommendations for mitigation
- Align remediation approach (mitigation measures) with regulators and other water stakeholders

To date, findings of the assessed catchments have indicated the following:
- The Upper Wonderfonteinspruit is seriously impacted by numerous water users in the catchment area. Management of discharge qualities, through strict control of discharge water treatment, remains a priority.
- The mid- and lower-Wonderfonteinspruit show significant improvement in terms of water quality despite upstream inputs from the affected upper Wonderfonteinspruit. Discharge qualities from Driefontein and Kloof have shown excellent compliance and in-stream monitoring indicates that water quality requirements have largely been met. Management measures are expected to focus on habitat improvement, which will be explored further in the next phases of the project.
- The Loopspruit, which receives input from Kloof, is in a good state in terms of water quality with excellent overall discharge compliance. Wetland areas and certain parameters will be considered during the course of subsequent phases of the study.

Cooke 4 shaft closure
Ezulwini Mining Company (EMC) appealed to the Minister of Environmental Affairs (appeal authority) against the Regional Manager: Mineral Regulation for the Gauteng regional office of the Department of Mineral Resources' negative environmental authorisation decision dated 30 April 2018. EMC’s application to the Department of Mineral Resources was for the decommissioning of the underground mine workings and associated cessation of pumping operations at Ezulwini mine, Gauteng, under reference GP 30/5/1/2/2 (38) MR.

The appeal authority issued a decision on the appeal on 6 March 2019, which upholds EMC’s appeal and sets the Department of Mineral Resources’ negative decision aside and refers the matter back to the Department of Mineral Resources for reconsideration.

West Rand Trans-Caledon Tunnel Authority mine drainage treatment facility
Successful operation of the dewatering and acid mine drainage (AMD) treatment plant led to a drop in the level of the Western Basin water table from 7.7m to 11.68m below the 18 winze decant point in 2018. In total, 11.670ML of impacted AMD mine water was treated, achieving 96.5% compliance to the directive limits, and discharged into the Tweeklopiespruit.

Driefontein North Shaft potable water treatment plant
In 2018, this plant achieved the following:
- Cost savings of R42.6 million
- Produced 3,493.5ML blended softened water
- Complied fully with SANS 241 water quality

Cooke 4 potable water treatment plant
The Ezulwini potable water treatment plant’s stable operation enabled lower municipal potable water consumption. The plant tested Crystalactor® technology for the treatment of mine service water in the past year, showing greater metal removal potential for application at other sites.

In 2018, this plant: achieved the following:
- Cost savings of R7.2 million
- Produced 1,068ML of softened water
- Complied fully with SANS 241 water quality

Cooke underground closure planning
Alternative regional socio-economic solutions for the long-term sustainable closure of Cooke’s underground mining operations have been completed.

The most environmentally responsible and cost-effective, sustainable closure solution for these operations includes installation of four concrete plugs between Harmony’s Doornkop mine and Cooke 1, followed by natural rewatering of the mine workings. A closure plan, with specialist studies in support of the closure strategy, has been completed.

West Rand tailings retreatment potable water pilot plant
A water treatment pilot plant is to be established at Kloof 4 to reduce high salt load in service water, thereby extending the life of the existing infrastructure and facilitating maintenance savings of about R3 million.

Wastewater treatment works optimisation
All our wastewater treatment works at the SA operations were reviewed to identify opportunities to improve water discharge compliance and to reduce operating costs. The review highlighted optimisation opportunities across the SA operations, including the conversation of the Kroondal wastewater treatment works to a transfer station, leveraging the under-utilised Waterval wastewater treatment works, which is running below capacity.
US PGM operations
Efficient and proper management of US PGM operations’ water resources continues to be a critical and focused operational effort. Due to the nature of our rock associated with the J-M Reef, neither acid-rock drainage nor metal mobility is a concern. Our primary constituent of concern is nitrogen that is introduced by blasting agents and dissolved in the water flowing through the mines. Given the pristine environment where our mines are located, we focus on proper management of the water following treatment.

First, we employ all reasonable efforts to limit the volume of water encountered underground. Mine water grouting programmes are instrumental in limiting water inflows in our footwall laterals. While driving a footwall lateral, the area in front of the drive is constantly probed with drills to evaluate rock conditions and major water sources. Should a major water source be identified, the drill hole is then used to grout and seal off the water source and allow mining through that zone with limited inflow.

Water encountered in the stoping (mining) blocks must be managed through water treatment and management systems. Limited grouting occurs in these areas, because they are actively mined in multiple cuts. This water generally contains elevated nitrogen from the blasting process. From the stopes, this water is brought to the surface to manage. Initially this water is recycled and reused as make-up water in the mill and tailings storage facilities, underground for drill water, in equipment washbays; and for dust control, among other uses. As a result of these water recycling efforts, very little fresh water is necessary for operations. Generally fresh water use is associated with potable water needs, including drinking and showering.

The balance of the mine water not recycled is treated through our mixed-bed bio-reactors where the nitrogen contained in the water is converted to nitrogen gas in a biological process and released to the atmosphere. These treatment plants remove upwards of 90% of the nitrogen contained in the water stream. As a result, the discharge of remaining nitrogen in the water is consistently 15% to 30% of regulatory limits or lower. Following treatment, the mine water is either returned to groundwater through a combination of percolation ponds or a groundwater injection well or land-applied using agricultural pivots for beneficial use.

US OPERATIONS: WATER MANAGEMENT PROJECTS
During the year, the following specific water management projects were advanced at the US PGM operations:

Hertzler percolation ponds
As a result of the need for increased water disposal capacity at the Stillwater mine, the Hertzler percolation ponds were permitted and constructed. These new percolation ponds increase water disposal capacity by a minimum of 1,000 gallons per minute (gpm). This treated water exceeds drinking water standards and is percolated into the groundwater system near the Hertzler tailings storage facility to improve the hydrologic balance.

Water treatment plant expansion
With ongoing expansion activities associated with the Blitz Project, the water treatment capacity at the Stillwater mine was increased from approximately 1,250gpm to 3,000gpm. This treatment plant expansion continues to focus on biological denitrification.

Benbow injection well optimisation
The injection capacity of the existing Benbow injection well was increased from 500gpm to 900gpm with the addition of new pipelines and a booster pump. Prior to the upgrades, an extensive hydrologic and engineering evaluation was completed to ensure increasing injection pressures would not compromise the integrity of the well construction or the injection formation. A study was also completed to evaluate the possibility of converting the Benbow potable well to an injection well, if needed.

Clarifier thickener upgrades
At the East Boulder mine, we began installing a new thickener tank in advance of the water clarifier. With increasing mine water flows and solids loading, the new thickener, in combination with the clarifier, will allow the mine to continue to meet targeted water quality and discharge solids loading in the mine water percolation.
**GENERAL RISKS**
Through a robust risk management process at our SA operations, we have identified the following general environmental risks for which action plans and mitigation strategies have been developed and are being implemented:

- Changes in legislation due to FP Regulations
- Preserving water in North West for sustained and continued operations
- Slow responses from regulators in respect of approving licences and amendments
- Regional water closure strategy and alignment of industry, community, local and national government among others
- Closure of Ezulwini and the ongoing legal battle to obtain regulatory approvals for this process
- Residual and latent liabilities
- Climate change and global warming

**COMPLIANCE**

**SA gold and SA PGM operations**

At our SA PGM operations, new water use licences were issued for our Rustenburg and Kroondal operations. The Rustenburg water use licence has been reviewed. We are engaging with the regulator to align conditions where clarity is required.

Although no new water use licences were issued for the SA gold operations, we have had successful interactions with the Department of Water and Sanitation about the water use licence amendment applications submitted. While we continue to engage with the regulator, we expect the amended water use licences to be issued during the first half of 2019.

General authorisation for the reclamation and rehabilitation of historically impacted wetlands at all Cooke operations has been approved.

The third phase of the integrated water use licence application for Burnstone is underway, including public participation and submission of final specialist assessment reports. The Department of Water and Sanitation visited the site and did not find any serious concerns.

Average underground and effluent discharge compliance improved by 3% across all operations with plans to address compliance challenges.

South African legislation, primarily through the National Water Act and supported by the National Environmental Management Act, requires the management and protection of the water resource, for all users. Legislation takes into account all watercourses – rivers, drainage lines or wetlands. Requirements for the licensing of activities occurring within the legislated buffer areas of these watercourses requires not only the registration of the water use but also specialist assessments, monitoring, management and mitigation measures to be implemented.

Within the SA operations, we influence the three major catchment areas in which we operate – Crocodile West/ Limpopo (gold and PGM operations), Olifants (PGM operations) and Vaal (gold operations) – in terms of direct and indirect water quality and quantity contributions and abstractions, changes in habitat and flow patterns as well as associated changes in biological components.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Compliance (%)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated effluent</td>
<td>97</td>
<td>95</td>
</tr>
<tr>
<td>Burnstone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>82</td>
<td>88</td>
</tr>
<tr>
<td>Cooke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underground water</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td>Kloof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined underground and treated effluent</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Ezulwini</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underground water</td>
<td>62</td>
<td>64</td>
</tr>
<tr>
<td>Driefontein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underground water</td>
<td>97</td>
<td>81</td>
</tr>
<tr>
<td>Driefontein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated effluent</td>
<td>91</td>
<td>86</td>
</tr>
</tbody>
</table>

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MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

These influences are monitored using the following techniques:

- Routine sampling and analyses of water quality, including tracking of issues and management measures to ensure compliance with licences and the protection of other water users
- Monitoring biological indicators to determine spatial and temporal trends in terms of the influences exerted by mining-related activities (refer to Biomonitoring of rivers fact sheet)
- Water quantity monitoring and analyses using water and salt balances to determine improvements in terms of efficiencies and cost-saving initiatives to achieve water conservation and water demand management targets

Over and above the river systems for which the monitoring and management initiatives described above are performed, numerous smaller systems, such as drainage lines and wetlands are also managed by:

- Specialist wetland assessments to determine wetland boundaries, health and management measures, and monitor management measures
- Floodline delineations to determine watercourse floodline boundaries, including drainage lines

SA operations: Wetlands in rehabilitation

In natural water systems, wetlands act as purifiers in freshwater systems. The wetland’s natural ability to attenuate flows and reduce the concentration of potentially harmful constituents can be enhanced in constructed wetland systems to assist in water treatment.

Careful design is critical and, while wetlands are less intensive in terms of resource and maintenance, as opposed to conventional chemical and mechanical treatment technologies, they require maintenance.

The ability to replicate the benefits of wetlands through the artificially constructed wetlands has resulted in the implementation of several wetland initiatives. The aims of which are to re-establish the once functional wetland systems that have been historically impacted.

Increasingly applications of these passive treatment solutions are becoming more popular in respect of water quality management due to the comparatively low maintenance and operational costs associated with these systems. They also continue to perform beyond the life of an operation.

Illegal mining also has an impact on the environment (refer to the fact sheet at www.sibanyestillwater.com).

SA operations: Biodiversity assessments

Biodiversity assessments have been conducted at Driefontein, Kloof and Burnstone. Similar assessments are being conducted at Beatrix, Rand Uranium and Ezulwini, as well as an update at Burnstone. The following species of interest, as per the International Union for Conservation of Nature (IUCN) and South African National Biodiversity Institute (SANBI) Red List data, have been found, although this is not a comprehensive list of all species in the respective areas.

<table>
<thead>
<tr>
<th>IUCN/SANBI Red List status</th>
<th>No. of species observed</th>
<th>Species observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near threatened</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Eupodotis caeruleascens</em> (Blue Korhaan) ¹ ³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Mirafra cheniama</em> (Melodius Lark) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Adromischus umbraticola subsp umbraticola</em> (Cliff Andromischus) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Panthera pardus</em> (Leopard) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Miniopterus schreiberi</em>* (Natal Clinging Bat) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Rhinolophus clivosus</em> (Geoffroy’s Horseshoe Bat) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Rhinolophus darlingi</em> (Darling’s Horseshoe Bat) ²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <em>Myoti tricolor</em> (Temminck’s Hairy Bat) ²</td>
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<td></td>
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<td>• <em>Vulpes chama</em> (Cape Fox) ³</td>
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<td></td>
<td></td>
<td>• <em>Leptailurus serval</em> (Serval) ³</td>
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<td></td>
<td>• <em>Atelerix frontalis</em> (Southern African Hedgehog) ³</td>
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<tr>
<td></td>
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<td>• <em>Adromischus umbraticula</em> ²</td>
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<td></td>
<td>• <em>Hypoxis hemerocallicea</em> (African Potato) ² ³</td>
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<td></td>
<td>• <em>Tyto capensis</em> (African Grass Owl) ³</td>
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<tr>
<td>Endangered</td>
<td>1</td>
<td>• <em>Circus ranivoros</em> (African Marsh Harrier) ³</td>
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¹ Burnstone  ² Driefontein  ³ Kloof
SA OPERATIONS: IDENTIFYING A NEW SPECIES

A potentially new distinct fish species was found for the first time within the Leespruit (Upper Vaal Catchment), downstream of Kloof, during the biomonitoring low-flow assessment in 2018.

The fish has been classified as Enteromius pallidus (Goldie Barb) although recent literature indicates that, due to the location of this species, it is likely to represent a completely unique species.

Further monitoring and specific sampling will be performed to establish another data set with a view to confirming that this is a new species and to assist in the formulation of a management programme to protect the fish.

US PGM operations

A number of significant environmental management, compliance, sustainability, and stakeholder engagement achievements and milestones were achieved during 2018. These efforts cross multiple management media types from air, waste, and water and focus on stakeholder engagement, minimising our environmental footprint, and strategic planning. As an industry leader in environmental stewardship we believe in continuous improvement through collaboration, innovation and balancing our activities with the natural environment.

Examples in the past year include:

- **Compliance** – During the year, the US PGM operations operated significantly below permitted discharge limits for SO₂, air emissions, and nitrogen discharge. SO₂ emissions were under 5% of permitted limits and nitrogen discharge was continually less than 30% of permitted limits.
- **Water treatment expansion** – At the Stillwater mine, water treatment facilities were expanded from a treatment capacity of 1,250gpm to 3,000gpm. This will ensure adequate water treatment capacity with ongoing expansion of the Blitz project.
- **Adaptive management planning** – Through the Good Neighbor Agreement, Sibanye-Stillwater has been working with the Stillwater Protective Association and Cottonwood Resource Council to develop a stakeholder-driven, independent water monitoring and assurance plan aligning with the goals and objectives of the Good Neighbor Agreement. This adaptive management plan has been developed to adjust as conditions change, knowledge improves, regulatory criteria is modified or as targets change.
- **Defining tailings management best available technology** – In collaboration with our stakeholders, including the Montana Department of Environmental Quality, the US Forest Service, and the Good Neighbors, and with support of an internationally recognised independent review panel, we have been defining site-specific best available technology for future storage of our tailings materials. This includes a comparison of filtered tailings, thickened tailings, paste tailings, co-mingled tailings, and conventional tailings slurry.
- **Closure of the Stillwater mine tailings storage facility** – During 2018, we initiated closure of the original tailing storage facility at Stillwater. These activities included design level cone-penetration testing and initial placement of geosynthetics and a waste rock cap placement in the southwest corner of the facility. Closing and dewatering the facility is estimated to take about four years.

- **Recycling** – Sibanye-Stillwater continues to operate the world’s largest autocat recycling programme. In 2018, over 686,592 3E PGM ounces were fed at the recycling operations in the US. For comparison, 592,608 2E ounces were mined in the US in 2018.
- **Strategic planning** – During the year, the US PGM operations developed long-term strategic plans related to future tailings and waste rock management, characterisation and permitting; long-term water management; and air permitting. These plans are iterative and designed to complement the existing mines and business plans.
- **Stillwater Protective Association community barbecue** – In association with the Stillwater Protective Association, Sibanye-Stillwater hosted a community Good Neighbor barbeque at its Beartooth Ranch. This barbeque included an evening of presentations, and a question-and-answer session for community members and interested visitors on the operation of and activities at Stillwater, including interaction with Sibanye-Stillwater’s CEO, Neal Froneman, and other executive team members.

See the fact sheet: Working together, the Good Neighbor Agreement

“A potentially new distinct fish species was found for the first time within the Leespruit (Upper Vaal Catchment), downstream of Kloof, during the biomonitoring low-flow assessment in 2018”
Our leadership in the industry coalition Stop I-186 campaign, which would have stifled mining development in the state of Montana, contributed to a resounding “No” vote.

Initiative 186 (I-186) would have required the Department of Environmental Quality to deny a permit for any new hard-rock mine in Montana unless the mine’s reclamation plan provided clear and convincing evidence that the mine would not require perpetual treatment of water polluted by acid mine drainage or other contaminants. The supporters of I-186 stated that the terms “perpetual treatment”, “perpetual leaching” and “contaminants” had not been fully defined and would require further definition by the Montana Legislature or through Department of Environmental Quality rule-making.

Opposition to I-186 represented a diverse cross-section of organisations and groups in Montana, including Sibanye-Stillwater. All agreed that it would have a negative impact on mining and the state of Montana – upsetting the balance that provides for thousands of families while protecting the environment.

Sibanye-Stillwater maintains that “our mining improves lives.” We are the largest industrial employer in Montana with more than 1,600 employees. Conducting our business among the world’s most pristine landscapes is a unique privilege, and we are stewards of the environment not only because of our regulatory and social obligations but also because we live and recreate there. We believe in our unique balance between environmental stewardship and responsible rural economic development, which I-186 jeopardised.

“...a number of significant environmental management, compliance, sustainability, and stakeholder engagement achievements and milestones were achieved during 2018...”

Monitoring rivers near our US PGM operations
INCIDENT MANAGEMENT

As per Sibanye-Stillwater’s procedures require that, all incidents are reported, investigated, classified and managed according to their potential risk and impact on the environment. Root-cause analyses are conducted to inform appropriate action plans that will mitigate potential impacts and also prevent a recurrence of the incident. All incidents are classified, evaluated and reported internally on a monthly basis and externally to the regulators when required.

While we consider all environmental incidents serious, we disclose all level 3 (short-term impact), level 4 (medium-term impact) and level 5 (long-term impact) environmental incidents to the relevant competent environmental authority/ regulator.

SA gold and SA PGM operations

In 2018, no level 4 or 5 incidents were reported with a 58% decrease in the number of level 3 incidents. The total number of level 3 incidents decreased to five (2017:12) with all of the incidents closed out. Two level 3 incidents were reported at our gold operations and three at the SA PGM operations. Four of the incidents related to mine dam overflows and one to the discharge of mine water following theft of a pipeline. The impact of these incidents can be classified as negligible or low with a short duration.

The decline in incidents reported followed as a result of the below average rainfall recorded in 2018 as well as the thorough management root cause analysis and controls in place.

See environmental incidents at www.sibanyestillwater.com for more detail on the level 3 and higher incidents reported during 2018.

Major non-conformances increased to 94 in 2018 (2017: 22) following a more stringent management review and control process and implementation of a new procedure classifying water discharge quality compliance and dust fall exceedances as non-compliances.

The procedure uses several water quality limits and criteria, frequency of exceedance, as well as toxic and chronic effect limits to determine the severity of the non-conformance.

54% of the non-conformance reported at the gold operations (29 from 54) resulted from exceedances of the licensed discharges limits.

93% of the non-conformance reported at the SA PGM operations (37 from 40) resulted from dust exceedances resulting from the transportation of surface material for reprocessing. An air quality assessment was conducted to determine high-risk areas and effective abatement measures have been implemented.

US PGM operations

The US PGM operations experienced one level 3 incident and 30 internally reportable events during the year. All releases were immediately cleaned up and remediated.

We continue to leverage technology to reduce air emissions to levels well below state and federal limits. Air quality at our US operations are mainly affected by sulphur dioxide (SO$_2$) at our processing facilities. Gases released from smelting operations are routed through a state-of-the-art, dual alkaline, gas/liquid scrubbing system, which removes approximately 99.8% of SO$_2$. During the year, 2.6 tonnes of SO$_2$ was released, amounting to 3.3% of our permitted limit. Monthly discharge rates have been routinely less than 5% of annual permitted levels.

In March 2018, we submitted air quality permit modifications for the Columbus Metallurgical Complex and the East Boulder mine to accommodate increasing processing and production rates. The 13800 Blitz vent raise minor revision was submitted to the Forest Service and State of Montana to permit the necessary ventilation breakout needed to support ventilation demands together with 50E portal in-take at the Stillwater mine. The Montana Department of Environmental Quality has also approved an amendment to the East Boulder mine site’s air quality permit to allow average annual ore production of up to 3,000t per day.
MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

“The implementation of energy efficiency projects has been instrumental in the continuous reduction of carbon emissions and in reducing our carbon footprint”

CARBON MANAGEMENT
Sibanye-Stillwater considers climate change to be one of the most pressing global environmental challenges of our time, and we recognise the importance of proactively managing our carbon footprint in the global context. We are also committed to contributing to a global solution by deploying responsible strategies and actions.

We have been voluntarily monitoring and reporting on our carbon emissions in our annual and investor reports, including those compiled for the CDP, using the World Resources Institute’s Greenhouse Gas Protocol to determine our carbon inventory.

In 2017, the South African Department of Environmental Affairs promulgated regulations for mandatory annual reporting of carbon emissions, primarily to inform the national inventory. Sibanye-Stillwater’s first annual report in this regard was submitted to the Department of Environmental Affairs in March 2018.

The South African government has set the trajectory for the country’s nationally determined carbon emissions as follows: greenhouse gas emissions are planned to peak between 2020 and 2025, to plateau for 10 years from 2025 to 2035, and to decline from 2036 onwards.

Notwithstanding government’s intention, we strive to reduce our carbon emissions year-on-year. During 2018, our 2010 base-year emissions were reviewed and recalculated in accordance with the Greenhouse Gas Protocol to incorporate the US-domiciled Stillwater operations acquired in 2017 as well as the DRDGOLD transaction concluded in July 2018.

The Intergovernmental Panel on Climate Change requires, by 2050, carbon emissions to decrease by 49% to 72%, relative to 2010 levels, and thereby to limit the increase in global average temperatures to below 2°C. We have aligned our carbon-emission reduction objectives accordingly and aim to reduce emissions annually by an average of 2.1%.

Our base-year (2010) Scope 1 and 2 emissions, incorporating Stillwater and the DRDGOLD transaction, amounted to 7,808,692 tonnes carbon dioxide equivalent (CO₂e).

Group Scope 1 and 2 carbon emissions declined by 14% from 2017 to 2018. Our carbon management activities (secondary sealing) at Beatrix reduced carbon emission levels by 198,522 tonnes (described on page 146).

See the fact sheet: Generating clean energy: the Beatrix methane capture and destruction project
SA operations
Annual total CO₂ emissions, Scope 1 and Scope 2, declined by 3.9% (2017: 2.0%) in 2018 to 5,525,134t CO₂e, exceeding our year-end target of 2.1%. On 5 February 2019, the Standing Committee on Finance adopted the Carbon Tax Bill. A carbon levy on petrol and diesel comes into effect from 5 June 2019. The financial impact of the carbon levy on petrol and diesel is estimated to be R2 million per annum (on the basis of the 2018 fuel consumption levels). Should the carbon tax levy be fully enforced, we would be liable for approximately R4 million per annum, based on current emission levels and where a carbon tax is levied on Scope 1 emissions (Phase 1 of carbon tax implementation). Phase 2 of carbon tax implementation is expected to begin in 2023 and it could be extended to include a tax on electricity. During Phase 2, the carbon tax on electricity purchased from Eskom could be passed on to consumers. We submitted our comments on the proposed Carbon Tax Bill to National Treasury on 9 March 2018, rejecting it on the basis of the financial impact on marginal operations. Scope 1 emissions (direct fuels) decreased by 28% year on year due primarily to reduction of fugitive mine methane as a result of the secondary sealing at Beatrix. Scope 2 emissions (purchased electricity) decreased by 12% primarily due to the implementation of energy efficiency projects.

The implementation of energy efficiency projects has been instrumental in the continuous reduction of our carbon footprint and therefore the potential carbon tax payable.

Operational changes, such as the cessation of underground mining at Cooke 1, 2 and 3 (reduction of 94,804MWh and 91,960tCO₂e in carbon emissions) as well as disruptions following safety related incidents at Kloof and Driefontein, power disruption earlier in the year at Beatrix, and damage to footwall infrastructure providing access to the western side of the Masakhane shaft contributed to the decreased consumption and emissions.

To maintain alignment with the long-term national emissions reduction trajectory, switching to low-carbon fuel sources where feasible is desirable. The first 50MW unit of the planned solar photovoltaic plant, to be constructed in the West Rand near the gold operations, is expected to be completed by late 2020, subject to final government approvals, and will reduce carbon emissions by 129,858t CO₂e per annum.

SA OPERATIONS: AIR QUALITY MANAGEMENT

A standardised procedure for air quality management monitoring and reporting was finalised in April 2018. This procedure standardises the dust management approach across SA operations.

Key developments during 2018 included active participation in the Highveld Priority Area Implementation Task Team to minimise emissions as well as the completion of an air impact assessment at the Burnstone operation. Burnstone is located in a declared air priority area.

While emissions from Burnstone are largely within legislated limits, air quality in the area is poor due to the cumulative effects of emissions from numerous non-mining related facilities. Burnstone has an approved dust management plan to minimise emissions.

A similar dust risk study was conducted at our SA PGM operations in 2018. The study provided a dust risk profile and quantified particulate matter emissions from major sources so that dust sources could be prioritised.

Quantification of emissions will also be used for annual emissions reporting to the Department of Environmental Affairs South African Atmospheric Emission Licensing and Inventory Portal in March 2019.

US PGM operations
Annual average Scope 1 and Scope 2 carbon emission levels declined by 5.0% (2017: -0.2%) in 2018 to 141,237 tCO₂e. Scope 1 emissions (direct fuel use) increased by 44% due to higher consumption of diesel for transportation and explosives usage related to the Blitz expansion project. Scope 2 emissions (purchased electricity) decreased by 48% primarily due to a change from a thermal to hydro source of electricity at the Stillwater mine and Columbus Metallurgical Complex.

The Stillwater mine is currently testing a battery powered load haul dumps off-shaft. Depending on testing, this may reduce Scope 1 emissions while correspondingly increasing Scope 2 emissions with battery charging. The US operations also continue to replace existing lighting fixtures with LED bulbs.

UNITY METALLURGICAL COMPLEX: AIR QUALITY MANAGEMENT

In parallel, management continues to

energY efficIency
SA operations
To counter the prospects of rising electricity costs in South Africa, management continues to pursue energy efficiency opportunities at our SA gold and PGM operations in order to limit or reduce the impact on our cost base.

In 2018, the SA gold operations consumed a total of 3.79TWh of electricity – an 8.9% reduction from 2017 consumption of 4.16TWh, largely as a result of energy efficiency improvements, mine incidents, the strike and Eskom interruptions. Successfully implemented energy-efficiency projects enabled 4.5% of the 8.9% reduction in consumption and saved R179 million in electricity expenditure. The SA PGM operations achieved a reduction in electricity consumption largely through footprint optimisation and mill reconfigurations.

In parallel, management continues to

Sibanye-Stillwater Integrated Report 2018 143
actively participate in several forums aimed at resolving the operational and financial woes faced by Eskom, and the mapping of its medium- to-long term path through the energy transition. These forums have included engagement with stakeholders such as Eskom, directly, government, the National Energy Regulator of South Africa, the Energy Intensive User Group and the Minerals Council South Africa. Sibanye-Stillwater also presented at the public hearings for Eskom’s Regulatory Clearing Account applications for Multi-Year Price Determination (MYPD) 3 (years two to four and, separately, year five) and MYPD4, advocating affordable electricity to ensure the sustainability of our operations and global competitiveness.

In terms of NRS048-9, in the event that Eskom cannot supply national electricity demand and institutes load shedding, the operations are issued a “load curtailment” instruction several hours in advance, calling for a managed electricity consumption reduction of 10% (Stages 1 to 2), 15% (Stage 3) or 20% (stage 4), depending on the severity of the event. In response to the load curtailment events experienced in Q4 2018 and Q1 2019 thus far, operations management has managed to minimise production losses and has put in place plans to limit any impact and risks associated with potential future load curtailment events.

Looking forward, the 2019 energy management strategy has been improved to focus on holistic energy efficiency using digital applications, such as digital twinning. The strategy will also continue to focus on ongoing improvements in the use of compressed air, pumping, ventilation and refrigeration, as well as the elimination of waste consumption, application of new technologies and footprint optimisation. This will ultimately reduce electricity consumption and expenditure. The new approach is expected to achieve a net electricity consumption reduction of approximately 2% in 2019.

As part of the medium- to-long term energy management strategy, Sibanye-Stillwater is still pursuing the first 50MW phase of its solar photovoltaic project to be built on a site strategically placed between the Driefontein and Kloof mining complexes on the West Rand. The project, originally envisioned in 2014, represents a partial solution to securing alternative electricity supply and enables the power generated to be injected directly into the mine’s electrical reticulation while reducing our overall electricity expenditure and carbon footprint. Sibanye-Stillwater elected to run a competitive tender process to appoint a developer who will build, own and operate the project, and sell power back to Sibanye-Stillwater through a power purchase agreement (PPA). This approach has a minimal upfront capital requirement for Sibanye-Stillwater and allows capital to be prioritised for core mining projects. The tender was successfully concluded in 2017, enabling a significant forecasted return to Sibanye-Stillwater over the course of the agreement. Although several regulatory delays were experienced in 2018, resolutions are expected to be reached in 2019. The PPA will then be executed and construction will begin.
US PGM operations

Electricity procurement at the US PGM operations follows two distinct schemes due to nuances in Montana’s electricity regulation laws. The Stillwater mine and Columbus Metallurgical Complex can purchase power on the wholesale market as a “choice” customer. The East Boulder mine is required to procure power from a local rural electricity co-operative. In July 2018, the Stillwater mine and Columbus Metallurgical Complex signed a new contract to purchase power from a hydro-electric dam in north central Montana owned and operated by a local Native American tribe. This contract replaced another that sourced power from thermal resources.

In addition to electricity sourcing, the US operations have been actively engaged in LED lighting changes, implementing as needed, secondary ventilation, testing battery-powered equipment, identifying and repairing air and water leaks, employing variable-frequency drives to control pump motors, reducing peak-energy demand, and using soft-starts on all large stationary equipment.

Electricity consumption (TWh)

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<td></td>
</tr>
<tr>
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<td>4.16</td>
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<td>0.65</td>
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<td>East Boulder</td>
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<td>6.48</td>
<td>5.82</td>
<td>4.21</td>
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1 Includes Burnstone’s consumption of 0.02 TWh
2 May to December 2017
3 Includes the Columbus Metallurgical Complex
4 Includes Marikana
5 Restated due to totalling errors

Energy intensity (GJ/tonne milled)

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<tr>
<td>Gold</td>
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<td>East Boulder</td>
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<td>0.69</td>
<td>0.68</td>
<td>1.02</td>
<td>0.98</td>
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1 May to December 2017
2 Includes the Columbus Metallurgical Complex
MINIMISING THE ENVIRONMENTAL IMPACT

SA operations: Energy efficiency project savings

<table>
<thead>
<tr>
<th>Project Description</th>
<th>MWh</th>
<th>t CO₂e</th>
<th>Potential carbon tax savings (R)*</th>
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<tr>
<td>Ventilation fans and cooling networks optimisation</td>
<td>19,997</td>
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<td>Air and water circuits optimisation</td>
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<td>98,570</td>
<td>4,731,372</td>
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<td>Variable speed drive controls on drive motors</td>
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<td>375,793</td>
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<tr>
<td>Efficiencies from use of turbines</td>
<td>12,115</td>
<td>11,752</td>
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<tr>
<td>Three-chamber pump system deployment</td>
<td>884</td>
<td>857</td>
<td>41,138</td>
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<td>Reduction of electrical distribution footprint</td>
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<td>1,699</td>
<td>81,573</td>
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<td>Shaft decommissioning</td>
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<td>Compressor discontinuation</td>
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<td>15,331</td>
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<td><strong>Total</strong></td>
<td>168,658</td>
<td>163,599</td>
<td>7,852,732</td>
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* Potential carbon tax savings premised on the tax on electricity coming into effect

Total CO₂e emissions: Scope 1, 2 and 3 (000t CO₂e)

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<td>Gold</td>
<td>Group</td>
<td>PGM</td>
</tr>
<tr>
<td>Total</td>
<td>203</td>
<td>46</td>
<td>44</td>
<td>113</td>
<td>196</td>
<td>32</td>
</tr>
<tr>
<td>Scope 1 (excl. fugitive mine methane)</td>
<td>366</td>
<td>NA</td>
<td>NA</td>
<td>366</td>
<td>565</td>
<td>NA</td>
</tr>
<tr>
<td>Scope 2</td>
<td>5,097</td>
<td>95</td>
<td>1,398</td>
<td>3,604</td>
<td>5,837</td>
<td>183</td>
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<tr>
<td>Scope 3</td>
<td>2,157</td>
<td>569</td>
<td>995</td>
<td>593</td>
<td>2,539</td>
<td>544</td>
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<tr>
<td>CO₂e intensity (per tonne milled)</td>
<td>0.14</td>
<td>0.11</td>
<td>0.07</td>
<td>0.24</td>
<td>0.13</td>
<td>0.01</td>
</tr>
</tbody>
</table>

1 January to December 2017 in accordance with World Resources Institute Greenhouse Gas Protocol

For Scope 3 emissions from the US operations during 2017 and 2018, in the absence of a site-specific or US country-specific emission factor, the South African-specific emission factor is used for the Stillwater operations as the bulk of Sibanye-Stillwater’s emissions emanate from the SA operations. The US operations continue to refine the processes for the reporting of information for the Scope 3 categories.

Scope 3 categories as per the World Resources Institute supplementary document “Corporate value chain (Scope 3) accounting and reporting standard”) not included:

- Business travel at the US operations is not tracked and not yet reported
- Upstream leased assets: no significant upstream leased assets have been identified
- Use of sold products: emissions associated with use of products sold are deemed insignificant as only processing and end-of-life treatment of products sold are expected to have significant associated emissions
- Franchises: Sibanye-Stillwater does not have franchises

Scope 3 categories included:

- Purchased goods and services: CO₂e emissions associated with extraction and production
- Capital goods: CO₂e emissions associated with production of purchased company-owned vehicles
- Fuel- and energy-related emissions not included in Scope 1 or Scope 2: emissions associated with extraction, production and transportation of diesel, petrol, liquid petroleum gas, coal, blasting agents, oxyacetylene and grid electricity
- Upstream transportation and distribution: CO₂e emissions associated with transportation and distribution of purchased commodities
- Waste generated in operations: CO₂e emissions associated with disposal and treatment of Sibanye-Stillwater’s solid waste and wastewater in facilities owned or operated by third parties (such as municipal landfills and wastewater treatment facilities)
- Business travel: CO₂e emissions associated with employees work-related travel for the SA operations
- Employee commuting: CO₂e emissions associated with transportation of Sibanye-Stillwater’s employees between homes and work sites
- Downstream transportation and distribution: CO₂e emissions associated transportation of products from Sibanye-Stillwater sites
- Processing of sold products: CO₂e emissions associated with smelting to repurpose products
- End-of-life treatment of sold products: CO₂e emissions associated with smelting to repurpose products
- Downstream leased assets: CO₂e emissions associated with the leasing of houses where emissions are generated from electricity use at the SA operations
- Investments: CO₂e emissions from investments
Nitrogen oxide and sulphur dioxide emissions ¹ (tonnes)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen oxides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA operations</td>
<td>1,119</td>
<td>1,126</td>
<td>887</td>
<td>618</td>
<td>19,901</td>
<td>14,618</td>
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<tr>
<td>US operations</td>
<td>112</td>
<td>105</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Group</td>
<td>1,231</td>
<td>1,231</td>
<td>887</td>
<td>618</td>
<td>19,901</td>
<td>14,618</td>
</tr>
<tr>
<td>Sulphur dioxides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SA operations</td>
<td>656</td>
<td>605</td>
<td>667</td>
<td>499</td>
<td>632</td>
<td>464</td>
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<tr>
<td>US operations</td>
<td>4</td>
<td>6</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Group</td>
<td>660</td>
<td>611</td>
<td>667</td>
<td>499</td>
<td>632</td>
<td>464</td>
</tr>
</tbody>
</table>

¹ January to December 2017
² Nitrogen oxide and sulphur dioxide emissions for the SA and US operations are derived by the multiplication of fuels (diesel, petrol, liquid petroleum gas, coal, helicopter fuel and paraffin) by the corresponding emission factors. The US operations also include SO₂ emissions from the Columbus Metallurgical Complex

WASTE MANAGEMENT

Sibanye-Stillwater aims to act responsibly in terms of waste management through the implementation of existing waste management procedures based on the current environmental policy statement: “efficient use of resources and responsible management of all waste streams”.

Waste management (Mt)

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
</tr>
<tr>
<td>Tailings deposited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailings storage facilities</td>
<td>18.94</td>
<td>0.67</td>
<td>4.86</td>
<td>13.41</td>
<td>32.70</td>
<td>0.39</td>
<td>17.05</td>
<td>15.26</td>
<td>26.16</td>
<td>10.7</td>
<td>15.46</td>
<td>14.31</td>
<td>15.73</td>
<td>13.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailings into pits</td>
<td>3.89</td>
<td>NA</td>
<td>0</td>
<td>3.89</td>
<td>3.27</td>
<td>0</td>
<td>0</td>
<td>3.27</td>
<td>4.02</td>
<td>0</td>
<td>4.02</td>
<td>4.20</td>
<td>3.79</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste rock</td>
<td>6.44</td>
<td>1.3</td>
<td>5.14</td>
<td></td>
<td>3.39</td>
<td>0.87</td>
<td>12.52</td>
<td>0</td>
<td>4.20</td>
<td>2.22</td>
<td>0.18</td>
<td>7.14</td>
<td>0.60</td>
<td>0.76</td>
<td></td>
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</tr>
<tr>
<td>Recycled waste</td>
<td>12.18</td>
<td>0.69</td>
<td>0</td>
<td>11.49</td>
<td>11.45</td>
<td>0</td>
<td>0</td>
<td>11.45</td>
<td>12.09</td>
<td>0</td>
<td>12.09</td>
<td>11.34</td>
<td>11.96</td>
<td>13.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mining waste</td>
<td>29.27</td>
<td>1.97</td>
<td>10.00</td>
<td>17.30</td>
<td>39.36</td>
<td>1.260</td>
<td>19.57</td>
<td>18.53</td>
<td>32.61</td>
<td>12.92</td>
<td>19.69</td>
<td>25.65</td>
<td>20.12</td>
<td>13.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ May to December 2017
² Nine months for Kroondal and two months for Rustenburg operations
³ Gold-bearing material such as waste rock dumps retreated at plant
MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

Materials consumed

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>PGM</td>
<td>PGM</td>
<td>Gold</td>
<td>Total</td>
<td>PGM</td>
</tr>
<tr>
<td>Timber (t)</td>
<td>85,564</td>
<td>146</td>
<td>14,193</td>
<td>71,225</td>
<td>117,706</td>
<td>263</td>
</tr>
<tr>
<td>Cyanide (t)</td>
<td>3,450</td>
<td>NA</td>
<td>NA</td>
<td>3,450</td>
<td>7,552</td>
<td>NA</td>
</tr>
<tr>
<td>Explosives (t)</td>
<td>30,437</td>
<td>4,331</td>
<td>21,920</td>
<td>4,186</td>
<td>31,942</td>
<td>3,893</td>
</tr>
<tr>
<td>Hydrochloric acid (t)</td>
<td>5,148</td>
<td>1</td>
<td>0</td>
<td>5,147</td>
<td>4,469</td>
<td>0.4</td>
</tr>
<tr>
<td>Caustic soda (t)</td>
<td>2,632</td>
<td>0</td>
<td>0</td>
<td>2,384</td>
<td>3,378</td>
<td>204</td>
</tr>
<tr>
<td>Lime (t)</td>
<td>50,278</td>
<td>0</td>
<td>0</td>
<td>50,278</td>
<td>72,378</td>
<td>NA</td>
</tr>
<tr>
<td>Cement (t)</td>
<td>19,809</td>
<td>3,454</td>
<td>8,294</td>
<td>8,062</td>
<td>60,706</td>
<td>16,459</td>
</tr>
<tr>
<td>Diesel (kL)</td>
<td>26,903</td>
<td>8,766</td>
<td>12,635</td>
<td>5,502</td>
<td>26,059</td>
<td>7,344</td>
</tr>
<tr>
<td>Lubricating and hydraulic oil (kL)</td>
<td>8,730</td>
<td>447</td>
<td>6,817</td>
<td>1,466</td>
<td>7,170</td>
<td>565</td>
</tr>
<tr>
<td>Grease (kg '000)</td>
<td>154</td>
<td>15</td>
<td>17</td>
<td>122</td>
<td>224</td>
<td>11</td>
</tr>
</tbody>
</table>

1 Represents January to December 2017 figures while Sibanye-Stillwater consumption is only from May to December 2017
2 Includes operations under management: Kroondal (50%) from April to December 2016 and Rustenburg from November to December 2016

At the gold operations, changes such as the cessation of underground mining at Cooke 1, 2 and 3 as well as disruptions following safety related incidents at Kloof and Driefontein, power disruption earlier in the year at Beatrix and the transfer of transfer of Driefontein 2 and 3 gold plants to DRDGOLD from August 2018 has contributed to a general decrease in the volume of materials consumed in 2018 as compared to 2017. During 2018, the volume of surface material processed at the gold plant increased to compensate for the lower tonnage from underground. The mineralogy of surface material required a higher strength of hydrochloric acid for effective processing and which resulted in increased quantities of hydrochloric acid in 2018.

In reference to materials consumed by the US PGM operations, a comparison of year-on-year use showed a reduction in timber use, cement and hydraulic oils while increasing use of greases. All other parameters remained essentially unchanged. While explosives and diesel show increased use, the values reflected in the table above compare eight months of use in 2017 versus 12 months in 2018. As a result, for explosives and diesel (year-on-year), these values are essentially the same when reconciled for a full 12-month period.

Timber is used at the mines for ground support and backfill activities. Annual use is dependent on the type of rock encountered underground, mining method, backfill type and the need for additional ground support. Less timber was needed for these activities in 2018 as a result of better ground conditions during the year and the type and location of backfill activities.

Similarly, cement use decreased significantly during 2018 as a result of less paste backfill and improved ground conditions resulting in lower shotcrete requirements. Lower hydraulic oil use was observed as a result of improved equipment operation and maintenance activities including more frequent “greasing” of equipment which resulted in higher grease use.

**SA gold and PGM operations**

Our gold operations focused on improving waste record keeping and licensing management in 2018 to ensure compliance with legislation at national and regional levels, specifically in terms of the National Environmental Management: Waste Management Act, and its associated standards and regulations.

A focused sewage sludge initiative began in 2018 and progress will be reported in 2019. The project aims to investigate the beneficial use of sewage sludge waste that is typically sent to landfill and classified as hazardous.

In-vessel composting technology was purchased for two of the gold operations as a pilot with the following benefits:

- Sewage sludge waste treated to acceptable standard for beneficial use as compost or fertiliser for rehabilitation and/or agricultural applications
- Decrease in resource requirements for disposal and management of sewage sludge
- Reduced greenhouse gas emissions
- Opportunities created for community and municipal involvement as well as expansion of the composter at other operations or in applications such as food waste processing

At Sibanye-Stillwater, a waste minimisation plan is being developed for the SA PGM operations in line with our aim to have zero waste to landfill by 2030.

The National Environmental Management: Waste Management Act: National Information Regulations requires that certain waste generators are registered with the national and regional waste information systems. The need to report on waste information is defined according
to the type and quantity of waste produced by a waste generator. The Driefontein gold operation was the only operation that required registration in 2018 while the SA PGM operations were already registered. The regulations highlight the importance of accurate waste record-keeping.

Progress was made with the planned donation of a portion of mine land (119 hectares) on which the Waterval landfill is located, to the Rustenburg Local Municipality. Through the donation process, Sibanye-Stillwater will relinquish the liability for closure and will only be responsible for the latent or residual liabilities or impacts, pollution and ecological degradation emanating from the previous use of the site for mining-related activities.

**US PGM operations**

Hazardous and non-hazardous waste generation rates at the US operations remained essentially unchanged during the year. The Stillwater and East Boulder mines are identified as conditionally exempt small-quantity generators by the EPA while the Columbus Metallurgical Complex is a large-quantity generator as a result of lead waste generation from the fire-assay process in the laboratory. Both mines continue to generate small quantities of hazardous waste associated with aerosol can disposal and the occasional need to dispose of waste chemicals. For many years, the US PGM operations have implemented a new product review process: any products proposed for use on site must first undergo an extensive chemical review by the environmental and safety departments. If the proposed product contains any chemicals that present a safety or environmental risk, they are rejected and not allowed on site. This process has enabled our waste generation rate to remain low.

During 2018, the Stage 2, Phase 1 section of the East Side waste dump at the Stillwater mine was lined to collect all meteorological water passing through the dump and leaching residue nitrogen from the waste rock. There are four proposed lining stages for the waste dump with Stage 1 complete and Stage 2, Phase 1 complete. All “new” waste rock generated at the Stillwater mine is placed on a liner. The lining also serves to cap existing, historic waste rock not placed on the liner. The Stage 2, Phase 2 liner is scheduled for installation in the spring of 2019 while Stage 3 and Stage 4 are scheduled for later years depending on waste rock production rates. Similarly, at the East Boulder mine, the waste rock lining system was completed in 2016 and all waste rock is now stored on liners for water collection. At both mines, the water collected from the waste rock lining systems is transferred to the water treatment plants for denitrification and water management.

Both mines continued with extensive future waste rock and tailings design and permitting efforts, including identification of best available technologies, site investigations, alternatives assessments, failure modes effects analysis, and multiple accounts analysis for the various waste rock and tailings storage alternatives. These activities and efforts were all completed in collaboration with stakeholders including the Good Neighbors, regulatory agencies, independent review panel experts, and local communities. During the year, the Stage 6 expansion of the East Boulder tailings storage facility was submitted to the agencies for permitting while efforts continue for preparation of the plan of operations Amendment for the future Lewis Gulch tailings storage facility and the Dry Fork waste rock storage dump at East Boulder. At Stillwater, similar activities are underway for a Plan of operations amendment for the Hertzler Stage 4/5 tailings storage facility expansion and an expansion of the east side waste rock storage dump. In both cases, the plan of operations amendment is targeted for submission in Q4 2019, which will initiate a multi-year environmental review and assessment by the permitting agencies.

At the Columbus Metallurgical Complex, efforts for the year focused on routine maintenance and cleanout of the SO2 regeneration circuit and ongoing management of the gypsum by-product. During the year, approximately 450t of calcified scale was cleaned from the regeneration circuit and properly managed. This maintenance activity will ensure the ongoing successful operation of the SO2 removal circuit for future years at the smelter. Additionally, the US operations continue to pursue a long-term gypsum management strategy. During the year, a long-term management contract was established with a local landfill, investigations were conducted for a company-managed long-term gypsum storage repository, relationships were established with area farmers for ongoing gypsum agriculture use, and testing was initiated for possible use of the synthetic gypsum in a cement plant in Montana.
MINIMISING THE ENVIRONMENTAL IMPACT CONTINUED

REHABILITATION AND CLOSURE

Our concurrent rehabilitation and closure strategy considers the protection of land and biodiversity to ensure post-mining land uses acceptable to stakeholders. Rehabilitation plans promote indigenous vegetation growth and aim to return land to a pre-mining state, weighed against socio-economic development requirements as well as the views of impacted mining communities insofar as end land use is concerned.

Refer to the 2018 Group Annual Financial Statements

Our management processes contribute to the conservation of biodiversity and integrated approaches to land use planning, as guided by the ICMM.

SA operations

At our SA operations, new mine developments undergo a detailed environmental impact assessment process in which all protected areas and the potential impacts from development are identified in line with the national environmental legislation. Mitigation actions and plans are included in environmental management programmes for which approval is sought from the regulatory authorities. Where development needs to occur in ridges and wetlands, we apply for licensing, and specific mitigation measures are proposed and signed off by the relevant regulatory authority before implementation. Scientific information on mine closure and rehabilitation as well as biodiversity aspects are continuously generated by professional scientists and other experts, and disseminated to the mining industry through the Minerals Council’s Environmental Policy Committee, the South African Mining Biodiversity Forum, relevant catchment management forums, the Land Rehabilitation Society of Southern Africa as well as conferences and research projects.

Total closure liability for the SA operations as at 31 December 2018 (including our portion of environmental liability in joint ventures and projects) was R7.1 billion. Of this, R2.8 billion was for the PGM operations and R4.3 billion for the gold operations. The inclusion of 15% VAT, as currently proposed in draft legislation, would add approximately R1.1 billion to the cost. We await the anticipated issuance of the draft financial provisioning regulations for public review and comment.

The closure plans have focused specifically on redundant buildings and infrastructure as well as infrastructure on prolonged care and maintenance.

At our PGM operations, R1.15 billion (43%) of the total provision of R2.8 billion was identified for potential permanent closure. Care and maintenance opportunities at our gold operations include the Libanon 9 and Beatrix 2 shafts with a closure provision of R26.4 million. Execution of the closure liability reduction projects and initiatives identified is subject to, among others, finalisation of the mine plans for 2019 and beyond.

US PGM operations

In addition to responsible closure and reclamation, the US operations have conservation easements on nearly 40% of its owned land. These legal mechanisms protect scenic vistas, enhance wildlife habitat, and preserve wildlife migration corridors, while maintaining Montana’s rural character and fostering biodiversity and healthy forests.

Reclamation and closure bonds are required at both mines in the US to ensure adequate resources are available to fund reclamation activities at closure. The amounts are adjusted at least every five years or as required by expansion and disturbance requirements following a collaborative review by the US and its regulatory agencies. Based on the five-year review, the East Boulder mine is scheduled for review in 2019 while the Stillwater mine is scheduled for 2020. State and federal regulatory authorities initiate and complete these reviews. The US operations assist in these reviews, provides information and data as requested, and ultimately sign off in agreement with the agency review and calculation.

During the year, US$1 million of additional bond was included for the Stillwater mine to address ongoing expansion activities associated with Blitz. This included the addition of the rail-dump expansion, the 50E north portal addition, the 13.8 surface ventilation breakouts, and water treatment expansions. The reclamation and closure bond is currently US$25.3 million at the Stillwater mine, including the Benbow Portal, and US$18.0 million at the East Boulder mine. An additional US$0.3 million is held for exploration activities not directly tied to either mining operation, for a total of US$42.6 million.

Of the 643 hectares permitted for disturbance, 71% has been disturbed for a total of 457 hectares. Of that total, 236 hectares have been reclaimed for a total of 52% of all disturbance. To date, the US operations have not requested any bond release associated with those 236 hectares.

The US operations have also initiated closure of the original tailings storage facility at the Stillwater mine.
SA OPERATIONS: HERITAGE ASSESSMENTS

All environmental impact assessments include heritage assessments – as indicated below for our gold operations:

- **Beatrix** – No sensitive heritage resources identified
- **Burnstone** – Cemetery dating back to 1933
- **Driefontein** – Sites of archaeological importance found (houses, ruins, workshops, headgear, hostels, graves and graveyards, Iron Age sites, kraals, huts, Anglo-Boer War stone-packed structures, religious sites and dilapidated buildings)
- **Ezulwini** – Sites of cultural significance identified (cemeteries, historic structures, cultural practice areas and Late Iron Age archaeological sites)
- **Kloof** – Sites of archaeological importance identified (Iron Age settlements, kraals, historic buildings, cemeteries, historic shops and farms, and Pullinger shaft)
- **Rand Uranium** – Graves identified

US PGM operations: Land under management and rehabilitated in 2018 (hectares)

<table>
<thead>
<tr>
<th></th>
<th>Total and/or permitted</th>
<th>Disturbed</th>
<th>Undisturbed</th>
<th>Rehabilitated/reclaimed</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Boulder</td>
<td>132.9</td>
<td>86.3</td>
<td>46.6</td>
<td>20.8</td>
</tr>
<tr>
<td>Stillwater</td>
<td>427.9</td>
<td>357.7</td>
<td>70.2</td>
<td>215.0</td>
</tr>
<tr>
<td>Columbus Metallurgical Complex</td>
<td>82.6</td>
<td>13.0</td>
<td>69.6</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>643.4</strong></td>
<td><strong>457.0</strong></td>
<td><strong>186.4</strong></td>
<td><strong>235.8</strong></td>
</tr>
</tbody>
</table>

FUTURE FOCUS

**SA operations**

- Broad alignment of the US PGM and SA operations Environmental Vision, values and practices to the key principles and philosophies that underscore the ESG criteria
- ISO 14001 implementation planned by 2022 with a comprehensive gap analysis across all the operations planned for 2019
- Challenging the complex legislative environment such as the financial provision legislation and carbon tax to develop greater clarity and certainty
- Proactive participation to drive a regional water closure strategy with closer alignment and co-operation between industry, community, local and national government
- Comprehensive carbon footprint disclosure and reduce our carbon footprint through implementation of emission reduction measures
- Improving verifiable compliance to conditions in water use licences, environmental management programmes, atmospheric emissions licences and other regulatory, legal and generally accepted standards
- Reduce overall closure liability, through a focused and cost-effective concurrent rehabilitation programme

**US PGM operations**

- Good Neighbor Agreement and other stakeholder collaboration
- Environmental management system gap analysis and programme definition
- Streamlining toxic inventory reporting
- Implementation and testing of the GNA adaptive management plans
- Technology enhancement
- Integrated waste management permitting (long-term) for tailings and waste rock
- Long-term gypsum management strategy
- Strategic land acquisitions
- Completion of an independent bond review
- Automation of tailings operation, maintenance and surveillance programs
- Reduction in petroleum releases and spills

“Legal mechanisms protect scenic vistas, enhance wildlife habitat, and preserve wildlife migration corridors”