Watercourse Impact Audit

October 2022

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Contents

Introduction and Scope

An environmental audit regarding water management was required as part of the water use licence application.

This assessment focuses on compliance with legal requirements and the site's own systems and procedures as well as on impacts with regards to watercourse characteristics namely surface flow, interflow, groundwater flow, water quality, geomorphology, habitat and biota. Site visits and document review was conducted and information from recently conducted specialist studies were used to reach conclusions. The audit was limited to the activities and areas visited within the geographic location of the site, as well as available documentation and interviews with employees.

The aim of the audit was therefore to identify deviations from the applicable requirements of environmental laws, procedures and policies, on a sample basis, as well as to identify impacts with regards to watercourse characteristics required as part of the Water Use Licence Application.

An audit of this nature focuses on the negative, although many positive developments may have been noted.

Locality

The location of the Lafarge Cement Plant and Tswana Quarry are presented in Figure 01. As depicted in this map, the cement plant is located 2 km northeast of Lichtenburg town, within the Ditsobotla Local Municipality of the North West Province. A site plan of the project site presenting the cement plant, unnamed drainage line and culverts are provided in Figure 02.

Hydrologically, the study area is located in Quaternary Catchment C31A, within the Lower Vaal Water Management Area (WMA No. 11). The Mean Annual Precipitation (MAP) of the study area is 614 mm and the Mean Annual Evaporation (MAE) of the study area is 1 860 mm, as per the Water Resources of South Africa 2012 (WR2012) study.

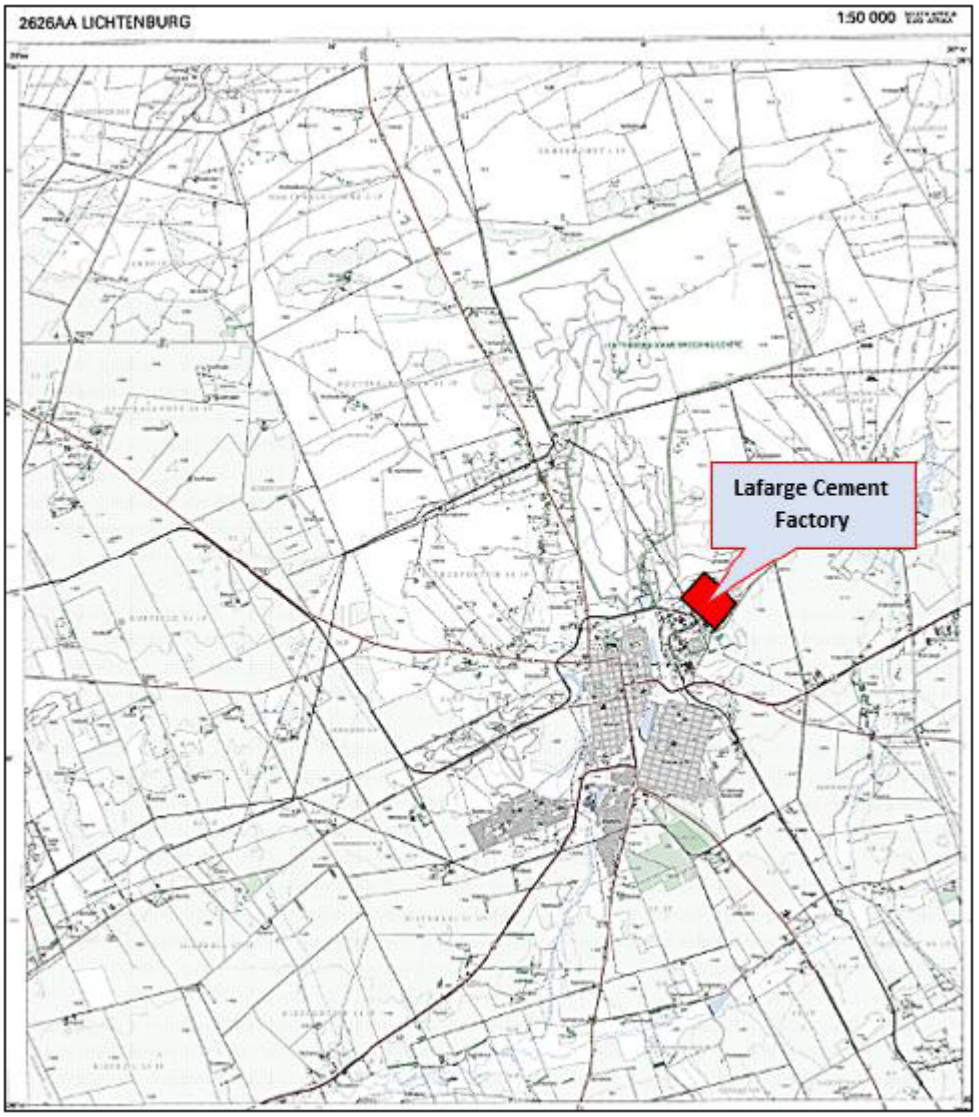

Figure 01: Locality of the cement factory in Lichtenburg

Site Description

The project site consists of a cement factory. At the cement plant, a process of grinding and burning takes place. Fine grinding produces a fine powder (known as raw meal), which is preheated and then sent to a Kiln. The material is heated to approximately 1 500°C before being rapidly cooled. This produces clinker, the basic material required for the production of all cements. The final manufacturing process involves cement grinding and shipping. A small amount of gypsum (3-5%) is added to the clinker to regulate how the cement will set. The mixture is then very finely ground to obtain “pure cement”. During this phase, different mineral materials, called “cement additives”, may be added alongside the gypsum. Used in varying proportions, these additives,

which are of natural or industrial origin, give the cement specific properties such as reduced permeability, greater resistance to sulphates and aggressive environments, improved workability, or higher-quality finishes. Finally, the cement is stored in silos before being shipped in bulk or in bags to the sites where it will be used.

The project site is located on relatively flat terrain. As presented in Figure 02, a single natural drainage line is located along the eastern boundary of the project site. This drainage line stems from an area that was once mined, and has a catchment area of approximately 5.5 km2 at the point where the drainage line intersects with the Lafarge property. The unnamed drainage line is a tributary of the Groot Harts River, which is a perennial river and contributes flow to the Barberspanand and Beiesiesvlei downstream of the Lafarge Cement Plant.

Lafarge had unlawfully carried out the following activities in terms of regulations under NEMA without prior authorisation:

• Infilling of a watercourse, and or a wetland, with more than 10 cubic metres of material; and

• The clearing of indigenous vegetation.

The non-compliance was based on a time series of Google Earth images. At the time of a site visit by a wetland specialist on 30 March 2021 it was observed that the area in question had indeed been used as a spoil site, and the progression of the infilling could be confirmed through the assessment of historical aerial imagery.

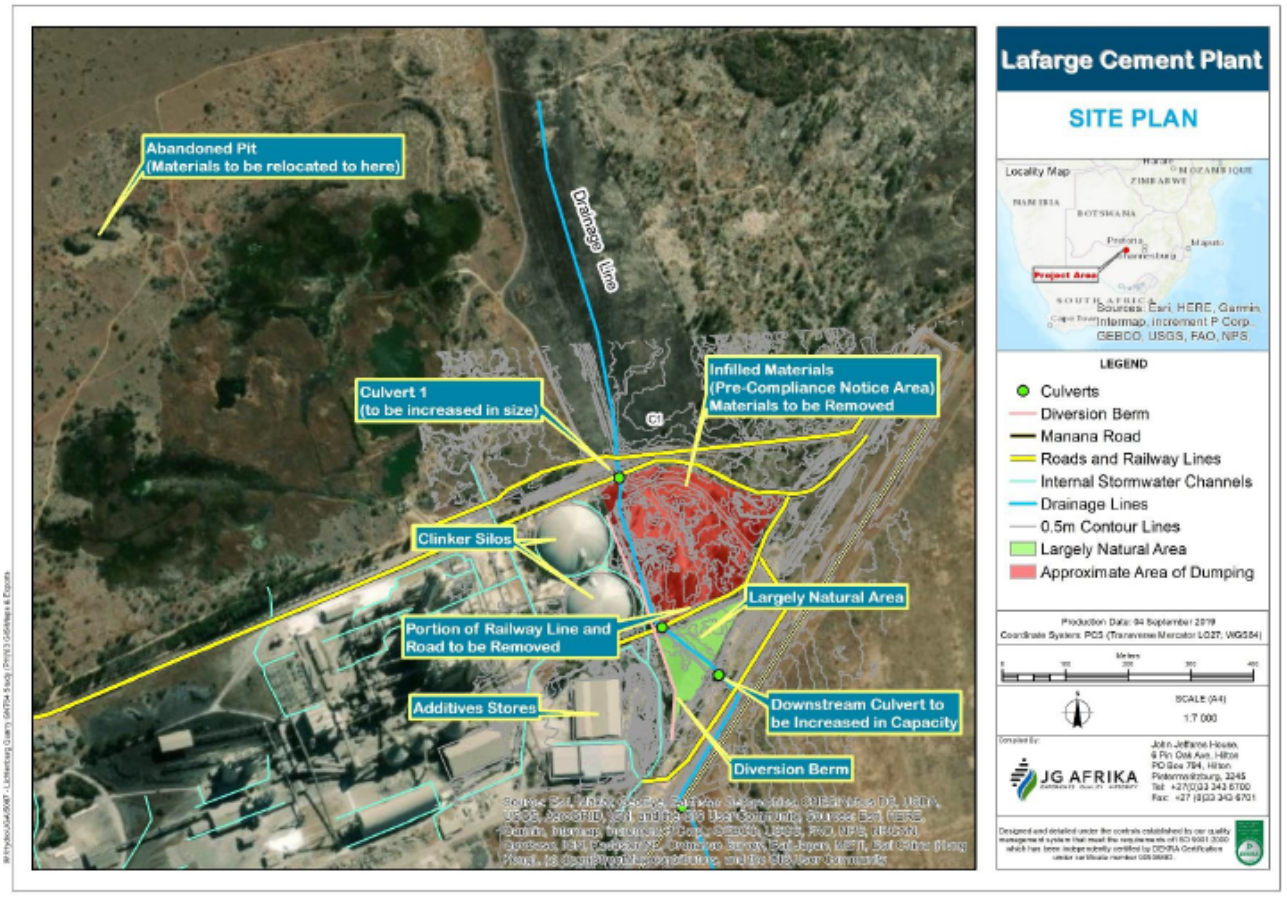

Figure 02: Lafarge Lichtenburg site plan for rehabilitation

Compliance with legal requirements

Security measures to prevent public access to pollution control measures / equipment

APPLICABLE LEGAL REQUIREMENTS:

In terms of Regulation 8 of GN 704 of 4 June 1999 – Regulations on the use of water for mining and related activities aimed at the protection of water resources, promulgated by DWS in terms of the National Water Act, 1998 as well as the general principles in the National Environmental Management Act, 1998, measures need to be implemented to protect pollution control measures as well as prevent public from having access to high risk areas (e.g. drowning, pollution etc.) The regulations require fencing off of certain dams / impoundments as well as the provision of adequate warning notices.

Audit Results:

1. Access control at high risk areas and/or pollution control equipment to prevent injury to employees or public and/or harm to the environment and to prevent unauthorised access to MR Deposits and Stockpiles: (GN 704 of June 1999 – Regulation 8 and GN R632 of 24 July 2015 – Regulation 9(1)(d))

1.1 Dams – Fencing and notice board warnings at dams containing poisonous, toxic or injurious substances and security measures to limit unauthorised access, security measures to protect pollution control equipment and security access to MRD's and infrastructure: (GN 704 of 4 June 1999 – Regulation 8(a), (b) and (d) and GN R632 of 24 July 2015 – Regulation 9(1)(d))

The Cement Plant, Lovedale and Tswana Quarries have access control in place. The Townlands Quarry area has also been fenced in with warning notices. During the site visit it was also noted that fencing, warning signs and notice boards were in place. Warning signs on the risks at the PEAT area were also noted.

1.2 Use of dams / Mine Residue Deposits for other purposes: (GN 704 of 4 June 1999 – Regulation 8(c))

No concerns were noted on the using of dams for other purposes.

1.3 Sewage Plant: (Stewardby Township)

Danger signs in respect of the electric fence were in place.

Finding: *No warning signs were in place at the partially flooded pits outside the electric perimeter fence, which contained screenings from the Sewage Plant, as well as burning garden and other waste. Ponding has also occurred outside the electric perimeter fence, which may present health hazards and even a risk of drowning to smaller children.*

Water Management to prevent / impact on Water Resources and the provision of water and sanitation services

APPLICABLE LEGAL REQUIREMENTS:

Water conservation and water demand management must form the basis on which water management is planned and implemented and is regulated by Section 21, 22, as well as GN 704 of 4 June 1999 – Regulations on the use of water for mining and related activities aimed at the protection of water resources. Almost all authorisations will stipulate obligation on the holders of the authorisation on such management. Relevant to water use activities, if any activity does not fall within the parameters of a published General Authorisation, or is not listed in Schedule 1 to the National Water Act, 1998 or is "an existing lawful water use", a Water Use /licence (WUL) is required for any water use activity listed in Section 21(a) – (k) of the said Act. Strict compliance to the conditions of the licence is required. Section 19 of the National Water Act, 1998, places a positive obligation on owners or users of land to protect surface and groundwater resources. To further protect water resources, DWS published regulations specifically applicable to mines in GN 704 of 4 June 1999 – Regulations on the use of water for mining and related activities aimed at the protection of water resources. The Regulations require adequate separation of clean and affected water, containment of affected water for re-use, recycling or evaporation, prevention of seepage and/or run-off of affected water from mine residue deposits and stockpiles, prohibition on any assessment of locality of new structures to prevent pollution of surface and/or groundwater, including riparian habitats of surface water resources. Water systems need to be adequately designed, constructed and maintained and must be able to service water during normal operations and up to the 1:50 year flood event. Relevant to water care works, Registration and Operational Permits from DWS are required for the operation of a water and sewage treatment plant as per GN R2834 of 27 December 1985 – Regulations for the erection, enlargement, operation and registration of water care works. These permits will reflect the classification of the plant and the qualifications of the operators of the facility, must comply with the classification of the facility. Annual information on the qualification and training of operators must be submitted to DWS. The quality of the water from the water treatment plant must comply with the national standard for drinking purposes SANS 241 – Drinking Water and any applicable IWUL. The quality of the treated water from the effluent plant will depend on the IWUL if any water is discharged to a watercourse . Draft regulations were published by DWS in GN R813 of 23 October 2013 – Regulations relating to Compulsory National Standards for Process Controllers and Water Services Works, but have not been put into effect. Further, in terms of the Water Services Act, 1997 (Act No 108 of 1997), no person may use water services from a source other than a water service provider nominated by the water service authority for the area. No person may obtain water for industrial use from any

source other than the distribution system from the water service authority, without approval. Industrial effluent may also not be disposed of in any other manner than the manner approved by the water service authority in the area. If water services are provided on behalf of a water service authority, it must be in terms of written agreement and approval in terms of Section 22 of the Act. Copies of any new or amended approved EMPr must also be submitted to DWS. Further, 60 days prior to the construction of any surface dam for waste, waste water and slurry, implementation of pollution or water control measures at mine residue deposits or stockpiles, plans, specifications and design reports approved by the engineer must be submitted to DWS.

Audit Results:

Background on surface and groundwater:

Cement manufacturing is a dry process and water is mostly used for washing, cooling, dust suppression, irrigation and domestic purposes. The Cement Plant, Townlands and Lovedale Quarries are located in the C31A drainage region with the Groot Harts River flowing south-west. A wetland is located to the east of the Cement Plant draining into the Groot Harts River. The Tswana Quarry is located in the quaternary catchment D414A, with the Polfontein Spruit flowing north west to the north of the Quarry. As per the 2017 Geohydrological Study, due to a lack of surface water resources, the town of Lichtenburg, industries, agriculture and Lafarge obtains a large volume of water from groundwater, via abstraction boreholes. Groundwater pollution, a shallow water table and over abstraction are critical risks to groundwater which requires close and constant monitoring.

Water used and supplied for domestic purposes by the Municipality and Lafarge is abstracted from three (3) boreholes. BH1 and BH2 are located less than 900 m downgradient from the Lichtenburg wellfield and BH3 located north-east of the Cement Plant. Water abstracted from BH2 is used for domestic and garden purposes and water from BH1 for drinking water in the Cement Plant and the Village. Water in the Townlands pit consists of the Cement Plant return water, rainwater, storm water run-off from the Cement Plant, as well as top-up water from BH3 when necessary. The water is pumped to the Cement Plant in pipes for equipment cooling. The water used for equipment cooling does not come into direct contact with the cement manufacturing process as it remains in the pipes. The water is cooled below ambient temperatures in cooling towers before re-entering Townlands pit. The Stewardby Sewage Plant located across Manana Road is currently not in use.

Waste water is removed using honeysuckers and disposed at the Municipal waste water treatment works until the refurbishment of the Lafarge Stewardby Sewage Plant is completed. Due to the shallow water table, groundwater is abstracted from the tunnels in the Cement Plant and runs towards the storm water channel leading to the Townlands Pit.

At Lovedale Quarry, minimal water is used, as the mine is being rehabilitated. Water is abstracted from a Quarry and pumped to the Workshop. At the active Tswana Quarry, water is abstracted from the South Sump, Far South Sump, as well as a borehole and pumped into the Main Dam. The water in the Main Dam is used for irrigation and dust suppression. Potable water from the borehole is pumped to the Reservoir for domestic use.

1. Water used for domestic purposes: (WSA, 1997 and SANS 241: Drinking Water)

Water used for domestic purposes is monitored at four (4) localities by Aquatico Scientific (Pty) Ltd (Aquatico) on a monthly basis.

No concerns were noted.

2. Provision / supply and management of water to other users: (WSA, 1997 – Section 7, 24-26)

2.1 Supply of water:

No concerns were noted.

3. Water and Sewage Treatment Plant: (GN R2834 of 27 December 1985 – Regulations for the erection, enlargement, operation and registration of water care works)

3.1 Water Treatment Plant – Operational Permit and Registration with DWA&F and compliance to GN R2834 of 27 December 1985 – Regulations for the erection, enlargement, operation and registration of water care works:

No water treatment for disposal into a water resource takes place at Lafarge.

4. Sewage Treatment Plant – Sewage Treatment and Disposal: (GN R2834 of 27 December 1985 – Regulations for the erection, enlargement, operation and registration of water care works)

4.1 Sewage Management:

The Sewage Plant at the Cement Plant is in the planning phase of being upgraded. Septic tanks are in use, which require collection from time-to-time.

5. Water Conservation and Water Demand Management: (NWA, 1998 – Section 21(IWUL), 22 and GN 704 of 4 June 1999 – Regulation 7(f))

Apart from an IWUL and the associated technical supporting document – the IWWMP (which is currently being drafted for submission as part of the IWULA); Section 22 of the National Water Act, 1998 and Regulation 7 (f) of the GN 704 of 4 June 1999 requires optimal use of water and prohibits the wastage of water. To comply with the above a water efficiency evaluation should as a minimum be done by appropriately skilled persons. An IWUL has not yet been issued to Lafarge.

Cement manufacturing is a dry process with water mostly used for cooling and washing purposes. Lafarge Cement Plant and Quarries are however located in an area where most of the users are dependent on groundwater as their sole source of supply, therefore water management is critical to minimise over abstraction from boreholes.

***Finding**: A pipe leakage was noted at Lovedale Quarry which was pointed out to the Lovedale workshop manager and immediately repaired.*

6. Water Use Authorisations: (Existing Lawful Use, IWUL and Water Use Registration)

DWS listed water use activities in Section 21 of the National Water Act, 1998, which may impact on water resources. The undertaking of such activities has to comply with the conditions of a published General Authorisation or if not applicable to the activity, a water use licence.

6.1 Existing lawful water uses: (NWA, 1998) (Previous valid permits / licences)

Lafarge hold water use registration certificates 26019718. Specialist studies to inform the water use licence application are being conducted and the application will be submitted before end October 2022.

6.2 IWUL (Integrated Water Use Licence), Water Use Registration and supporting IWWMP: (NWA, 1998 – Sections 21 and 22)

6.2.1 Status of the IWUL compliance to IWUL and IWWMP: (including internal and external audits)

The IWULA will be submitted before end October 2022. Although various water use activities are undertaken at Lafarge, no IWUL is yet in place to authorise the activities. An application was submitted to DWS in 2011, which had to be re-submitted in 2018. After various discussions, site visits, change in case officers and transfer of the Tswana Lime part the application from the Northern Cape region to the North West region, the specialist studies were reconducted and the application is being finalised for submission.

6.2.2 Water Use Registration: (GN R1352 of 12 November 1999 – Regulations requiring that a water use be registered)

Water uses have been registered for Townlands under Water Use Certificate 26019718 dated 1 January 2000 issued by DWA&F in terms of Section 26(1)(c) of the National Water Act, 1998, as follows –

Section 21(a) – Taking of water from a water resource

Section 21(b) – Storing of water;

Section 21(f) – Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or any other conduct.

6.2.3 Alignment of water management strategies, in all applicable Environmental Authorisations, e.g. EA's, EMPr's, WML's and other:

Risk: *An IWUL has not been issued yet. Water use strategies should be aligned after the approval of the IWUL and IWWMP with the EMPr and its amendments.*

7. Notification of new and/or cessation of mining activities to DWS: (GN 704 of 4 June 1999 – Regulations 2(1) and 2(2)(b))

"activity", means –

(a) any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants, and

(b) the operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not,

i. in which any substance is stockpiled, stored, accumulated or transported for use in such process; or

ii. out of which process any residue is derived, stored, stockpiled, accumulated, dumped, disposed of or transported;

No concerns were noted.

8. Pollution prevention (surface and groundwater resources):

8.1 Surface and groundwater monitoring – monitoring programme, including analysis of water quality (chemical, bacteriological and physical) and availability to other users:

Aquatico undertakes surface and groundwater monitoring at various surface and groundwater localities at Lafarge with monthly reports being submitted. The monitoring includes sampling, analyses and evaluation of the physical, chemical and bacteriological quality of drinking, surface and groundwater samples. Groundwater monitoring is done on a bi-annual basis with surface and

drinking water being done on a monthly basis. In the absence of an IWUL prescribing water quality limits, drinking water is compared to SANS 241 – Drinking Water standard, with groundwater also compared to SANS 241 – Drinking Water standard and for comparative purposes against the DWS Water Quality Guidelines, 1996, Volume 4 – Agricultural Use: Irrigation. Waste water is compared against the limits in the "General Authorisations" issued in terms of Section 39 of the National Water Act, 1998 (GN 398 of 26 March 2004 (as amended)) and Process waste against the DWS Guideline 1996, Volume 3: Industrial use and DWS General Authorisation Limits. Aquatico owns a laboratory accredited by SANAS, ref: No. T0685, for the purpose of analysing the samples. Eleven (11) groundwater sampling localities form part of the bi-annual groundwater monitoring programme, four (4) localities for potable water monitoring and five (5) localities for surface and process water monitoring (WWTW, Zinc Dam and Townlands Pit, Tswana Quarry WSWB and process water).

8.2 Management of possible risks to groundwater resource (as per the groundwater monitoring results and specialist studies):

Mining and associated activities at Lafarge has been undertaken over the last 70 years which contributes to complex environmental risks to be managed during operational and closure phases. Various historic and current activities may impact on the groundwater at Lafarge. Activities include abstraction of groundwater, historic and current backfilling and infilling with unknown waste streams, hydrocarbon management, dust deposition and build-up on open soil, storage of raw material and other, including coal, gypsum and clinker.

A geohydrological study was concluded in 2017 at the Cement Plant and the Tswana Quarry as part of the IWUL application by Tucana Solutions. According to the Geohydrological Study 2017, the aquifers in the Lichtenburg area are highly sensitive to pollution risks and over abstraction. Groundwater also constitutes more than 80% of the water supply of the area, requiring strict protection of the sensitive water resource.

The current groundwater monitoring network was assessed during the geohydrological assessment conducted in 2022 which included yield testing of boreholes and updating of the numeric and transport flow model.

8.3 Management of possible risks to surface water resources: (rivers, wetlands, vlei areas etc.) (NWA, 1998 – Sections 19, 20 and 21, GN 704 of 4 June 1999 – Regulations 4, 5. 6(a), 6(b) and 7)

8.3.1 Surface water resources:

The Cement Plant and Townlands Quarries are located between two (2) tributaries, of which the one to the west of the Cement Plant is a tributary to the Groot Harts River and the other tributary to the east of the Cement Plant, has been identified as a wetland system. The "Townlands pit" is also a clean water system, and forms part of two further wetlands in the Townlands Quarry area . The Polfontein Spruit runs next to the Tswana Quarry with a Wetland system in the Quarry.

8.3.2 Process water quality risks:

Finding: *The Tswana Quarry washbay samples reported high levels of TSS, soaps, oils, and greases, which confirms the non-effectiveness of the oil separator. Refurbishment is required.*

8.3.3 River Diversions and protection of Wetlands:

Wetlands:

JK Afrika conducted a Wetland Survey in the vicinity of the Cement Plant in 2021 and updated the survey in 2022. It was confirmed that a wetland system is located within a tributary to the east of the Cement Plant, originating from a Spring, running into the Groot Harts River. Further, wetlands exist in the Townlands Quarry area, both mined out Quarries filled with water over time, located to the north (part of the Townlands Pit) and north-west of the Plant.

Finding: *The following concerns were noted on the protection of Wetlands at Lafarge –*

the wetland to the east of the Cement Plant has been impacted upon with "infilling" / backfilling in the Quarry Area, as well as within the Cement Plant area. No evidence of protection of the regulated area of 500 m at the Wetland could be verified;

apart from infilling, no bufferzone was identified around the wetland (500 m), therefore roads and other activities were and are taking place within the wetland system. Mining activities also occurred in 2003 on both sides of the wetland together with subsequent backfilling;

the "Townlands Pit" forms part of a Wetland System with affected storm water from the Cement Plant running off into the system.

River Diversions:

Finding: *The Wetland to the east of the Cement Plant is located within a tributary to the Groot Harts River, which tributary was diverted with the expansion of the Cement Plant without any EIA and WUL in terms of Section 21(c) and (i). The diversion was also not maintained to ensure effective flow and as discussed above, backfilled with inert plant material.*

Note: *this issue forms part of an enforcement process with both DFFE and DWS and is still in process. A wetland rehabilitation plan has been presented to both Authorities. DWS has approved the plan and DFFE requested changes to the plan which has been done and resubmitted. The plan will be resubmitted to DWS once approved by DFFE to ensure that DWS also approves of the amended plan.*

8.3.4 Compliance Audit to and Exemption required in terms of GN 704 of 4 June 1999:

Important Note: As per Regulation 3 of GN 704 of 4 June 1999 – Regulations on the use of water for mining and related activities aimed at the protection of water resources, exemption to the conditions of GN 704 may only be applied for, in respect of regulations 4, 5, 6, 7, 8, 10 and 11. Regulation 9 is not included, which deals with the design, modification, construction and maintenance of pollution control measures during the temporary or permanent cessation of a mine or activity related to mining.

Lafarge appointed Greenmined/JG Afrika to undertake a compliance audit against the conditions of GN 704 of 4 June 1999 and the development of a Storm Water Management Plan for the Cement Plant and the Tswana Quarry.

8.3.5 Floodline protection of surface water resources – Mining, prospecting (surface and underground) mine residue deposits / stockpiles, dams, reservoirs and associated infrastructure or other facilities, including sanitation, conveniences, fuel deposits, must be outside the 1:100 year floodline or 100 m from a watercourse, whichever is the greatest: (NWA, 1998 – Section 10 and GN 704 of 4 June 1999 – Regulation 4(a) and (b)).

Apart from the GN 704 Audit, JG Afrika also undertook a 1:50 and 1:100 year Floodline Study.

8.3.6 Disposal of residue in underground or opencast: (NWA, 1998 – Sections 19, 21 and GN 704 of 4 June 1999 – Regulation 4(c) and NEM:WA, 2008 – Section 19)

Disposal / placement of any residue or substance which causes or is likely (risk) of causing pollution of a water resource not in underground or opencast areas, or other excavations: (GN 704 of 4 June 1999 – Regulation 4(c))

"Residue" for the purpose of GN 704 is defined in GN 704 as – "residue", includes any debris, discard, tailings, slimes, screenings, slurry, waste rock, foundry sand, beneficiation plant waste, ash and any other waste product derived from or incidental to the operation of a mine or activity and which is stockpiled, stored or accumulated for potential re-use or recycling or which is disposed of.

Classification was conducted by Enviroserv to verify whether residue disposed of into the Quarries and used as backfill may cause pollution.

8.3.7 Use of mine residue for construction purposes: (NWA, 1998 – Sections 19, 21 and GN 704 of 4 June 1999 – Regulation 5)

Residue or substance which may cause or likely to cause (risk) pollution of a water resource may not be used for construction of dam, impoundment or embankment, road or railway or any other purpose: (GN 704 of 4 June 1999 – Regulation 5)

No concerns were noted.

8.3.8 Diversion of clean storm water from dirty areas and capacity of diversion structures: (GN 704 of 4 June 1999 – Regulation 6(a), IWWMP, IWUL and approved EMPr)

The Lichtenburg area in which the Cement Plant, Townlands, Lovedale and Tswana Quarries are located, is relatively flat. Berms were constructed around the Quarries at the active mining area, Tswana, to prevent clean storm water from entering the Quarry. Lovedale and Townlands Quarries will be rehabilitated for closure.

Pollution control dams are recommended in the stormwater management plan to divert clean storm water from the Coal Stockpile area and from the additives storage area to minimise pollution of storm water. If not practical, affected storm water must be contained in a proper affected storm water system.

8.3.9 Containment of affected water into properly designed, constructed, operated and maintained affected water management systems, structures and facilities to prevent overflow / seepage into the environment and/or water resources and Capacity of affected water management systems during normal operation and in flood events, up to 1:50 year flood event: (NWA, 1998 – Section 19 and GN 704 of 4 June 1999 – Regulations 4, 5, 6 and 7(a), (b), (c) and (g))

Recommendations of the stormwater management plan ensure that the affected water management system will provide for the collection and containment of affected water / substances (either from natural flow or seepage) into properly designed, constructed, maintained and operated affected water systems for use, re-use and evaporation. Adequate pollution control and maintenance measures will be provided and implemented at critical pollution control equipment. The affected storm water system will be able to contain the 1:50 year flood event volume.

8.3.9.1 Collection and containment of affected water to prevent pollution of water resources: (NWA, 1998 – Section 19 and GN 704 of 4 June 1999 – Regulations 6 and 7(a), (b), (c) and (g))

Refer to discussions above on the recommendations of the stormwater management plan and the proposed pollution control dams.

8.3.9.2 Capacity of the affected water system: (NWA, 1998 – Section 19 and GN 704 of 4 June 1999 – Regulations 6 and 7(a) and (b))

A capacity assessment has been done at the active areas, Cement Plant and the Tswana Quarry, to identify the capacity required for affected water storage to contain affected water during normal operations up to 1:50 year flood event.

8.3.9.3 Inspection and maintenance on clean and affected water channels:

Inspections and maintenance currently done on the clean and affected water systems will need to be expanded once the recommended infrastructure is built, in order to ensure proper operation of these systems.

Dams with Safety Risks

APPLICABLE LEGAL REQUIREMENTS:

Chapter 12 of the National Water Act, 1998 as well as the regulations as per GN R 139 of 24 February 2012 – Regulations regarding the safety of dams (promulgated under the National Water Act, 1998), contain strict requirements on dams declared as "dams with safety risks". These dams need to be classified and registered with DWS as either Category I, II or III dams. Prior to any construction, alteration or enlargement, a permit from DWS is required. No impoundment may take place unless a permit therefor is also in place. Apart from internal inspections, compulsory safety inspections and various operational and closure documents are also required.

Audit Results:

1. Dams with Safety Risks: (NWA, 1998 – Sections 117-123, GN R139 of 24 Feb 2012 – Regulations regarding the safety of dams)

Not applicable to Lafarge.

Biodiversity Management

APPLICABLE LEGAL REQUIREMENTS:

Biodiversity will ultimately be regulated by the National Environmental Management: Biodiversity Act, 2004 and subsequent regulations. DEA is in the process of implementing the Act and developing specific regulations. Identification, eradication and control of weeds and invader plants on agricultural land are currently prescribed in terms of the Conservation of Agricultural Resources Act, 1983, including the regulations as per GN R1048 of 25 May 1984. Protection of certain trees is regulated in terms of the National Forest Act, 1998, which protected trees may not be cut, removed or destroyed without a permit from the Department of Agriculture, Forestry and Fisheries. The current protected trees are listed in GN 635 of 6 December 2019. Apart from the said legislation, the National Environmental Management Act, 1998 – Section 28 also places a duty of care on any person to protect the environment of which biodiversity forms part. Biodiversity needs to be adequately protected from inception of mining activities until closure. Apart from the specific obligation in the National Environmental Management: Biodiversity Act, 2004, surface water resources, including riparian habitats need to be protected as provided for in Section 19 of the National Water Act, 1998 and GN 704 of 4 June 1999 – Regulations on use of water for mining and related activities aimed at the protection of water resources and biodiversity in general, as provided for in Section 28 of the National Environmental Management Act, 1998. Further, specific obligation on biodiversity management in EA's and EMPr's issued in terms of the National Environmental Management Act, 1998, IWUL's issued in terms of Section 21 of National Water Act, 1998 and WML's issued in terms of the National Environmental Management: Waste Act, 2008 need identification and inclusion in a Biodiversity Management Plan and implementation as an integral part of mining. Closure liability needs to include costing of remediation and rehabilitation of the biodiversity, forming part of the measures required to achieve the end land use goal at closure. Relevant to alien and invasive species, Section 65 (alien species) and 71 (invasive species) of the National Environmental Management: Biodiversity Act, 2004 prohibits restricted activities in respect of the aforesaid sections. On 1 October 2014 regulations came into operation which regulated the listed invasive species as published in GN 864 of 29 July 2016 (as amended by GN 627 of 3 June 2020)

Audit Results:

1. Biodiversity Management: (NEM:BA, 2004)

1.1 Biodiversity Assessment and Action Plans, including critical endangered, endangered and vulnerable ecosystems and protection of ecosystems, watercourses and riparian habitats: (NEM:BA, 2004 – Section 43, GN 1002 and GN 1009 of 9 December 2001 and NWA, 1998 – Section 19)

The Lichtenburg Cement Plant and Townlands Quarry, Lovedale and Tswana Quarries lie within sensitive areas which include the two (2) tributaries to the Groot Harts River and the associated wetland in the tributary to the eastern side, and the Polfontein River running past the Tswana Quarry with wetlands identified in the Tswana Quarry. The two (2) tributaries at the Cement Plant originate in two (2) Springs which drains into the Groot Harts River.

The biodiversity assessment was updated in 2022. The updated biodiversity assessment is critical in the rehabilitation on closure planning and Lovedale and Tswana Quarries and future management of all identified sensitive areas and protected plants, species and ecosystems.

1.2 Weeds and invader plant management: (NEM:BA, 2004, GN R1020 of 25 September 2020, CARA, 1983 and Provincial)

Implementation of a detailed eradication and control plan for the identification of weeds and invader plants is needed. The eradication and control measures / practices are of utmost importance during the rehabilitation as it can impact on the effectiveness of rehabilitation practices applied. Follow-up surveys will be done to verify the effectiveness of eradication and control activities and records maintained of all management and control measures applied.

Impacts with regards to watercourse characteristics

Surface flow

It is not possible to remove all rail and road embankments that have been constructed across the wetland area since some, including the Manana Road, are still in use. As presented in Figure 02, this includes the roads upstream and downstream of the wetland area where culverts are required to ensure that there is no impediment to the natural flow of water through the wetland area. Based on a floodline study undertaken by JG Afrika, the 1:50 year peak discharge rate for the drainage line of concern equated to 11.9 m3/s. In order to prevent flooding of the Lafarge infrastructure, the proposed dimensions of the culverts along the drainage line were based on the 1:50 year flood event.

With the intention to expose the original full wetland area, the infill materials are to be removed from all of the areas indicated in the Pre-compliance Notice, as presented in Figure 02 (red polygon). In addition, some infill is also to be removed from a strip closer to the Manana Road. This is to be undertaken only once authorisation has been obtained from the DFFE and DWS for relocation of the materials to the proposed site (i.e. upon approval of this rehabilitation plan).

Geomorphology, habitat and biota

The large gum trees in the area downstream of the area where infilling has occurred (i.e. the green polygon presented in Figure 02) are to be felled and the trunks and larger branches may be left in place provided that they do not obstruct the flow of water through the area. This recommendation is made in the interest of minimising compaction of the soil as a result of the movement of trucks or heavy machines over the un-impacted (largely natural) area as indicated in Figure 02. The debris will not pose any threat and, through time, will provide habitat for wildlife as well as slowly releasing nutrients into the soil.

Clearing of materials is to be done down to the original soil surface, with care taken to ensure that as little as possible compaction to the original soils occurs. Ideally, as many old and unused road and rail embankments as possible should be removed so as to allow for smooth passage of water flows through the area.

It is necessary that a landscaped wetland strip is constructed within the rehabilitated wetland area. The width of the landscaped area should be at least 30 m and must be smoothed and slightly dished. Across the 30 m width the central and deepest part of the floor should be no more than 10 cm below the level of the edges so as to provide a slope of 1 in 150, which should be stable and not lead to erosion of channels. The slope from the upstream (northern) end of the wetland channel down to the downstream (southern) end of the wetland should be dictated by natural ground contours of the areas upstream and downstream of the wetland area. Care must be taken to ensure that there are no high points which will hold water back although the developing vegetation will promote percolation of water into the soil. The approximate length of the rehabilitation area is 250 m and the vertical drop over this distance is approximately 1m and so careful finishing will be called for.

It is hoped that the soil in the wetland rehabilitation area will be the original natural soil of the area. As a result, the wetland rehabilitation may be wider than 30 m in places. Where natural wetland soil is found, all that should be necessary will be to lightly rake the area with a spike harrow and then to introduce appropriate plant species. The entire area is to be grass seeded initially but some wetland plants may be introduced later. The latter plants may be taken (with appropriate permission) from the upstream and downstream areas of the wetland. They may be obtained with a corer of approximately 150 mm in diameter and be planted in holes of a similar size. Care must be taken to ensure that the corer lifts the root system of the plants and the recipient holes must be deep enough to accommodate the roots. The plant collection must be scattered over a large area so as not to open the donor sites to the risk of erosion.

The planting of the plugs will not seek to cover the entire rehabilitation area but will be done in transverse swathes which span the full width of the rehabilitation area and are approximately 60 cm to 100 cm deep. Planting should not be done immediately after establishment of the new wetland area but should be held back until there is evidence of wetness in the soil. Failure to do so will probably result in the introduced plants dying even if watered. Plantings may be done in any sequence and wherever wet conditions develop. Thus, areas which become wet first will be planted first. In this way the natural flow of the water through the soil will guide the rehabilitation process. For this reason, the revegetation process may take several months, or even more but, in

the dry climate of the region and with the low topography profiles of the terrain, this is not considered to be problematic.

The banks of the wetland channel should be planted to natural variety of Kweek Grass (Cynodon dactylon) or other species, such as Witpluim-chloris Grass (Chloris virgata), if available. The soils should be lightly hand raked again after seeding, and a soil protection product such as biojute may be used along the lower areas so as to retain the seed. Seeding should be done at the start of the wet season but further watering may still be needed to promote the growth of the young plants.

The progress of recovery of the wetland will have to be monitored to meet requirements of the DFFE and DWS. It is anticipated that the process will take some time and possibly even several years. An ECO should be present during the initial removal and wetland rehabilitation and occasional inspections be done after that.

Impact assessment

The baseline hydrology and impact assessment report completed in August 2022 identified the following potential hydrological impacts associated with the Cement Plant:

- Changes in catchment water resources;
- Changes in catchment water quality; and
- Changes in catchment flood hydrology (including interflow and groundwater flow)

Table 01: Significance Ratings of Identified Potential Impacts

Abstractions	1	1	4	5	1	1	2	54	**Low.** No water is abstracted from a nearby stream or river for water supply to the cement factory. Water is currently sourced from boreholes, the Townlands Quarry Sump, and will in the future be augmented from water stored in the Additives Pollution Control Dam (PCD) and Coal Stockyard PCD. These abstractions have no obvious impact on the downstream catchment area or regional catchment area, hence the low significance rating.
Limiting Flow (capturing of contaminated stormwater)	1	2	4	2	2	1	2	49	**Low.** The volume of water to be captured in the Coal Stockyard and Additives PCD's are insignificant compared to local and regional runoff volumes.

Reduction in Catchment Water Quality due to:									
Erosion from the project site and sedimentation of downstream water resources	4	3	4	3	4	5	3	143	**Moderate.** Largely due to the fact that there are currently no PCD's on site preventing the transport of fine materials or contaminated stormwater runoff from the factory to the downstream environment.
Discharging waste or contaminated water (i.e., contamination from the coal stockyard and, additives areas, pit dewatering and sewage spills)	4	3	4	3	5	5	3	176	**Moderate.** Currently there are limited means of limiting contaminated stormwater discharge from the factory site. It is noted that a number of areas with the potential to contaminate stormwater runoff are located under roofed areas (for example the Additives Area), however, there are areas that are not covered and will result in the contamination of the downstream environment (such as the coal stockyard). This impact is therefore associated with a high significance rating.
Changes in Flood Hydrology due to:									
An increase in impervious areas	3	2	4	1	3	1	2	63	**Moderate.** It is likely that there will be an increase in the stormwater runoff discharge rate, when compared to natural catchment conditions. However, due to a significant portion of the stormwater runoff from the project site being directed to the Townlands Quarry Sump (which has no outlet), the significance of this impact is considered as moderate to low.
Altering the bed, banks, course or characteristics of a water course	4	1	4	3	4	5	1	117	**Moderate.** As noted above, the drainage line to the east of the project site has been blocked by materials from the cement factory. This has resulted in an impediment to the natural flow of water. During a flood, this will change the dynamics of flooding downstream of the factory site. This is therefore associated with a moderate significance.
Post-Mitigation									
Changes in Catchment Water Resources due to:									
An increase in impervious areas	1	2	4	3	4	1	1	63	**Moderate.** No mitigation measures are recommended, as this would require the impervious areas to be removed. It should, however, be noted that the impact of the impervious areas on the local and regional hydrology is insignificant (refer to **Section 3.2.1** for more details).
Impeding or altering the flow of water in a drainage line	1	1	1	1	1	1	1	12	**Low.** There are currently projects in place for the rehabilitation of the drainage line and the incorporation of culverts to ensure that there is no impediment to the natural flow of water. Once these projects are completed, there will be no impact on catchment water resources and therefore this significance rating has gone from high to low.
Abstractions	1	1	2	4	2	5	1	48	**Low.** No mitigation measures are required as there are no current or planned abstractions from surface water resources (refer to **Section 3.2.1** for more details on this impact assessment).

Limiting Flow (capturing of contaminated stormwater)	1	1	1	3	2	5	1	33	**Low.** The implementation of PCD's at the project site will reduce the volume of water to the downstream environment, however, in the context of the local and regional catchment this impact is low (refer to **Section 3.2.1** for more details).
Reduction in Catchment Water Quality due to:									
Erosion from the project site and sedimentation of downstream water resources	1	1	2	1	2	5	1	36	**Low.** There are currently projects in place that include the design and construction of PCD's downstream of the Coal Stockpile and Additives areas. Once implemented the likelihood of sediment discharging from the Cement Factory will be significantly reduced, hence the reduction in the significance rating of this identified potential impact. See **Section 3.2.2** for more details on the analysis of this impact.
Discharging waste or contaminated water (Hydrocarbon spills, pit dewatering and sewage spills)	1	1	4	2	1	5	1	54	**Low.** As stated above, the incorporation of PCD's for the management of contaminated stormwater runoff from the project site will significantly reduce the risks associated with the contamination of downstream water resources. Please refer to **Section 3.2.2** for more details on this impact.

Nature of Impact	Severity	Spatial Scale	Duration	Frequency of Activity	Frequency of Incident	Legal Issues	Detection	Significance Score	Significance / Comment / Mitigation Measure
Pre-Mitigation									
Changes in Catchment Water Resources due to:									
An increase in impervious areas	1	2	4	3	4	1	1	63	**Moderate.** It is noted that a significant portion of the cement factory is impervious through roofed or concrete lined areas. These areas limit infiltration to the groundwater reserves and increase runoff, therefore resulting in the hydrology of the immediate area being impacted on. These impacts are for the lifespan of the factory. Although the impact of this on the local and regional catchment area are relatively insignificant, the permanent nature of the impact raises it from a "low" to a "moderate" significance rating.
Impeding or altering the flow of water in a drainage line	4	3	4	3	4	5	5	187	**High.** This impact relates to materials that have been deposited in the unnamed drainage line located to the east of the factory, resulting in the natural flow of water through the project site being impeded. This is likely to alter the hydrology of the downstream environment and so is associated with a high significance rating.
Changes in Flood Hydrology due to:									
An increase in impervious areas	1	1	1	1	1	5	1	24	**Low.** Due to the incorporation of PCD's to the stormwater management infrastructure at the factory site, the impact of impervious areas increasing the discharge rate from the project site will be reduced. It is also noted that a stormwater management plan is currently being developed for the project site, which will also assist in limiting the impact of the factory site on the downstream flood hydrology. See **Section 3.2.3** for more details on this impact.
Altering the bed, banks, course or characteristics of a water course	1	1	3	1	1	5	1	40	**Low.** As noted above, there is currently a project that has been initiated to aid in the rehabilitation of the drainage line. Once implemented, the drainage line will be restored to its natural condition, which result in the stream to flow freely across the project site. See **Section 3.2.3** for more details.

Changes in Catchment Water Resources

A hydrological analysis of the local (unnamed drainage line adjacent to the Cement Plant) and regional (C31A quaternary catchment) catchment hydrology was undertaken to determine the potential impact of the Cement Plant on the local and regional hydrology. The hydrological analysis

consisted of assessing catchment Mean Annual Evaporation (MAE), MAP and MAR, based on results obtained from the Water Resources of South Africa Study (WR2012) undertaken in 2012.

The local catchment (unnamed drainage line within the vicinity of the Cement Plant) forms part of the regional catchment (Quaternary Catchment C31A) hydrology. Based on the respective catchment areas and information provided in the WR2012 study, the MAR of the local catchment (i.e. which includes the unnamed drainage line catchment area), in the vicinity of the Cement Plant equates to 0.03 MCM (million cubic meters), and the MAR of the regional catchment (C31A) equates to 8.11 MCM. This is based on an average runoff depth of 5.78 mm/annum for the respective catchments. In order to determine the anticipated impact of the Cement Plant on the catchment water resources (volume of water), the catchment area of the overall Cement Plant site was compared to the local and regional catchment areas. Based on this, the Cement Plant, with an area of approximately 0.61 km2, comprises approximately 11.04 % of the local catchment area and approximately 0.04 % of the regional quaternary catchment area (C31A). The resulting impact on local and regional catchment resources is 11.04 % and 0.04 %, respectively. Based on this, the anticipated impact of the Cement Plant on the local and regional catchment water resources (from a water volume perspective), as a result of an increase in impervious areas are considered to be negligible.

	Local Catchment	C31A Quaternary Catchment
Catchment Area (km^2)	5.48	1 403.00
MAR (MCM/annum)	0.03	8.11
Average Quaternary Runoff Depth (mm/annum)	5.78	
Catchment Area of Cement Plant (km^2)	0.61	
Percentage of Quaternary Catchment Affected by the Cement Plant	11.04	0.04
Flow Volume Traversing the Cement Plant (m^3/annum) Based on Affected Local Catchment Areas	3 500	
Average Daily Flow Rate Traversing the Cement Plant Site (m^3/s), Based on Annual Flow Volumes	**0.000111**	

Table 02: Comparison of Regional to Local Catchment Hydrology

As presented in Table 01, the most significant impact of the Cement Factory on the local catchment hydrology is as a result of the current blockage on the unnamed drainage line to the east of the factory. This blockage is as a result of materials that were dumped over the drainage line. This impact was identified and significant steps have been undertaken to remediate the affected area.

This includes the development of a rehabilitation plan, which details how the drainage line is going to be restored and how culverts along road and rail crossings will be constructed to allow for the unhindered flow of water across the site. Currently, the proposed rehabilitation plan is with the DFFE and the DWS for approval. Once the rehabilitation plan has been approved and implemented, the impact of the blockage will go from a “high” impact rating to a “low” impact rating.

It is our understanding that there are no plans to abstract water from the local unnamed drainage line for the purposes of augmenting water supply to the Cement Plant. Therefore, the impact of taking water from the drainage line, and the subsequent potential impact on the downstream environment and water resources was classed as “low”.

As part of the assessment of the hydrology of the project area, an analysis of the licensed water abstractions downstream of the Cement Plant, within the C31A Quaternary Catchment, was undertaken using the 2022 DWS Water Authorisation and Registration Management System (WARMS) database. The database indicated that there were no licenced water users located downstream of the study area, between the Cement Plant and the Harts River. Although there are no current licences pertaining to the Cement Factory and downstream users, it is noted that Lafarge Lichtenburg are in the process of applying for a number of water uses at the Cement Plant. These applications largely pertain to the following:

- Taking water from water resource (Section 21 (a) Application). This includes pumping from three boreholes on site and pumping from the Townlands Pit, located to the north of the factory site.

- Disposing of waste in a manner which contains waste from or which has been heated in any industrial or power generation process – water is used for cooling purposes (Section 21 (h) Application). This includes the discharge of water from the cooling process at the Kilns to the Townlands Pit.

- Waste discharge related water use (Section 21 (g) Application). This application pertains to water that is potentially contaminated, discharging from the coal stockpile area, additives area, Kilns and from septic tanks.

• Irrigation with water containing waste, artificial recharge of aquifer, modification of atmospheric precipitation and in-stream power generation activities (Section 21 (e) Application).

Reduction in Catchment Water Quality

Although there are no registered water users downstream of the Cement Plant, any reduction in water quality for any un-registered water users (such as farmers and stock watering) and the environment is associated with a high significance level. Potential types and sources of surface water contamination are as follows:

• The coal stockpiles and materials stored at the additives area. Further to this, any piles of fine materials that are spilled or dumped in the vicinity of the factory are considered hazardous to the downstream environment.

• Hydrocarbons from spillages around fuel and hydrocarbon stores and workshop areas.

• Spillages of untreated sewage.

In order to mitigate against these identified impacts, the following is proposed:

• As indicated previously, Lafarge have appointed JG Afrika to undertake the design of two PCD's at the factory site. These PCD's are positioned to manage stormwater runoff from the coal stockyard and from the additives areas. These dams will ensure that both sediment and contaminated water do not enter the downstream environment from these areas.

• In addition to the PCD's, it is recommended that berms are constructed upslope and downslope of any area that contains fine materials that may block drains and emanate into the downstream environment. Upslope berms will ensure limited surface flows through areas associated with sediment and downslope berms will ensure that sediments eroded from areas associated with sediment loss will be trapped, therefore reducing the impact to the downstream receiving environment. It is recommended that the berms are constructed out of a non-erodible material.

• Machinery should be regularly (at least daily) checked for oil leaks. During periods where the machinery is not in use, drip trays should be placed under the machinery to contain any spillages.

• The sizing and positioning of “dirty” stormwater channels and recommendations on bunding around areas containing potential for surface water contamination should be designed such that:

    o Dirty stormwater channels and bunding walls will contain runoff generated during the 1:50 year storm event, as per the requirements stipulated in General Notice 704 (GN704) of the National Water Act (Act 36 of 1998).

• Areas that may result in the contamination to groundwater should be sufficiently lined to meet with regulatory requirements (such as the Coal Stockyard).

• The sizing and positioning of clean stormwater diversion channels or berms so as to keep “clean” stormwater runoff from mixing with “dirty” stormwater runoff should be designed such that:

    o “Clean” stormwater runoff diversion infrastructure will be sized to divert runoff generated during the 1:50 year storm event as per the GN704 requirements.

• All domestic waste should be regularly removed from the Cement Plant site on a regular basis and dumped in appropriate waste handling facilities.

• Long-term sewage containment management and/or treatment facilities implemented at the Cement Plant should be sufficiently sized, such that spillages of untreated sewage to the environment are unlikely.

• Fuels and hydrocarbon stores should be lined and bunded such that spills from the store areas will not enter the receiving environment.

• Water downstream of Cement Plant should be monitored to ensure no degradation of water quality occurs.

Changes in Flood Hydrology

Currently, the most significant impact of the Cement Factory on catchment flood hydrology is located in the area where materials have been deposited over the unnamed drainage line located to the east of the factory. The result of the blockage is that the natural flow of water down the

drainage line has been impeded. This will exacerbate flooding upstream of the blockage, which may result in flooding of infrastructure associated with the Cement Factory. As mentioned previously, Lafarge has appointed JG Afrika to develop a rehabilitation plan, which is aimed at restoring the drainage line to its natural state. This plan is currently with the DFFE for approval. Once approved, it is understood that Lafarge will remove all materials dumped in the drainage line and install culverts at road and rail crossings, which will allow for the free flow of flood waters across the project site. Once the rehabilitation measures have been implemented, the significance rating of the identified impact will go from “high” to “low”.

Due to an increase in impervious areas and changes in catchment landcover characteristics associated with the Cement Plant, there is a possibility that this will result in an increase in the peak discharge rates from the catchment in which the Cement Plant is located. It is, however, noted that the majority of stormwater runoff from the cement plant is directed into the Townlands pit. There are no discharge points from this old pit and pit area and so there will be no increased discharge rates to the downstream environment. Further to this, a portion of the area that currently discharges to the downstream environment (in the western half of the project site) will soon discharge into a PCD (downstream of the Coal Stockyard. Therefore, the increase in discharge rates from the cement plant is associated with a low risk and significance level.

Discussions And Conclusion

The water use licence applications are being finalised for submission to DWS. Once the water use licences are received, all conditions of the water use licences will need to be implemented. In the interim, while waiting for approval of the licences, Lafarge will need to commence implementation of the recommendations of the specialist studies and closing of the findings identified during this audit, so long as legal authorisation for implementation of the recommendations of the specialist studies and closing of the findings identified during this audit do not require authorisation.

As part of the impact assessment, a general hydrological characterisation of the area in which the Lichtenburg Lafarge Cement Plant is located was undertaken. This included defining the MAP, MAR and MAE for the project site. In order to determine the impact of the Cement Plant on the local and regional hydrology, the catchment areas corresponding to these regions were defined. The

local catchment area was defined as the catchment area of the unnamed drainage line located on the eastern boundary of the Cement Plant. The regional catchment area was defined as the Quaternary Catchment C31A, in which the Cement Plant is located.

In addition to the hydrological characterisation of the Cement Plant, an impact assessment of the plant on the local and regional hydrology was undertaken. Mitigation measures to reduce the significance of the identified potential impacts were provided. The potential impacts and mitigation measures identified included:

- Changes in catchment water resources. The most significant impact associated with changes in water resources is associated with materials that have been deposited along the drainage line located to the east of the Cement Factory, which has resulted in impeding the natural flow of water across the site. It is, however, noted that a process of rehabilitation of the affected drainage line has been initiated. The proposed rehabilitation plan is currently with the DFFE and is awaiting approval from the relevant authorities. Once the proposed rehabilitation has been implemented, the impact of the blocked drainage line on the catchment water resources will be significantly reduced, resulting in the post-mitigation impact rating going from “high” to “low”.

- Changes in catchment water quality. The potential sources of contamination were identified as the fine sediment located throughout the project site and especially in the area of the Additives Stores, contaminated runoff from the Coal Stockpiles, hydrocarbon spills (through fuel stores and machinery on site) and domestic and sewage waste. In order to reduce the risk of surface water contamination, numerous recommendations were made, largely with respect to management of contaminants at their source. It is noted that Lafarge have appointed JG Afrika to undertake the design of two PCD’s, located downstream of the Coal Stockpile and Additives areas. Once constructed, the risk of contamination of surface water resources will be significantly reduced.

- Changes in catchment flood hydrology. The impact of the blocked drainage line on the eastern boundary of the project site is a significant change in the flooding dynamics of the project site. It was noted that during a flood event, the flooding in the area in which the stream has been blocked will be exacerbated. However, the rehabilitation of the drainage line and the implementation of proposed culverts along road and rail crossings will ensure that the impact of the impeded flows is mitigated against. The proposed culvert crossings

have been based on transferring flows associated with the 1:50 year flood event. Therefore, once implemented, the significance of the changes in flood hydrology, as a result of the blocked drainage line, will reduce from “high” to “low”.

• Changes in peak discharge rates from the Cement Plant. It was noted that as a result of stormwater runoff from the cement plant being directed to the Townlands Pit (with no point of discharge) and considering the proposed construction of PCD’s downstream of the Coal Stockpile and Additives stores, the risk of increase discharge rates from the cement plant is largely reduced. The significance of changes in the flood hydrology of stormwater discharging from the project site is associated with a low significance.

Based on the baseline hydrology and impact assessment study, it is noted that there are a number of significant impacts associated with the Cement Plant, particularly on the local hydrology. These impacts are associated with the current blockage of the unnamed drainage line to the east of the project site. Further to this, there is currently a risk of contaminated stormwater discharge to the downstream environment, particularly from the Coal Stockyard and Additives areas. It is, however, noted that Lafarge are taking significant steps to alleviate the identified impacts. In line with this, they are in the process of obtaining approval for the rehabilitation of the drainage line that has been blocked and have also appointed engineers to design PCD’s that will be located downstream of the Coal Stockyard and Additives areas. This will limit any contamination to the downstream environment.

Once the proposed mitigation measures have been implemented, the impact of the Cement Plant on the local and regional hydrology will be limited.

References:

1. JG Afrika. Environmental Management Plan: Rehabilitation Of The Wetland In The Vicinity Of The Lafarge Cement Factory In Lichtenburg. August 2022.
2. JG Afrika. Lichtenburg Lafarge Cement Plant Baseline Hydrology And Impact Assessment. August 2022.