



OFFICE OF THE DIVISIONAL FOREST OFFICER KALAHANDI SOUTH DIVISION

At/Po-Parmanandapur, Bhawanipatna, Ward No.4, Rly Station Road Dist-Kalahandi, Odisha, Pin code-766002
Phone & Tele Fax No.-06670-230268 (O) Phone No.06670-230479 (R) (E-Mail ID:- dtokids6@gmail.com)

Memo No: 5545 /3F (Lease) /2021.

Dated, Bhawanipatna the 08th Nov, 2021.

To,

The Regional Chief Conservator of Forest,
Bhawanipatna Circle, Bhawanipatna

Sub:-

Diversion of 15.265 ha of forest land for expansion of existing of Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District of Odisha by Vedanta in favour of M/S IDCO, Bhubaneswar, under Kalahandi South Division.

Ref:

Your office Memo No.5457/4F (Misc.)-70/2021 dt.29.10.2021 and Memo No.18145/9F (Ind)-398/2020 dt.28.10.2021 of the Conservator of Forests (nodal), O/o: the PCCF, Odisha, BBSR.

With reference to the above cited memos on the captioned and subsequent letter No.5-ORC469/2021-BHU dt.20.10.2021 of the Government of India, MoEF & CC, IRO, Bhubaneswar, the compliance report of the observation made in Para (a) & (d) as sought for by the Dy. Inspector General of Forests (Central), Government of India in MoEF & CC, IRO, Bhubaneswar is furnished below for favour of your kind information and necessary action.

Para (a) :-

A report to be sought from the State Forest Department on the representation received from Ministry of Lanjigarh Factory Anchal Vikash Samiti within 15 days. If no response is received within the stipulated time, it will be deemed that, the State Government has nothing to say in this representation.

A detailed report on the representation received from Lanjigarh Factory Anchal Vikash Samiti has been already submitted to your good vide this office Memo No. 5526 dated 26.10.2021.

Para (d) :-

User Agency shall submit a technical report as to whether the proposed site is polluting the first level aquifers within 15 days.

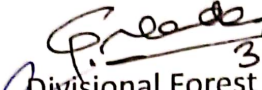
The User Agency has submitted a detailed Technical report vide his letter No. VL/Land/2021 dt.02.11.2021 evidencing fact that, the proposed site is not polluting the first level aquifers duly prepared by IIT, Bhubaneswar. Copy of Technical Report is enclosed herewith for your kind information.

Encl:- As above.

P. Meade
3/11/21
Divisional Forest Officer
Kalahandi South Division

Memo No: 5546 / Date: 03/11/2021 /

Copy forwarded to the Chief Conservator of Forests (Nodal), O/o: the Principal Chief Conservator of Forests, Bhubanewar Circle for favour of his kind information and necessary action with reference to his Memo No. No.18145/9F (Ind)-398/2020 dt.28.10.2021 and Memo No.5458 dt.29.10.2021 of the Regional Chief Conservator of Forests, Bhawanipatna Circle, Bhawanipatna to his address.


3/11/21
Divisional Forest Officer
Kalahandi South Division

Memo No: 5547 / Date: 03/11/2021 /

Copy forwarded to Chief General Manager (Land), IDCO, IDCO Tower, Janpath, Bhubaneswar-751022, Odisha for information and necessary action with reference to Memo No. No.18147 dt.28.10.2021 of the Chief Conservator of Forests (Nodal), O/O: the PCCF, Odisha, Bhubaneswar to his address.


3/11/21
Divisional Forest Officer
Kalahandi South Division

Memo No: 5548 / Date: 03/11/2021 /

Copy forwarded to Sri Nabal Kishor Sharma (Head-Legal, Land & External Affairs, Vedant, Lanjigarh for his information and necessary action with reference to his letter No. VL/Land/2021 dt.02.11.2021.


3/11/21
Divisional Forest Officer
Kalahandi South Division



vedanta

transforming elements

VL/Land/2021

2nd November 2021

To
The DFO, South Division,
Kalahandi, Bhawanipatna

Sub Diversion of 15.265 ha of Revenue Forest land for expansion of existing Red Mud Pond at village Rengopali under Lanjigarh Tahasil in the district of Kalahandi by M/s Vedanta Limited, Lanjigarh, under South Forest Division, Kalahandi.

Ref: 1. Letter from Ministry of Forest and Environment, IRO, No-5-ORC469/2021-BHU of dated-20.10.2021

2. Our Letter dated-22.10.2021

Dear Sir

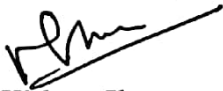
With reference to Integrated Regional Office, (IRO), MOEF, Bhubaneswar letter dated 20th ^{October} ~~September~~ 2021, it is to place on record that we have submitted the technical report prepared by IIT, Bhubaneswar evidencing fact that the proposed site will not pollute the first level aquifer. The report has been submitted to IRO, MOEF, Office with copy to PCCF, Nodal & Forest department, Govt of Odisha vide our letter dated 22.10.2021 in compliance to clause (d) of letter.

A copy of above letter submitted with the technical report is enclosed herewith for your ready reference. We would request you to kindly consider above for onward clarification on compliance as sought in clause (d) of referred letter from MOEF.

Thanking You

Yours faithfully,

For Vedanta Limited, Lanjigarh


Nabal Kishore Sharma
(Head – Land, Legal & External Affairs)

Encl: As above

CC : The Addl. PCCF & Nodal Officer(FCA), Forest Dept, Govt. of Odisha
The CGM(Land), IDCO, BBSR

Vedanta Limited

PO : Lanjigarh, Dist. : Kalahandi, Odisha, India - 766 027

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Registered Office : Vedanta Limited 1st Floor, 'G' wing, Unit 103, Corporate Avenue, Atul Projects.
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भारत सरकार / Government of India
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय / Ministry of Environment, Forest and Climate Change
एकीकृत क्षेत्रीय कार्यालय / Integrated Regional Office
प/3, चंद्रशेखरपुर / AJ3, Chandrasekharpur
भुवनेश्वर - 751 023, ओडिशा / Bhubaneswar - 751 023, Odisha



Telephone: 0674 - 2301213, 2302432, 2301248, 2302452, 2302453. E-mail: roe2.bsr-mef@nic.in

No.5-ORC469/2021-BHU

19th October, 2021
20th

To

The Addl. Chief Secretary,
Forest & Environment Department,
Government of Odisha,
Bhubaneswar

Sub: Diversion of 15.265 ha of forest land for expansion of existing of Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District of Odisha by Vedanta in favour of M/s IDCO, Bhubaneswar, under Kalahandi South Forest Division.

Ref.: State Govt. letter No.10F(Cons)44/2021-10169/F&E dated 04.06.2021

Madam,

With subject and reference cited as above, I am directed to inform that the above proposal was discussed in the REC meeting held on 11.10.2021. The Committee decided to approve proposal conditionally with the following observations.

- A report to be sought from the State Forest Department on the representation received from Ministry of Lanjigarh factory Anchal Vikash Samiti within 15 days. If no response is received within the stipulated time, it will be deemed that, the State Govt. has nothing to say in this representation.
- All non-forest land received under CA in Kalahandi district should be notified as forest under the Indian forest Act, 1927 within 6 months.
- CA area under degraded forest is very large and planting 200 saplings/ha. seems to be very scanty. State Forest Department may consider to afforest the degraded area with more saplings per hectare.
- User agency shall submit a technical report as to whether the proposed site is polluting the first level aquifers within 15 days.

It is therefore requested to kindly furnish the observations made in Para (a) & (d) above to this office for further necessary action.

Yours faithfully,

Padma Mahanti
(Padma Mahanti)

Dy. Inspector General of Forests (C)

Copy to:

1. The Addl. PCCF & Nodal Officer (FCA), Forest Department, Govt. of Odisha, Aranya Bhawan, Chandrasekharpur, Bhubaneswar-751023.
2. The Chief General Manager (Land), IDCO, IDCO Tower, Janpath, Bhubaneswar, Odisha.

Dy. Inspector General of Forests (C)

Ref: VL/ 2021/

Dt. 22.10.2021

To

Dy. Director General Forests (Central)
Ministry of Environment, Forest & Climate Change,
Integrated Regional Office, Bhubaneswar, Odisha.

Sub: Diversion of 15.265 Ha of forest land for expansion of existing Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District of Odisha by Vedanta in favour of M/s. IDCO, Bhubaneswar under Kalahandi South Forest Division.

Ref: Decision of REC recommending above forest diversion proposal with conditions vide minutes of 61th meeting of Regional Empowered Committee (REC) of Integrated Regional Office, Ministry of Environment, Forest & Climate Change, Bhubaneswar held on 11.10.2021.

Dear Sir,

The forest diversion proposal for grant of stage I over 15.265 Ha of forest land for expansion of existing Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District has been approved conditionally with few observations by Regional Empowered Committee of MOEF & CV at its meeting dated 11.10.2021 as referred above. (Copy of REC minutes enclosed). We have been asked to submit a technical report as to whether the proposed site is polluting the first level aquifers at point 4. In this regard, we awarded a technical consultancy project to School of Infrastructure at Indian Institute of Technology Bhubaneswar (Dr. B. Hanumantha Rao, Assistant Professor, and School of Infrastructure) and based the same a technical report on "No pollution load to first level aquifer system" in the proposed site has been submitted with us.

This report entails factual information on no pollution to first level aquifer system as a result of new permanent construction of Southwest Red Mud Pond (SW RMP, the proposed site) towards the expansion from the existing 2 MTPA to 6 MTPA. The report concludes at the end that first level aquifer will not be polluted due to construction of the new SW Red Mud Pond (proposed site). (Copy of report enclosed).

It is note that the new Red Mud Pond project at proposed site has already been appraised by Expert Appraisal Committee (EAC) of MOEF & CC while considering our Environmental Clearance for 2-6 MTPA Alumina Refinery Expansion. The Committee has dealt with all these issues in detail and subsequently MOEF & CC has granted us Environmental Clearance on 06.08.2021. (Copy of Environmental Clearance is enclosed herewith).

We would request to kindly note of the above report and oblige us with grant of Stage I clearance, so that we can move ahead with compliances of conditions therein to get stage II clearance and start the construction of pond at the proposed site.

Vedanta Limited

PO : lanjigarh, Dist. : kalahandi, Odisha, India - 766 027

T +91-6677 247312 - 15, Fax +91-6677 247311, Website : www.vedantalimited.com

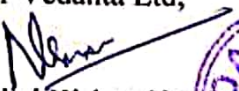
Registered Office : Vedanta Limited 1st Floor, 'C' wing, Unit 103, Corporate Avenue, Atul Projects, Chakala, Andheri (East), Mumbai 400093, Maharashtra, India.

CIN : L13209MH1965PLC291394

We would like to reiterate that existing RMP has limited life and would get exhausted in coming 6 months maximum and earliest grant of forest clearance would facilitate construction of RMP at proposed site and would help in continuity of operation. We shall remain obliged for your kind action.

Thanking you,

Yours faithfully,
For Vedanta Ltd,


Nabal Kishor Sharma
Authorized Signatory



Encl: As above.

- CC: 1. Addl. Chief Secretary, Forest & Environment Department, Govt of Odisha, Bhubaneswar.
2. Addl, PCCF & Nodal Officer (FCA), Forest Department, Govt of Odisha, Aranya Bhawan, Chandrasekharpur, Bhubaneswar-751023.
3. The Chief General Manager (Land) IDCO, IDCO towers, Bhubaneswar, Odisha.

Minutes of the 61st meeting of Regional Empowered Committee (REC) of Integrated Regional Office, Ministry of Environment, Forest & Climate Change, Bhubaneswar held on 11.10.2021.

Due to pandemic of COVID-19 virus, the 60th meeting of the Regional Empowered Committee (REC) of Integrated Regional Office, Ministry of Environment, Forest & Climate Change, Bhubaneswar was conducted on 11.10.2021 through video conferencing and process was undertaken by circulation under provisions of Rule 4 (4) of Forest (Conservation) Second Amendment Rules, 2014. The following members/ representatives of the State Govt. of Odisha were present during the video conferencing.

1.	Shri Bivash Ranjan, Dy. Director General of Forests (Central), Ministry of Environment, Forest & Climate Change, Integrated Regional Office, Bhubaneswar, Odisha	Chairperson
2.	Shri J. D. Sharma, 10054, Prestige Shantiniketan, Bangalore- 560048	Non-Official Member
3.	Shri S. S. Srivastava, Flat No. B-31, Raheja Atlantis, Secto-31, Gurgaon, Haryana - 122 001	Non-Official Member
4.	Dr. Subrata Maity, B2/210, Kalyani, Nadia, West Bengal – 741 235	Non-Official Member
5.	Mrs. Padma Mahanti Dy. Inspector General of Forests (Central), Ministry of Environment, Forest & Climate Change, Integrated Regional Office, Bhubaneswar, Odisha	Member Secretary
6.	Conservator of Forest & Nodal Officer (FCA) Forest Department, Govt. of Odisha, Aranya Bhawan, Chandrasekharapur, Bhubaneswar-751023.	Special Invitee
7.	The Joint Secretary, Revenue & Disaster Management Deptt., Govt. of Odisha, Bhubaneswar.	Special Invitee did not attend the meeting
8.	Dr. Ajit Kumar Pattnaik, IFS (Retd.) Bhubaneswar	Special Invitee

The agenda items and the recommendations by the members through circulations over emails and video conferencing/telephonic discussions of the members with Dy. DGF (Central)-cum-Chairperson REC are as follows:

Diversion of 15.265 ha of forest land for expansion of existing of Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District of Odisha by Vedanta in favour of M/s IDCO, Bhubaneswar, under Kalahandi South Forest Division.

1. Total land involved in this project is 64.444 ha comprising of 15.265 ha of Reserve Forest land and 49.179 ha of non-forest land. The total land involved in the project located in village Rengopali under Lanjigarh Tahasil of Kalhandi district under Kalhandi South Division is tabulated below:

Forest land involved (in ha)			Non-forest land involved (in ha)			Grand Total (in ha)
Sabik Forest	Gramya Jungle	Total	Govt. land	Private land	Total	
9.053	6.212	15.265	11.174	38.008	49.179	64.444

2. **Justification :** Giving justification, State Govt. has informed that the project envisages expansion of the existing Red Mud Pond towards its south face because of the following site constraints as projected by the project proponent, due to reasons furnished below:
- Towards the northern side of existing Red Mud Pond the filtration Plant and the main public Road from Lanjigarh to Dahikhal is located.
 - Towards eastern side of the existing RMP, Basantapara village located and relocation of the entire village would be required.
 - The main road link from township to Plant site & one village pond is located on Western side of existing RMP.
 - One Southern face, vacant space is available to integrate the existing RMP with proposed new pond for better management of the waste product.

3. FACT SHEET

1.	Name of the Proposal	Diversion of 15.265 ha of forest land for expansion of existing of Red Mud Pond at village Rengopali under Lanjigarh Tahasil in Kalahandi District by Vedanta in favour of M/s IDCO, Bhubaneswar, under Kalahandi South Forest Division.
2.	Location	
	(i) State	Odisha
	(ii) District	Kalahandi
	(iii) Village/Taluk	
3.	Particulars of Forests	
	(i) Name of Forest Division	Kalahandi South Forest Division
	(ii) Forest area involved	15.265 ha
	(iii) Legal Status/Sy. No	Revenue Forest (Sabik and Gramya Jungle)
	(iv) Density of vegetation	0.1 (Eco-Value Class-III)
	(v) Species wise and diameter class wise enumeration of trees.	Total 306 nos. of trees have been enumerated on the forest land proposed for diversion. Further, it is reported that 927 nos. of trees are standing on non-forest land involved in the project.
4.	Brief note on topography and vulnerability of the forest land proposed to be utilized for to	The DFO, Kalahandi South has informed that the applied area is going to be used for storage of red mud rise out of Bauxite Ore processing. There will

	erosion	be less possibility of erosion.
5.	Approximate distance of forest land proposed to be utilized for from boundary of the forest land	The DFO, Kalahandi South has informed that applied area is 1.5 Km away from the nearby RF.
6.	Whether forms part of National Park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve, Elephant Corridor etc. (if, so, the details of area, comments of CWLW)	The project area does not form part of any Elephant Corridor/Wildlife Sanctuary/National Park/Biosphere Reserve/Tiger Reserve or Eco-Sensitive Zone any Protected Area.
7.	Whether any rare or endangered or unique species of flora and fauna found in the area, if so details thereof:	The DFO, Kalahandi South Division has reported that there is no rare or endangered or unique species of flora and fauna found in the area. State Govt. has reported that forest comprises predominantly by Sal, Char, Dhaura, Gamar, Bara, Sidha, Mahula, Bahada, Bija, Pipal, Harida, Jamun, Asan, Kendu, etc. The wildlife like Wild Boar, Hyena and Indian Hare are seen in the area.
8.	Whether any protected archaeological/heritage/defence establishment or any other important monument is located in the area:	No protected archeology structure/heritage site/defence establishment or any other important monument is located in the applied area.
9.	Whether requirement of forest land as proposed by user agency is unavoidable and bare minimum for the project.	The DFO, Kalahandi South has reported that the requirement of forest land proposed by the user agency is barest minimum and unavoidable for the project.
10.	Whether any work in violation of FC Act or guidelines issued there under has been carried out (Yes/No). If yes, details of the same including period of work, action taken on erring officials. Whether work violation is still under progress	The DFO, Kalahandi (S) reported that no violation has been committed by the user agency under F.C. Act, 1980.
13.	FRA certificate:	The user agency has not furnished the certificate under FRA, 2006.
14.	Resettlement & Rehabilitation	State Govt. has reported that the project involves displacement of 117 families (SC-18 & ST-99) from the project area. The project proponent IDCO has requested to M/s. Vedanta Ltd, Lanjigarh to submit details of master plan duly approved by Collector, Kalahandi and the matter is under consideration with district revenue authorities. The IDCO has undertaken to submit the Re-settlement & Rehabilitation plan approved by Collector Kalahandi, before Stage-II.
15.	Environment Clearance	The User agency has not obtained Environment Clearance for expansion of the alumina Refinery Plant from existing 2 MTPA to 6 MTPA.
16.	Recommendation	

(a)	D.F.O.	Yes
(b)	RCCF	Yes
(c)	PCCF	Yes
(c)	State Govt.	Yes

4. **Details of Compensatory afforestation Scheme:** In lieu of proposed forest land for diversion the State Govt. has identified 15.379 ha of non-forest land and 125 ha of degraded forest land for Compensatory Afforestation as given below:

S. No.	Name of village/RF/ Tahasil	Non-forest land (in ha)	Degraded forest land (in ha)	No. of plots/ patches	Mode of plantation	No. of seedlings	Approved Financial outlay of C.A. Scheme (in Rs.)
1.	Dangajore	15.379	0	1	ANR @ 200 plants	3,075	61,90,300.00
2.	Ghana RF	0	125.000	1	ANR @ 200 plants	12,190	1,76,21,200.00
Total		15.379	125.000			15,265	2,38,11,500.00

5. **DSS report.**

- a) CA land (Non-forest) : 15.38 ha.

	Area (in ha)
Forest Cover	
Scrub	01
Non-Forest	14
Total	15

- b) CA land (Degraded forest) : 128.388 ha.

	Area (in ha)
Forest Cover	
Moderately Dense Forest	01
Non-Forest	82
Scrub	46
Total	129

6. **Net Present Value**

Sl. No.	Division	Forest Area (in ha)	NPV Rate (in Rs. per ha)	Crown Density	Eco-Class	Total (in Rs.)
1.	Kalahandi (South)	15.265	6,26,000/-	0.1	III	95,55,890/-

7. This office has asked following information vide its letter dated 22.06.2021.

- The density of vegetation in the proposed area is reported to be 0.6 (Eco-Value Class-III), whereas total 306 nos. of trees have been enumerated over proposed forest land for diversion.
- The DFO, Kalahandi (South) Division has not uploaded the Sol Toposheet, DGPS map, KML file & C.A. Scheme of identified degraded forest land for additional C.A. in Parivesh web portal.

8. Addl. PCCF (Nodal), Odisha vide its letter No.16164/9F(Ind)-398/2020 dated 18.09.2021 furnished the following information.

- a) It is intimated that the density of vegetation in the proposed area reported earlier as 0.6 (Eco-Value Class-III) is a typographical error and the actual density of vegetation is 0.1 (Eco-Value Class-III). The DFO, Kalahandi (South) has submitted revised Site Inspection Report.
- a) It is has intimated that the add & edit option on Part-II of Point No.9 Compensatory Afforestation in Parivesh Web Portal is not active during uploading of Sol Toposheet, DGPS Map, KML file & C.A Scheme of identified degraded forest land for additional C.A. Hence, the same could not be uploaded at this level. In this context, Shri Anil Kumar, Senior Technical Director, FCCID, MoEF&CC, New Delhi has been contacted for technical assistance regarding uploading of the same. An email was received by the concerned DFO from Monitoring Cell, New Delhi on 01.09.2021 stating that "as per your trailing mail there is no provision of Update the documents in Part-II of DFO once they recommended the proposal from their side. If you want to change those documents uploaded, kindly enclose the documents with a letter issued by State Nodal Officer to change in Part-II and send it to us. The State Govt. has submitted the hard copy of Sol Toposheet, DGPS Map, KML file and C.A. Scheme identified for degraded forest land for additional C.A. duly signed by all concerned.
9. Earlier this office has received a copy of representation received by Ministry from Lanjigarh Factory Anchal Vikash Samitee on 27.08.2021 regarding construction of Red Mud Pond without legal, environment & RR Policy Compliance at Rengopalli village, Lanjigarh, Kalahandi by Vedanta Ltd. This office vide letter dated 02.09.2021 has requested the State Govt. to enquire into matter, take necessary action and submit action taken report on the representation. However, reply of the State Govt. yet to be received in this office.

Decision of REC:

The REC has been approved the proposal conditionally with the following observations.

1. A report to be sought from the State Forest Department on the representation received from Ministry of Lanjigarh Factory Anchal Vikash Samiti within 15 days. If no response is received within the stipulated time, it will deemed that, the State Govt. has nothing to say in this representation.
2. All non forest land received under CA in Kalahandi district should be notified as forest under the Indian Forest Act, 1927 within 6 months.
3. CA area under degraded forest is very large and planting 200 saplings/ha seems to be very scanty. State Forest Department may consider to afforest the degraded area with more saplings per ha.
4. User agency shall submit a technical report as to whether the proposed site is polluting the first level aquifers within 15 days.

Approved vide e-mail
dated 12.10.2021

(J. D. Sharma)

Non-Official Member, REC

Approved vide e-mail
dated 12.10.2021

(S. S. Srivastava)

Non-Official Member, REC

Approved vide e-mail
dated 12.10.2021

(Dr. Subrata Maity)

Non-Official Member, REC

Padma Mahanti

(Padma Mahanti)

DIGF (C) & Member Secretary - REC
MoEF&CC, IRO, Bhubaneswar

Approved vide e-mail
dated 13.10.2021

(Bivash Ranjan)

Dy. DGF (C) & Chairperson - REC
MoEF&CC, IRO, Bhubaneswar



**Final Report
on
NO POLLUTION TO FIRST LEVEL
AQUIFER SYSTEM**

For Constructing the New SW Red Mud Pond
at
Vedanta Lanjigarh

SUBMITTED TO:



REPORT PREPARATION AND SUBMISSION BY:

B. HANUMANTHA RAO
SCHOOL OF INFRASTRUCTURE
IIT BHUBANESWAR
ARGUL JATNI ODISHA
OCTOBER 2021

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Report on
No Pollution Load to First Level Aquifer System
For the construction of New SW RMP at Vedanta Lanjigarh
Odisha

1.0 Preamble

M/s. Vedanta Limited-Aluminium Refinery at Lanjigarh, Odisha, has awarded a technical consultancy project to School of Infrastructure at Indian Institute of Technology Bhubaneswar (Dr. B. Hanumantha Rao, Assistant Professor, School of Infrastructure), for which we are pleased to submit the technical report on **"No pollution load to first level aquifer system"** in the area to be covered by the proposed new red mud pond construction. This report entails factual information on no pollution to first level aquifer system as a result of new permanent construction of Southwest red mud pond (SW RMP) towards the expansion from the existing 2 MTPA to 6 MTPA. All the information presented in this report is on the basis of analysis of various reports submitted by different organization, site visits and information provided by Vedanta Limited.

As per the guidelines of Ministry of Environment and Forests (MoEF) & CC, a project shall require approval either from Central or State Pollution Control Board. An excerpt from Central Pollution Control Board, which stipulates the guidelines for according the permission, pertinent to different category of projects are given below:

"All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification".

"All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub-paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfil the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification.



2.0 General

Vedanta Resources Limited is a globally diversified natural resources company. We extract and process minerals, oil and gas, engage more than 65,000 employees and contractors, primarily in India, Africa, Ireland and Australia. Vedanta Limited is one of the operating companies of Vedanta in Aluminium Business. Vedanta Limited is a leading producer of metallurgical grade Alumina and other Aluminium products. The Alumina Refinery Complex is situated at Lanjigarh in the State of Odisha, India.

EC has been granted to M/s Vedanta Limited, vide letter no J-11011/406/2011-IA.II(I) dated 6th August 2021, for expansion of its existing 1.0 MTPA Alumina refinery & 75 MW Captive Power Plant at- Lanjigarh in Kalahandi District of Odisha to 6.0 MTPA Alumina & 285 MW power.

3.0 Site Location Information

Place:	East & South Side of Existing RMP, Lanjigarh
District:	Kalahandi, Odisha
District Head Qtr.:	Bhawanipatna (70 Km from plant site)
Nearest State highway:	Rayagada-Bhawanipatna State Highway 8 Km from plant site
Nearest Railway Station:	Muniguda on Rayagada-Titlagarh route 25 Km
Nearest Town:	Bhawanipatna
Nearest City Vizag:	(270 Km from site)
Nearest Sea Port:	Vizag
Nearest airport:	Vizag

3.1 Geographical details of RMP and its surroundings

The red mud pond is about 0.5 km from the main plant area. The surrounding features of red mud pond area in east, west, north and south are as follows: refinery Plant on the North, Basantpara village to the east, Rengopalli village to the south, and the process water lake on the west side. The downstream area of mud pond area is spread over to a distance of approximately 0.5 km.

4.0 The scope of the present report

The scope of this report is to bring out a fact that the construction of new SW RMP will not cause any increase in pollution load to first level aquifer system underneath area covered by the proposed new SW RMP at Vedanta Lanjigarh.

5.0 Red Mud Pond (RMP)

Red mud is the processed waste material generated by the Alumina Refinery. At present, Vedanta stores the generated red mud in a pond which is divided into two cells, i.e. East cell and West cell, both cells are in operation to receive the deposition of residue. Figure 1 shows East and West cells of RMP.



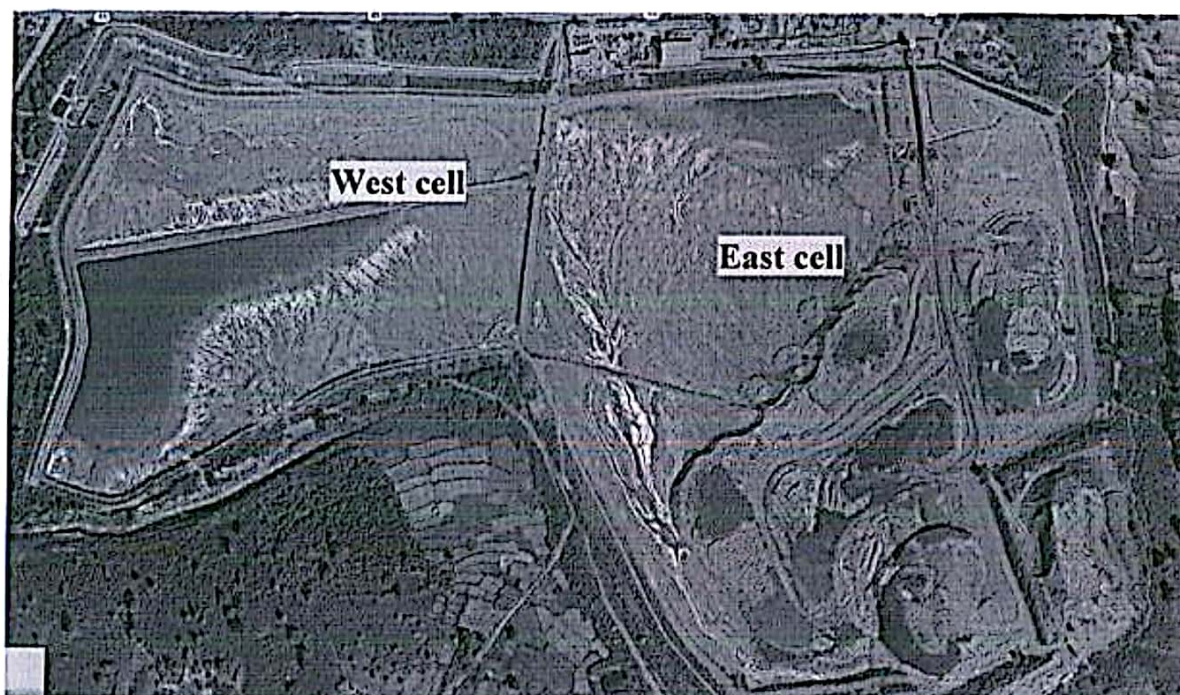


Figure 1 Google earth image showing East and West cells of locations of soil testing on the RMP

West pond was taken into operation in the year 2007 and HCSD method was adopted. West pond was completely filled by 2011. Consequently, East pond was developed and commenced its operation in the year 2011 and disposal was done by HCSD. After developing the dry disposal technology, Vedanta had commissioned red mud filtration unit in the year 2013. Since then dry filter cake red mud is deposited into the East pond. Red mud is transported through pipeline to a filter press dewatering facility. By conveyor from thereon, it is disposed as a dry cake material into the red mud pond. Within the pond. Dry cake is further spread with a dozer and compacted with a drum compactor in lifts. The red mud pond has been created by two earthen embankments to form the east and west cells for storage of red mud along with the contiguous new SW red mud pond. M/s. Golder vide report number 1786571 dated: 26th April 2018 has developed methodology for dry stacking of red mud and the same procedure is certified by IIT Bhubaneswar.

6.0 Aquifers and Water Movement in Aquifers

Groundwater is one of our most valuable resources—even though you probably never see it or even realize it is there. The zone above the ground water table is called unsaturated zone, while below it is saturated zone (Figure 2). Though unsaturated zone is permeable enough, it can hold water but still stay solid. This is essentially due to the filling of void spaces with water. However, porosity and permeability characteristics of natural ground varies spatially and temporally and the change in these characteristics is so drastic that water movement and its storage highly varies from



location to location. The saturated area beneath the water table is called an aquifer, and aquifers are huge storehouses of water. This stored water readily transmits to wells and springs. Figure 3 clearly distinguishes between aquifer and common ground water table. Precipitation is only the means of recharging or adding water to the porous soil of the aquifer. The rate of recharge is not the same for all aquifers.

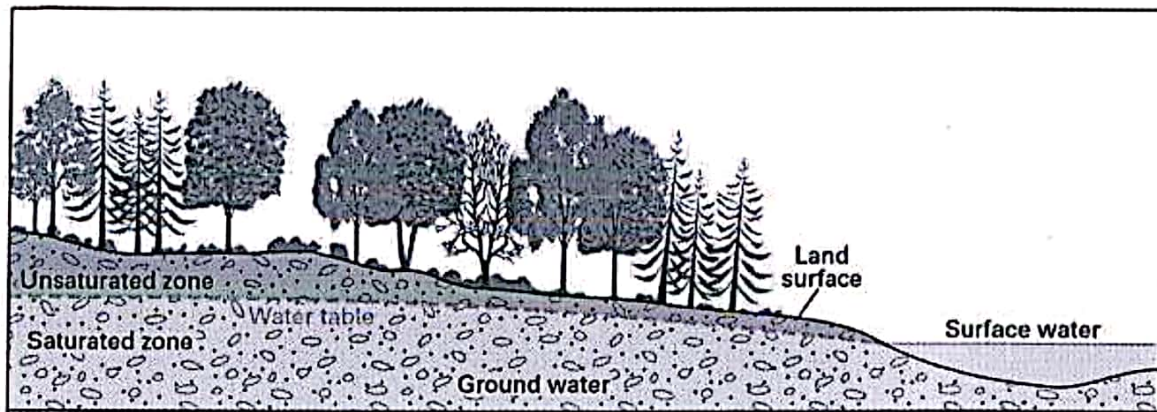


Figure 2: Image showing storage of ground water within the ground

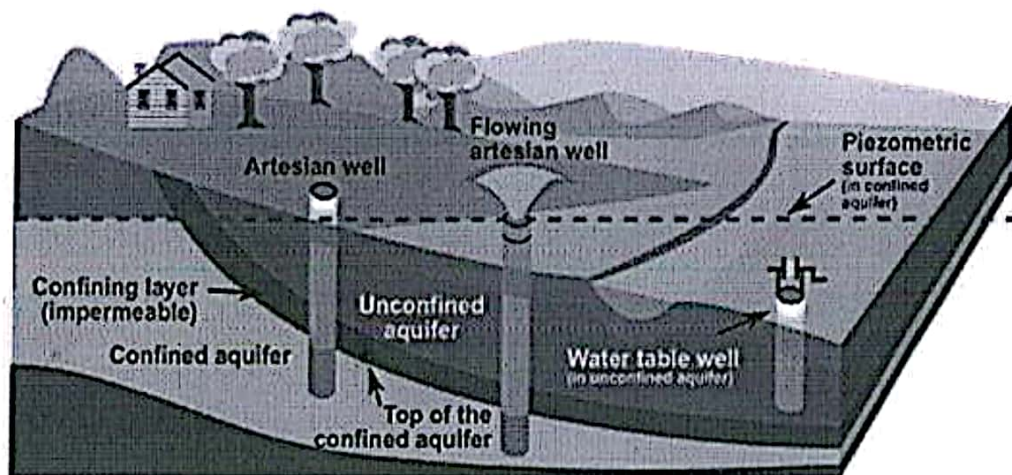


Figure 3: Image showing the difference between aquifer and ground water table

Water movement in aquifers is highly dependent on the permeability of the aquifer material. Permeable material contains interconnected cracks or spaces that are both numerous enough and large enough to allow water to move freely. In some permeable materials groundwater may move several meters in a day; in other places, it moves only a few centimeters in a century. Groundwater moves very slowly through relatively impermeable materials such as clay and shale. After entering

an aquifer, water moves slowly toward lower lying places and eventually is discharged from the aquifer from springs, seeps into streams, or is withdrawn from the ground by wells.

7.0 Study Area: First Level Aquifer and Catchment Area

Figure 4 shows the details of the proposed new SW red mud pond area. This area shall be considered in this report as a study area under for first level aquifer system that might get polluted due to the construction of a new SW red mud pond. The rainfall occurring over this catchment area shown in Figure 4 is considered contributing for surface runoff as well as infiltration source to first level aquifer as a ground water. Therefore, it is necessary to analyse the design aspects of RMP and diversion of stormwater coming from this catchment area.



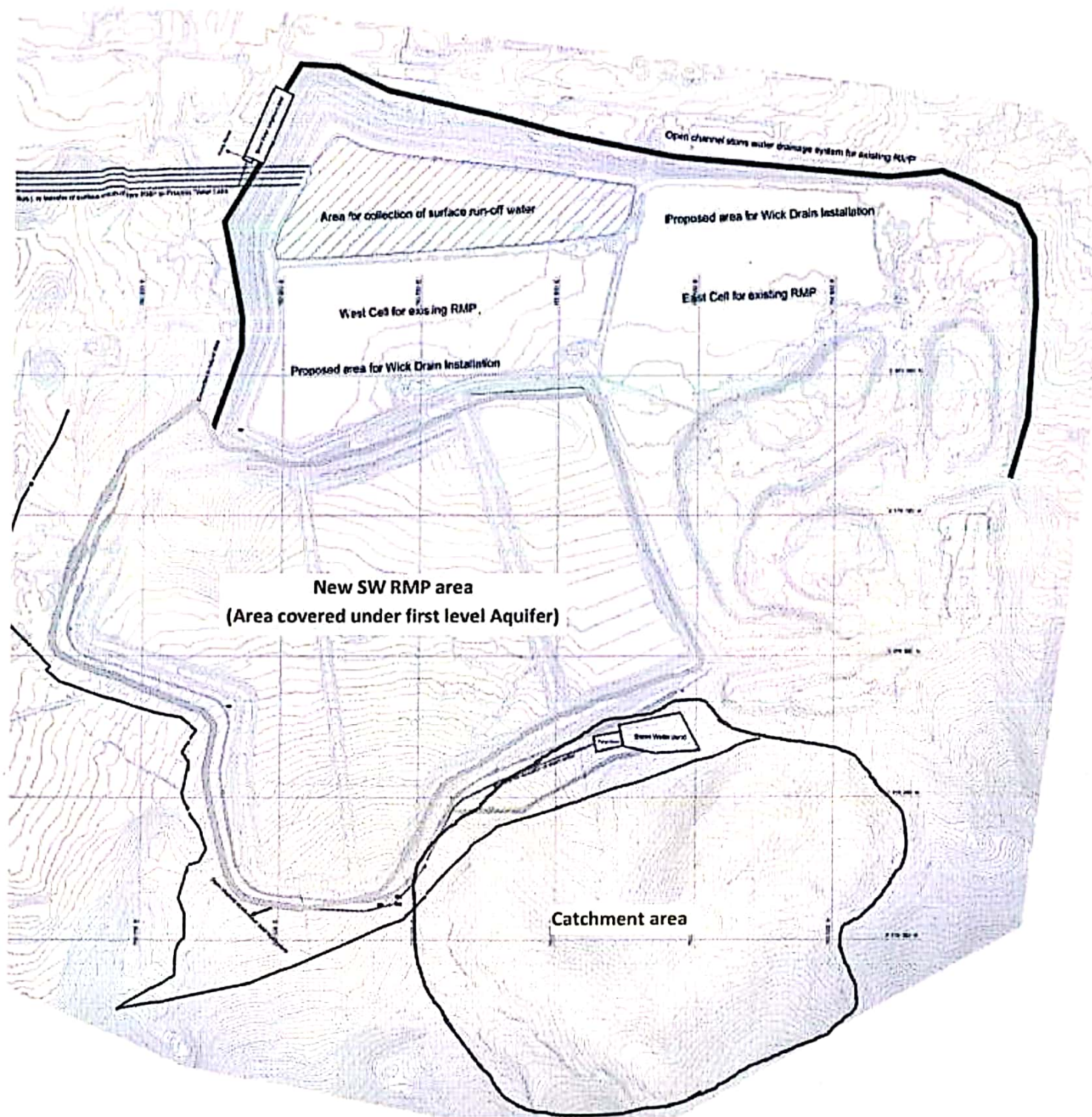


Figure 4: Sketch showing the area covered under first level aquifer and possible catchment area might contribute for recharge of first level aquifer



8.0 Factors Contributing for Pollution Load Increment of First Level Aquifer and Remedial Measures Inbuilt in Design of New SW RMP

First, there are no stipulated guidelines by pollution control board or any other agency about causative factors contributing for pollution of first level aquifers. Therefore, academic expertise along with the vast experience in dealing with tailings dams and other guiding factors as released by SPCB/CPCB on environmental monitoring and management relevant issues are used to prepare this report. Based on this, the following points have been set as guiding factors that could account for pollution load increment as a result of the construction of the proposed new SW RMP. Therefore, these points have been verified in detail by correlating them with the reports that were submitted by Vedanta Limited, and assessment is made on the pollution load increment with proper justification. A basic understanding demonstrates that all three elements such as soil, water and air can become polluted due to the proposed second SW RMP in the due course of time. However, in this report aquifer system comprises of two fundamental elements, soil and water, are considered for verification purpose with vulnerability to undergo pollution.

To address the issue associated with pollution of first level aquifer and remedial measures inbuilt in the design of new RMP, the following points have been analysed and appropriate inferences are made herein.

- Raw materials, Technology adoption and Waste generation
- Disposal practices of red mud
- Seepage from existing RMP
- Design details and drawings of second red mud pond
- Catchment area and storm water management
- Environmental Monitoring plan

8.1 Raw materials, Technology adoption and Waste generation

Raw materials: Bauxite ore is the chief raw material being used for production of alumina by Bayer's process.

Technology adoption: Bayer Process Alumina refining technology has been adopted since the inception of plant and the same process shall be followed for the expansion capacity of the refinery.

Waste generation: Red mud, an insoluble solid residue, is the primary waste and is generated after digestion of bauxite ore with the caustic solution. The detail of the waste generation has been reported to OSPCB for the year 2020-2021 vide annual Environmental Statement Nos. VLL/HSE/ENV/2021/1343.

It is concluded as regards to raw material, technology adoption and waste generation that there is no alteration in the input raw materials or product mix (as per the specific consumption wise pattern), technology adoption (Bayer process technology), and waste generation quantities (as per the specific generation wise pattern). It is also noticed vide the aforementioned annual



environmental statements that the average consumption of input raw materials and waste generation subsequent to consumption of raw materials is nearly same.

8.2 Disposal practices of red mud: Dry Stacking Methodology

M/s Golder had proposed the stacking of red mud residue in its dry cake form in five phases with various subphases for the safe stacking giving sufficient time for proper consolidation in the due course of time. Taking these as input data, a detailed analysis has been carried out for each subphase stack deposition as well as complete stack as a whole deposit. The design report suggested for dry stacking from RL 463m to RL 550m by combining existing & new red mud stack area. Each stack is of 7m height and a berm width of 15m is left at each stack lift, allowing the movement of vehicles and manpower. Based on the design report, it was proposed to install wick drain in the existing slurry area. Looking into the criticality of the structure, only the initial two stages above the wick drain area have been designed with the slope in 3H:1V; whereas in other case slope has been kept in 2H:1V. Factor of safety has been checked for both static condition which is 2.137 against the requirement of 1.5 and for dynamic condition which is 1.52 against the requirement of 1.2. Figure 5 illustrates the disposal of red mud in old ponds by dry stacking methodology.

A moisture content in the range of 20-25% only is maintained in the dry cake post subjected to filtration process in the RMF unit. As per the previous studies, it is understood that such amount of moisture content is, indeed, required to compact the red mud while depositing into the pond area. As such, there is no possibility of transmittance of this moisture reaching to the natural ground, which is a first level aquifer system. Therefore, it can be concluded from the disposal practice of dry cake from that there is no scope for pollution of first level aquifer by the deposition of the red mud.

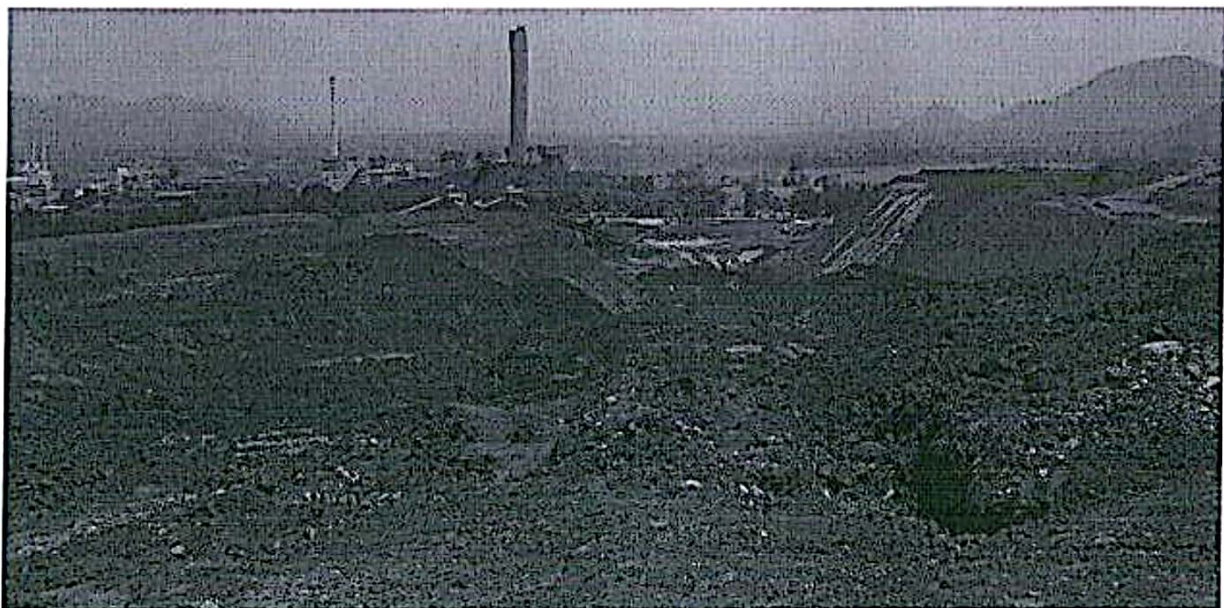




Figure 5: Photograph of red mud disposal by dry stacking methodology

8.3 Seepage Collection System

The West side of west cell near the hill and South side of East cell shares a common bund with the proposed phase 1 of SW RMP. Though the scope for seepage of caustic liquor from East and West cells is remote, there is already an in-place seepage collection system exists along ~200m length towards East side of the SW RMP, where it has a common embankment with the existing East RMP. The existing collection system will be tied into a separate seepage mainline that will transport the seepage out through the northwest corner of the SW RMP. From here it will be collected into one of the West RMP seepage collection channels where it will subsequently drain into the West RMP seepage collection pond.

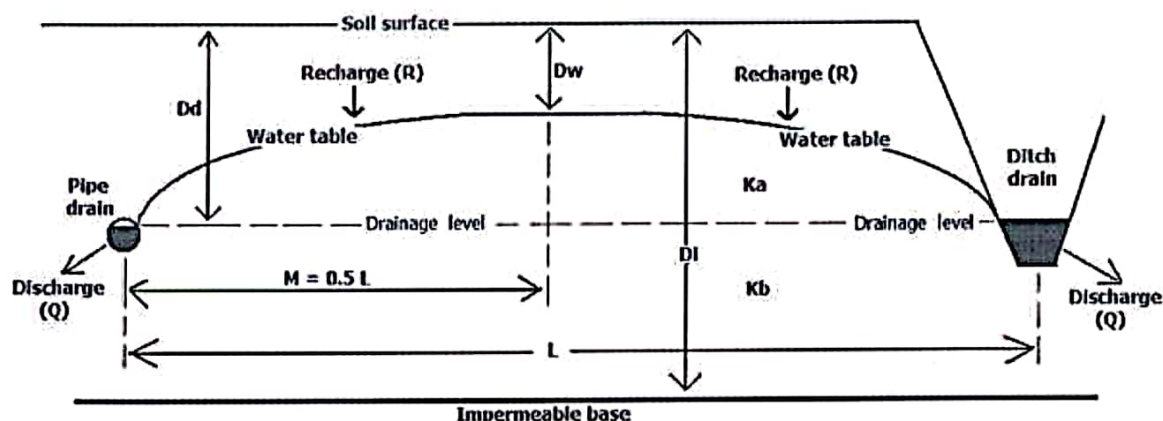
8.4 SW RMP Underdrain System

Phase 1 of the SW RMP has shown a historical high groundwater level as the run-off from the southern forested hillside is directed into this area and the natural drainage has been blocked by construction of the East and the West RMP. This high groundwater level will be controlled below the geomembrane liner by the underdrain system. Figure 6 shows the cross section of drainage systems for lowering the ground water table. It can be noted that, with the construction of phase 1 of SW RMP, the run-off from the southern forest hill land will be blocked completely. The completion of phase 1 of SW RMP can also alleviate the historical high ground water level because



there is no input water source from the upstream side i.e. southern side of hillside. The spacing of the underdrain system was determined using Hooghoudt's drainage equation (Figure 6) and the EnDrain computer software to calculate the optimum drain depth of ~1m with a drain spacing of 25m. The underdrain system consists of a chevron pattern of 315mm diameter perforated HDPE pipes with a central 450mm diameter perforated drain that collects the flow from the system and directs it to a solid 450mm pipe that transfers the groundwater seepage out of the cell area to the northwest corner of the new SW RMP.

By diversion of seepage and constraining of run-off from hillside area with the proposed underdrain system, it can be concluded that there is no possibility of pollution to first level aquifer system.



Geometry subsurface drainage system by pipes or ditches

D = depth K = hydraulic conductivity L = Drain spacing

Figure 6: Proposed under drainage systems beneath Phase 1 SW RMP

8.5 Design details and drawings of SW RMP

Vide point 8.2, it is apparent that solid waste dumped into the proposed new SW RMP is in dry cake form with a moisture content of less than 25%. Though, there is no scope for migration of moisture, presuming that moisture seeps in the longer period of time through the bottom and side lining systems and thereby, enter into the natural ground and ultimately reaching ground water or first level aquifer. It can be asserted that seepage through bottom liner system is a chief cause for pollution of soil and ground water. As a precaution against ground water pollution from the red mud pond, the design provided by M/s Golder has adopted to provide 1.5 mm thick smooth-smooth HDPE Geomembrane, as a liner material in accordance with the guideline given by MoEF. Whereas, the peripheral slopes will be lined with one side textured-smooth HDPE 1.5 mm thick geomembrane. The membranes will be anchored on top of the berm with a suitably designed anchor trench of 1 m x 1 m cross sectional area and the trench is further backfilled after anchoring



of the membrane is completed. The geomembrane is further sandwiched between clay liners, which composes of impervious clay admixed with 2-5% of Bentonite.

The HDPE geomembrane is made of polypropylene and its main function is to effectively control the seepage through it and thereby, mitigate pollution of ground water or aquifer system. Moreover, the addition of 2-5% of bentonite to natural clay soil further improves the impervious characteristics of bottom liner system. Understandably, the combination of clay liner and HDPE geomembrane could effectively control migration of moisture into the natural soil and to ground water and thereby, prevent pollution of these natural resources.

8.5.1 Seepage

During rainfall events, it is expected that a portion of rainfall will infiltrate into the red mud. Out of this, a portion might try to seep through the clay liner. The remaining will be retained by the red mud and will be considered as entrained or not recoverable. A seepage rate of $1\text{E-}8$ cm/s through the clay liner is assumed and the permeability of red mud is in the order of $1\text{E-}7$ cm/s. Generally, this is the permeability rate assigned to compacted clay liners which seemed reasonable for the clay lined RMPs. It is obvious that the integrated clay liner system and HDPE geomembrane effectively prevents seepage of rain water into the natural ground.

It can be concluded from the design details of SW RMP, the bottom liner system integrated with HDPE geomembrane efficiently controls the seepage of rainwater into the natural ground and thereby, prevents pollution of first level aquifer system.

8.6 Catchment area and storm water management

As per the design drawing provided by Golder (Figure 4), approximately 250 to 500m south of the Red Mud Ponds, the land elevation rises steeply by about 600m. Both the hill slopes and immediate plateau area have a dense mixed native jungle cover. The immediate areas are reported to be reserved forest areas (Niyamagiri Reserve and Khambesi proposed Reserve). This high topographic creates challenges from a hydrologic and runoff point of view but is mitigated to some degree by the dense forest cover. As the watershed runoff area behind the Red Mud Ponds is significant, the surface water run-off will have to be directed around the Red Mud Pond project area.

8.6.1 Soil types and water retention properties

The principal soil types are tropical laterites, having relatively deep organic horizons at the lower elevations and elevated percentages of sand, gravel, cobbles, and laterite nodules (moorums) at topographic highs. Elevated organic content soils are present in the low-lying areas where the new Southwest Red Mud Pond will be sited, are due to farming activities as well as sediment transport from the steep elevated lands to the south. The organic rich horizon is most prominent in the farm fields using flooded paddy type irrigation. The permeability of these soil types is relatively quite



high and the water retention capacity, which would contribute to aquifer system, of these soils is very low.

8.6.2 Design of SW RMP Surface Water Management

It is certain that clean runoff emanates from upstream catchment area, as per the Figure 7. Therefore, under water management, two things have been considered. First, surface runoff water within the stacking area and the second is the clean water run-off from the hill side catchment area (refer to Figure 7). North west side of the existing west cell pond is identified as the collection of surface runoff water inside the stacking area to address first point. The same system will be maintained as it is even after closer of the stacking life of RMP. Further, for the runoff water inside the pond area, toe drain will be developed after completion of each stack & the water to be channelized towards the north west side of the existing west cell pond followed by transfer to the process water lake finally through the pipeline and from process water lake water is taken to inside plant for utilization. Section of the toe drain will be developed based on the practical site condition before monsoon. Considering the catchment area final drain section will be designed & will be constructed around the toe of stack for collection of storm water which will be connected to the northwest side of existing west cell. Subsequently, the water will be transferred to the process water lake and taken back to plant process.

For the clean runoff water coming from the hill side, Golder developed three step system. It includes, first collection of surface water runoff from catchment area by “stormwater channel” (Figure 7), second diversion of collected stormwater into the “clean water pond” (Figure 8), and the third is to pump the stored clean water by “stormwater bypass pipes” (Figure 9). Typical cross section of stormwater drain can be seen in Figure 10.

The design includes stormwater conduits passing under the RMP, penstocks, and staging/retention pond. The upstream catchments that cannot be diverted to the western perimeter diversion channel are combined using a short collection channel to direct the flow to a single staging/retention pond located at the southeast corner of the SW RMP (Figure 8). This pond is drained through two penstocks into two 600mm diameter steel pipes which transport the collected surface water under the RMP to the northwest corner of the SW RMP where it is discharged into the natural drainage channel.

8.6.2.1 Water Sources and inputs to the design of clean water pond

Rainfall for Kalahandi, Orissa District was selected for calculating the capacity of clean water pond by Golder. The monthly rainfall records were obtained from the India Meteorological Department for the period from 1901 to 2002, which is 102 years of monthly data. Six (6) years of daily rainfall records were also obtained from VAL from 2012 to 2018 from a rain gauge at the processing plant. Golder used a stochastic rainfall simulator developed in GoldSim to predict rainfall patterns anticipated in a catchment over time. The rainfall generator accounts for seasonal variations and cyclic rainfall patterns with wet and dry years. The 102-year monthly data was used for long term planning (future scenarios) of managing water and tested with the 6-year daily data



to account for peak rainfall events. For the Lanjigarh water balance mode, 50 realisations were conducted for the 10-year period to produce possible ranges of results for the rainfall events. The historical monthly rainfall data was linked in the model and for each realisation, a different 10-year rainfall set, selected randomly from the available data was used. This results in a probabilistic distribution from the model, allowing the user to assess the risk of spillage.

As regards to discharge of clean water from the collection pond, Golder & IIT Bhubaneswar has suggested three methodologies. Different options are as follows:

Options

- a. Through 100% underground piping system
- b. 50% through underground piping & 50% through pumping system
- c. 100% pumping system

But Vedanta Limited has decided to go with 100% pumping system.

In addition to this, one garland drain is constructed surrounding the existing pond area at the outer edge of the embankment & connected to the catchment pond for collection and subsequent transfer to the process water lake through pumping system same. Layout plan is as per the below Figure 9. The typical cross section of garland drain can be seen in Figure 10.

Based on the above design details with regard to management of clean water runoff, it can be concluded that there is no inflow of clean water into the ponds from outside the pond embankments.



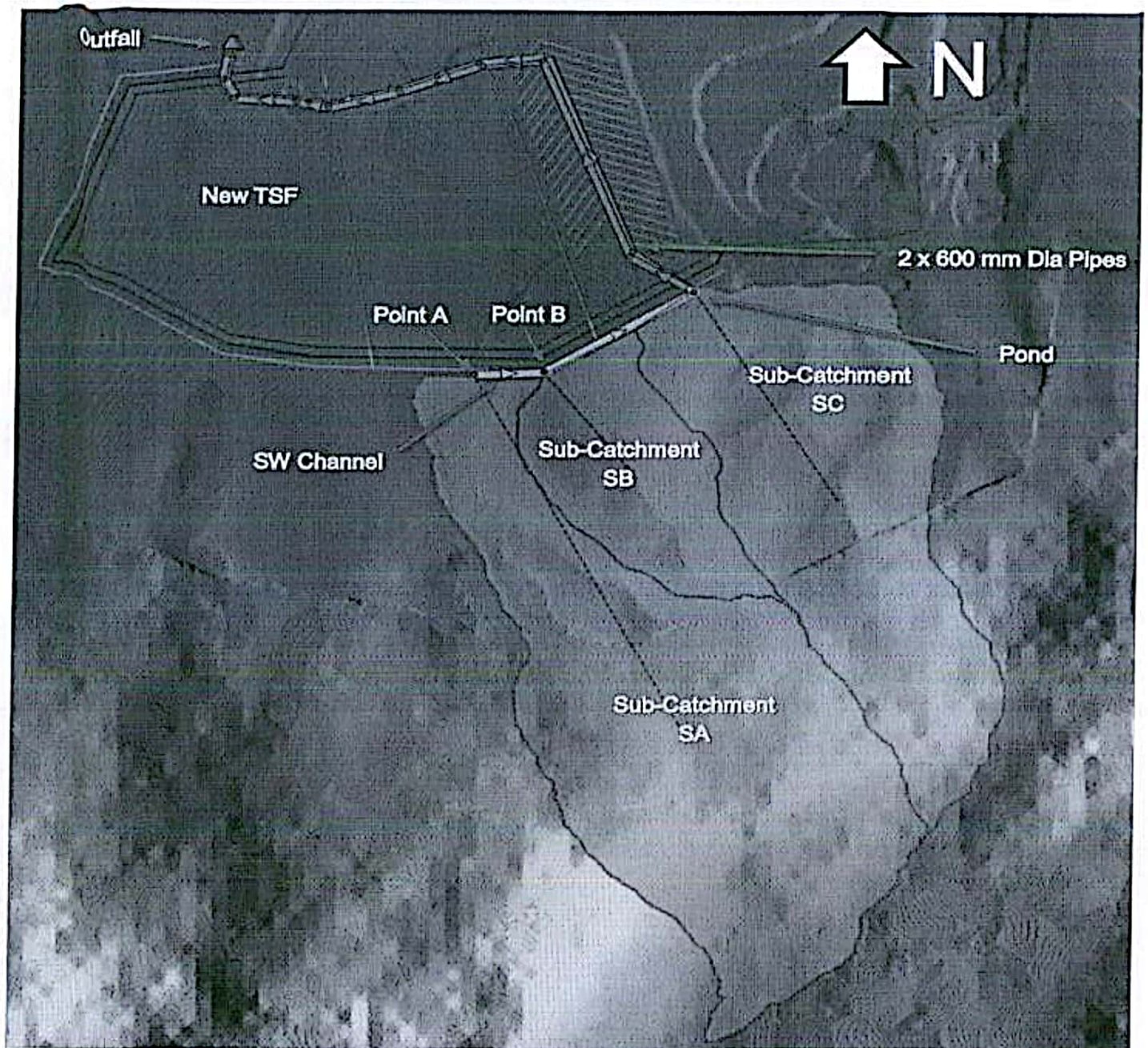


Figure 7: Catchment area for clean water run-off with stormwater channel and pipe layout for its diversion



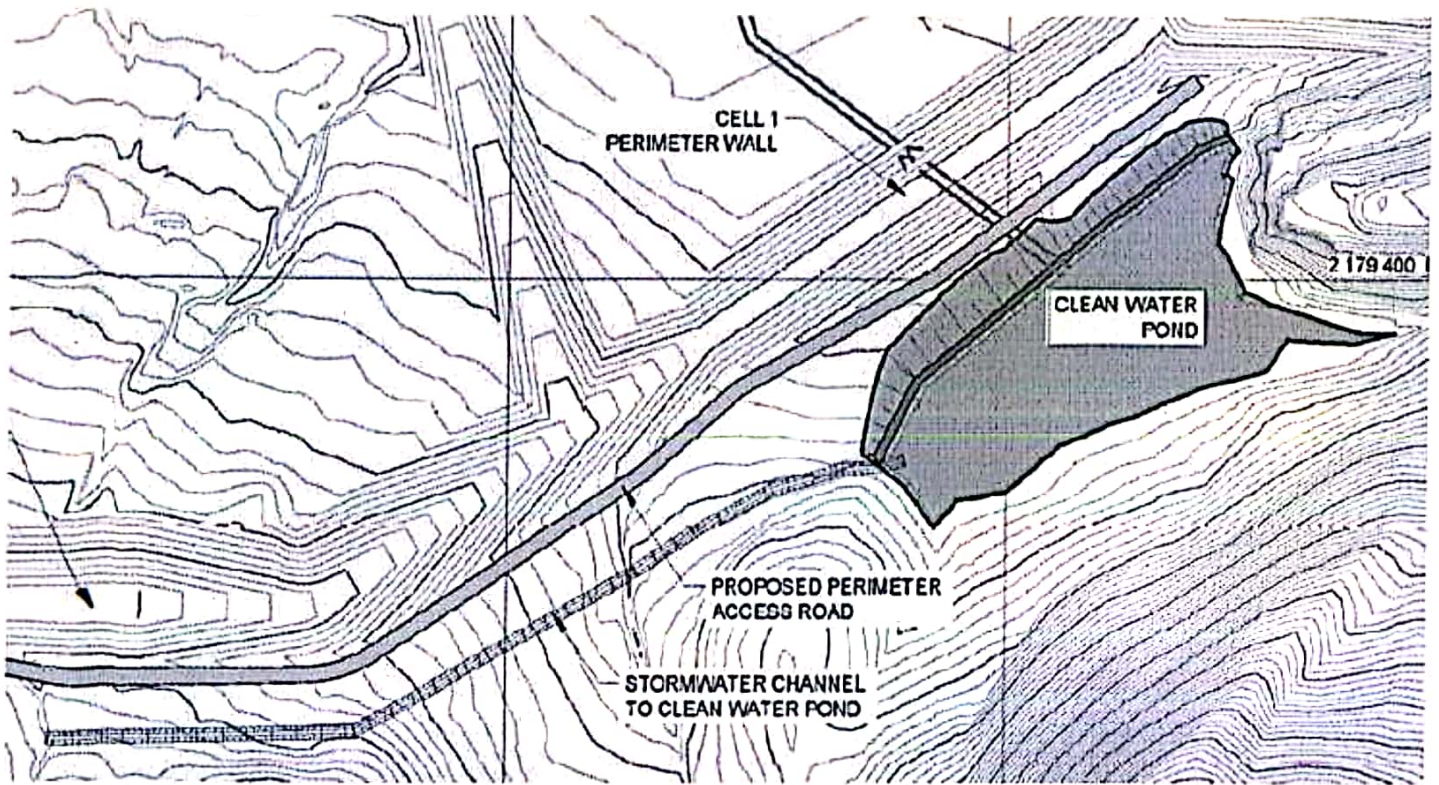


Figure 8: Details of clean water pond for diversion of surface run-off water





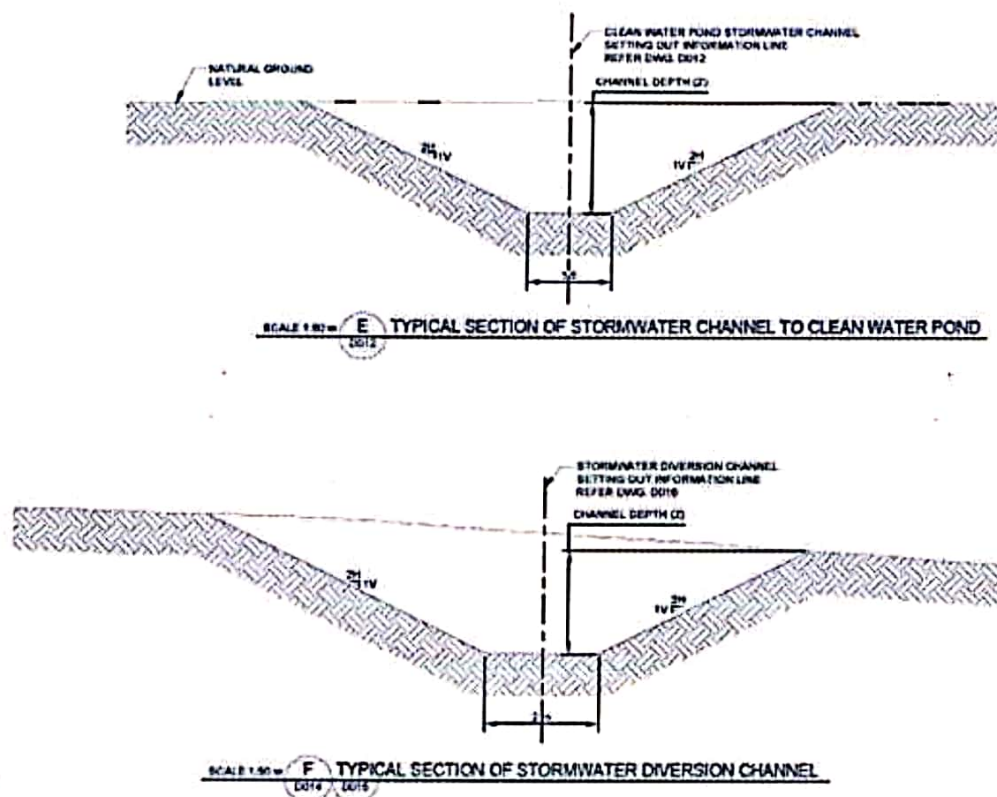


Figure 10: Typical cross section of a garland drain

8.7 Monitoring and Stability Analysis of dykes

Discharge of the red mud into the pond is a constant and continuous process. As a result, there is a continual increment in overburden pressure, besides development of seepage pressure within the dikes, due to rupture of HDPE geomembrane. Looking into the criticality of the structure, it becomes essential that the stability of dikes is ensured by stability analysis on annual basis. Analysis shall be carried out for each subphase stack as well as for complete stack of a particular lift. Factor of safety shall be checked for both static condition as well as dynamic conditions, whose requirement is 1.5 and 1.2 respectively.

It is important to monitor to have a real-life monitoring system that could reveal health condition of dykes. This is also necessary in view of constant dumping of red mud and increase in surcharge load due to rise in height of dry stacking. This can be accomplished by installing piezometer on the top of the dyke and measuring the water levels in it periodically, say on daily or weekly basis. Survey monuments in the embankment and inclinometer on sloping surfaces of the starter dyke installation will help to monitor the settlements and slippage respectively.



9.0 Recommendations

Vedanta Alumina Refinery at Lanjigarh is planning to construct a new SW red mud pond for storage and disposal of bauxite residue to be generated as a result of expansion of plant from its 2 MPTA to 6 MPTA capacity. Vedanta wants to ensure that the proposed construction of a new SW RMP will not cause any pollution to first level aquifer system underneath it and covering the construction area. In this connection, VEDANTA has sought the expertise of IIT Bhubaneswar to undertake the pollution load study and provide no pollution to first level aquifer system certificate.

For the above purpose, the perspective causes that could contribute for pollution to first level aquifer system because of the construction of SW RMP has been reviewed considering both practical viewpoint and academic knowledge. The bundle of design documents provided by M/s. Golder (reports number: 1786571) and Vedanta (Annexure-I) have been reviewed to comprehend the problem and remedial action engrained in the design drawings.

After reviewing exhaustive information and making inferences with appropriate justifications on (a) consumption of raw materials with a specific pattern, technology adoption and waste generation specific patterns, (b) disposal practices, (c) design aspects of SW RMP, and (d) catchment area and stormwater management, it is understood that the first level aquifer might get polluted due (a) clean water run-off from hillside catchment area and entering into the SW RMP, (b) infiltration of rainwater on the stacking area, and (c) entering of seepage water from southwest side of East and West cells in to the SW RMP.

Vedanta Limited may take care of no pollution to first aquifer system (a) by constructing the clean water pond, which collects and stores the clean water runoff channelized through stormwater channel, on the southern side near the hill and thereby, could effectively constrain entering of clean runoff into the pond and (b) secondly, by adopting to the bottom clay liner integrated with HDPE geomembrane system, which could efficiently impede seepage of rainwater into the natural ground and thereby, ward off pollution of first level aquifer system. It may be understood by all concerns that construction of the SW RMP by Vedanta Alumina Refinery at Lanjigarh neither pollutes the first level aquifer system nor it will alter the pollution load in the future.

10.0 Conclusion

Considering all the above technical analysis, the design by M/s Golder associates and the design vetting by IIT, Bhubaneswar & implementation of the above-mentioned recommendations, it is concluded that the first level aquifer will not be polluted due to construction of the new SW RMP.



Annexure-I

Sl. No.	Description	Drawing no.
1	General arrangement plan	D001A
2	General arrangement plan	D001B
3	Site clearing layout, typical section and setting out information	D002
4	Cell 1 general arrangement plan	D003
5	Cell 2 general arrangement plan	D004
6	Cell 3 general arrangement plan	D005
7	Cell 1 embankments long section and setting out information	D006
8	Cell 2 embankments long section and setting out information	D007
9	Cell 3 embankments long section and setting out information	D008
10	Typical sections and details	D009
11	Underdrains and storm water pass-through layout plan	D010
12	Clean water pond layout, cross section and setting out information	D011
13	Storm water diversion channel to clean water pond layout, long section and setting out information	D012
14	Storm water bypass collection pipeline long section and setting out information	D013
15	Storm water diversion channel layout plan and long section (sheet 1 of 2)	D014
16	Storm water diversion channel layout plan and long section (sheet 2 of 2)	D015
17	Storm water diversion channel setting out information	D016
18	Perimeter road layout plan and long section (sheet 1 of 3)	D017
19	Perimeter road layout plan and long section (sheet 2 of 3)	D018
20	Perimeter road layout plan and long section (sheet 3 of 3)	D019
21	Perimeter road setting out information	D020
22	Typical section of perimeter road and diversion drains	D021
23	Clean water pond penstock and pipeline dissipator	D022



Annexure - III

F. No. J- 11011/406/2011- IA.II (I)
Government of India
Ministry of Environment, Forest and Climate Change
(I.A. Division – Industry I sector)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj,
New Delhi – 110003
E-mail: r.sundar@nic.in
Tel: 011-24695304
Dated: 6th August, 2021

To

Shri. Rahul Sharma,
Chief Executive Officer,
M/s. Vedanta Limited,
AT/PO:- Lanjigarh, District Kalahandi,
Odisha - 766027.
Email: headhse.vll@vedanta.co.in; Tel: 7328833912

Subject: Expansion of Alumina Refinery (1 MTPA to 6 MTPA) and Captive Power Plant (75 MW to 285 MW) by M/s. Vedanta Limited, located at Lanjigarh District Kalahandi Odisha - Amendment in Environment Clearance – regarding.

Sir,

This refers to application of M/s. Vedanta Limited made online vide proposal no. IA/OR/IND/209784/2021 dated 22/04/2021 along with Form 4, submission of additional information vide letter dated 29/05/2021 and 08/06/2021 and sought for amendment in Environment Clearance accorded by the Ministry vide letter no. J-11011/406/2011/IA-II(I) dated 20/11/2015.

2. The proposal was considered by the Reconstituted EAC (Industry-I) in its 36th meeting held on 18-19th May, 2021, 37th meeting held on 31st May- 1st June, 2021 and 38th Meeting held on 15-16th June, 2021. The EAC proceedings of the said meetings are furnished as below:

Details submitted by the project proponent

3. M/s. Vedanta Limited submitted their application to MoEF&CC on 19/08/2014 for grant of EC for expansion of **(1MTPA to 6 MTPA – Phase I: 1 to 2 MTPA; Phase II: 2 to 4 MTPA and Phase III: 4 to 6 MTPA)** Alumina Refinery and Captive Power Plant (from 75MW to 285MW) at Dist. Kalahandi, Odisha. As per the proposal submitted to MoEF&CC, the total project area is 1552.7 ha. Out of this total area, 833.17 + 53.5 ha is under advanced stage of acquisition and the balance 666.03 ha was yet to be acquired. Since the total land required for the project activity was not under the possession of proponent, the EC was accorded for the expansion of Alumina Refinery **(1 MTPA to 4 MTPA)** and Captive Power Plant (75 MW to 285 MW) on 20/11/2015. As per para no. 26 of the EC dated 20/11/2015, the project need not go through a fresh appraisal process again for the Phase -III expansion from 4 to 6 MTPA and stipulated a following specific condition:
"v. For Phase-III (6 MTPA), the proponent shall obtain an amendment of EC after completion of land acquisition of the balance area of 666.03ha".
4. The phase wise land break up for the alumina refinery as per EC dated 20/11/2015 is furnished as below.

o/c

S. No.	Facility	Existing area (ha)	Addl. land for Phase I (ha)	Addl. land for Phase II	Addl. land for Phase III	Total
1.	Main Plant with green belt	420	0	0	0	420
2.	Red Mud Storage Pond with green belt	211.47	0	53.5 ha (process of acquisition initiated)	518.03 (yet to be acquired)	783
3.	Ash Pond with Pipeline with green belt	95.4	0	0	80 (yet to be acquired)	175.4
4.	Township & Misc including green belt	52.5	0	0	28 (yet to be acquired)	80.5
5.	Railway including Green belt	53.8	0	0	40 (yet to be acquired)	93.8
	TOTAL	833.17 ha	0	53.5	666.03 ha	1552.7 ha

5. The instant amendment proposal is for seeking amendment in the EC dated 20/11/2015 as given below:

- i. As per the assessment done by Industrial Promotion & Investment Corporation of Odisha (IPICOL), the nodal agency of Government of Odisha through Engineers India Limited (EIL) have assessed that the total additional land required for expansion to 6 MTPA is of only 666 acres i.e. 269.52 hectare as against 666 ha prescribed in the EC dated 20/11/2015. The major additional land requirement for red mud storage got reduced to 263.5 ha against 571.53 ha as per EC 2015 due to adoption of new technology and conversion from Wet disposal to Dry disposal of red mud.
- ii. Technical justification for Reduction of Land requirement for Red mud storage is due to following points to be adopted for disposal of red mud.
 - a) Switching from Wet disposal to Dry disposal through red mud Filtration unit by reducing the moisture percentage to 20-25%.
 - b) Adoption of Wick drain technology in the earlier Wet red mud storage area for extraction of moisture content and utilize the area for Dry stacking.
 - c) Adoption of stage-wise dry stacking methodology with proper design analysis.
 - d) Development of a new red mud disposal area contiguous to the existing red mud disposal area so as to increase the base of the dry stacking as well as height of the stack.
 - e) Separate storage to handle the run-off water of red mud stacking area during monsoon.
 - f) It is to be noted that with dry mud stacking, the disposal area is not a pond but a dry disposal area for Bauxite Residue.
- iii. Design aspects of red mud storage area with Dry disposal with increasing Height.

M/s. Vedanta appointed M/s. Golder Associates who has experience in dry stacking of tailings. Based on M/s. Golder Associates design report, the following points need to be ensured for the safe disposal of dry red mud.

- a) Stacking height will vary from RL 463m to RL 550m
- b) At the center of the dry stack, the height will be 87m. The overall slop is very safe at 4. 5H:1V.
- c) Height of each stack limited to 7m height.
- d) Berm width of 15m to be kept after each stack

- e) Side slope over the wick drain area to be kept 3H: 1V and in other area 2H: 1V
- f) 500mm thickness of soil blanketing to be done outer surface of the slope followed by coir mats with seeding for green vegetation.
- g) After reaching the final height of proposed stack, slope to be regraded & convert to single slope which will be kept in 4.5H: 1V.

After completion of design by M/s. Golder, for reassurance of the safety of the proposed design M/s Vedanta Limited (VL) had taken the services from IIT, Bhubaneswar for independent analysis. Dr. B Hanumantha Rao, Asst. Prof. IIT, Bhubaneswar had done the analysis through simulation for the proposed dry red mud stack. The action plan delineated by the IIT, Bhubaneswar is as below:

Emergency Response Plan for risk management: This report primarily comprises of emergency preparedness and response plan under an eventuality of breach in dyke of existing or proposed new solid waste red mud storage facility. The action plan is prepared considering two scenarios: breach in dyke of the red mud storage facility and rupture of red mud slurry carrying pipeline. The report highlighted Emergency Command Structure in G-shift working hours and silent hours, which comprises of combat group, Rescue team and Communication coordination group. The duties and responsibility of each group also clearly mentioned in the report.

Checklist of monitoring tailings storage facility: The monitoring check list comprised of reporting the present condition of tailings storage on Daily, Weekly, Monthly, and Quarterly basis, which follows a hierarchy.

Instrumentation for monitoring of tailings storage facility: The monitoring aspects include sliding of the slope, fluctuation in seepage and settlement of embankment. The action plan delineates monitoring of these aspects by installing vibrating wire piezometer in wick drain area, piezometer in dykes for the pore pressure measurement & calculation of FOS (factor of safety), survey monuments in the embankment and inclinometer on the slope of the starter embankment. Through these instruments, safety of the dyke will be monitored on regular basis to avoid any critical situations. It is also recommended to monitor the pore pressure so that pore pressure should not increase beyond 40KPa and 55KPa in stage-1L & 2B-2.

Water Management: The action plan addresses two aspects of water management: surface runoff water within the stacking area and fresh water coming from hillside catchment area. Surface runoff from the stacking area will be diverted into process Water Lake which is utilized internally by proponent. To manage the fresh water, it is first collected in the storm water pond to be constructed on the upstream side of stacking area and shall be released into natural stream or nalla. The action plan by proponent on the recommendation of IIT Bhubaneswar for utilization of fresh water is by implementation of 100% pumping system.

Closure plan: The action plan on Closure plan includes regrade the slope by benching, redesign of toe drain, covering the red mud with 500 mm thick natural soil, covering the natural soil with coir mats and plantation on coir mats to minimize the precipitation infiltration, to enhance the greenery, and to reduce the erosion.

Post closure monitoring plan: Action plan on post closure includes erosion prevention by gully formations, habitat assessment, retention of greenery by monitoring the

surveillance of plant species, quality checking of surface water and ground water on regular basis, and land use for beneficial purpose.

Dam break analysis to minimize the impact on Environment and human habitat: M/s. Golder Associates vide report no.: 1786571/A.0 has submitted a detailed report on dam break analysis of red mud storage facility. Action plan of proponent is to evacuate the habitants of Bundel village and the habitants of the temporary shops developed near to the plant gate with the help of rescue team and shift the habitants to safe location. Action plan of proponent also includes to have material resources such as 3600 sandbags, 360 m³ of boulders, 300 m³ of stone aggregates and 120 m³ of stone clips to hinder the flow of debris under contingency plan.

- iv. Total land requirement for 6 MTPA Alumina as recommended by EIL (appointed by Government of Odisha through IPICOL in October 2018 is 1102.54 ha. Out of total area, the land under possession and acquisition is 833.17ha and 269.63ha respectively. Out of 269.63 ha, 87.81 ha is in final stage of acquisition and land filed for acquisition is 183.7 ha.
- v. Following is the Configuration & capacity change granted in EC vis-a-vis with the proposed changes in configuration & capacity of units:

S No	EC condition	Capacity as per EC letter dated 20/11/2015	Amendment	Remarks
1	Specific Condition no v of the Environmental clearance F. No. J- 11011/406/2011 -IA II(1) dated 20/11/2015.	"For Phase-III (6 MTPA), the proponent shall obtain an amendment of EC after completion of land acquisition of the balance area of 666.03 ha detail of which will be furnished to MoEF&CC."	For phase-III (6MTPA), the proponent shall acquire a land of 666 acres.	This condition for amendment from 4 MTPA to 6 MTPA.
2	Specific Condition no (xxiii) of the EC dated 20/11/2015	Of the total area of 1552.65 ha. an area of 512.37 ha (33%) shall be developed into green belt. Of this, a total of 215.20 ha of green belt have been developed and the balance area of 297.17 ha shall also be brought under plantation, which includes plantation in a width of 15-20m along the remaining boundary wall of 3km of the 8km.	In view of proportionate reduction in Green belt land requirement by IPICOL, the condition will be read as under: "Of the total area of 1102.54 ha. an area of 363.83 ha (33%) shall be developed into green belt. Of this, a total of 278.21 ha of green belt have been developed and the balance area of 85.62 ha shall also be	Present green belt is 29% of land in possession

Expansion of Alumina Refinery (1 MTPA to 6 MTPA) and Captive Power Plant (75 MW to 285 MW) by M/s. Vedanta Limited, located at Lanjigarh District Kalahandi Odisha -Amendment in Environment Clearance – regarding.

S No	EC condition	Capacity as per EC letter dated 20/11/2015	Amendment	Remarks
			brought under plantation, which includes plantation in a width of 15-20m along the remaining boundary wall of 3km of the 8km."	

6. The total land estimated for production of 6.0 MTPA Alumina at the time of grant of EC was 1552.7ha. This was finally revised to 1102.54 ha by IPICOL based on the report of EIL. No additional land is required to set up the main plants covered in three phases. But additional land will be required exclusively for (a) storing Bauxite Residue up to year 2045 after commencement of 6.0 MTPA Alumina production by year 2025, (b) development of additional green belt and (c) development of Railway line which are requirement after production is started.

7. Detailed presentation was made by the project proponent inter-alia reduction in project area, issues related to red mud pond design & stability and lay out etc. Further, the land break up requirement as per the EC dated 20/11/2015 and proposed EC amendment is given as below.

S. No.	Facility	Total land (ha) for 6 MTPA alumina refinery as per EC dated 20/11/2015	Proposed amendment in land (ha) as per PP	Remarks
1.	Main Plant with greenbelt	420	284.5	420 ha in EC included Conveyor & Mines approach road and part of Railway siding
2.	Red Mud Storage Pond with green belt	783	432.4	Reduction in land due to Dry disposal of red mud cake to optimum height.
3.	Ash Pond with Pipeline with greenbelt	175.4	91.1	As per MoEF&CC norms, 0.32 ha/MW of land comes to 92.3 ha of land requirement for 285MW power plant. EIL also considered 50% ash utilization. At present, ash utilization is 100% since last three years. With the above scenario and the utilization of ash by Fly ash brick industries, no additional land is required for Ash pond.
4.	Township & Misc including greenbelt	80.5	72.7	As per EIL assessment, the exiting township area of 52.5 ha (129.7 acres) is sufficient to cater to the need of additional manpower requirement of 6 MTPA by

Expansion of Alumina Refinery (1 MTPA to 6 MTPA) and Captive Power Plant (75 MW to 285 MW) by M/s. Vedanta Limited, located at Lanjigarh District Kalahandi Odisha -Amendment in Environment Clearance - regarding.

S. No.	Facility	Total land (ha) for 6 MTPA alumina refinery as per EC dated 20/11/2015	Proposed amendment in land (ha) as per PP	Remarks
				constructing multiple high-rise apartments. Remaining area is for green belt development.
5.	Railway including Greenbelt	93.8	145.2	EIL also considered the railway sidings of bauxite and coal inside plant.
6.	Air strip	--	29.2	Considered in Main plant area during EC accorded on 20/11/2015.
7.	Conveyor & Mines	--	47.8	
	TOTAL	1552.7 ha	1102.9 ha*	

*Note -Total land is 1102.9 ha inter-alia including Forest land of 26.244 ha for which stage II forest clearance has been accorded by MoEF&CC vide letter no. 5-ORC264/2015-BHU dated 12/11/2020. Out of the total land, the land under possession and acquisition is 833.17 ha and 269.63 ha respectively. Out of 269.63 ha, 87.81 ha is in final stage of acquisition and land filed for acquisition is 183.7 ha. To this effect, PP has submitted a letter number IDCO LAE-7667/2021-4760 dated 12/03/2021 issued by IDCO. In addition, PP informed that the air strip was established and commissioned after obtaining approval from Airport Authority of India on 15/05/2006 and is not meant for commercial purpose. The said air strip does not require environmental clearance under the provisions of EIA, 1994 and EIA, 2006.

8. One court case is pending at NGT, Kolkata as on date: Shri Prafulla Samantaray, a self-proclaimed environmental activist, has filed an appeal against the order of MOEF&CC granting EC for expansion of Alumina Refinery from 1 to 4 MTPA and CPP from 75 to 285 MW dated 20.11.2015. The appeal (No. 01 of 2016) has been filed before National Green Tribunal, Kolkata Bench. In the said appeal, one Misc. case (MA No. 333/2016/EZ) has also been filed for condonation of delay in filing appeal. The matter was last listed for hearing on 17/02/2021. The matter would be posted for hearing of the arguments, however the same has not been heard by the Hon'ble Tribunal. No interim order has been passed by Hon'ble Tribunal in this matter.
9. Name of the EIA Consultant: GLOBALTECH Enviro Experts Pvt. Ltd. [S.No.96 in the List of ACOs with their Certificate / Extension Letter no. NABET/EIA/2023/IA0066 Rev. 10, May 13, 2021].

Observations of the Committee

10. The Committee noted that the project proponent is seeking following amendments in the EC dated 20/11/2015 as per the stand taken by the Ministry during the accord of the said EC with a reduced land requirement.
- a. **Subject matter of the EC dated 20/11/2015**
Expansion of Alumina Refinery (1 MTPA to 6 MTPA) and Captive Power Plant (75 MW to 285 MW) by M/s. Vedanta Limited, located at Lanjigarh District Kalahandi Odisha
- b. Total area of the project shall be 1102.54 ha in place of 1552.7 ha. The land area break up for 1102.54 ha is as below.

S.No.	Facility	Total land (ha) for 6 MTPA alumina refinery
1.	Main Plant with greenbelt	284.5
2.	Red Mud Storage Pond with green belt	432.4
3.	Ash Pond with Pipeline with greenbelt	91.1
4.	Township & Misc including greenbelt	72.7

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S.No.	Facility	Total land (ha) for 6 MTPA alumina refinery
5.	Railway including Greenbelt	145.2
6.	Air strip	29.2
7.	Conveyor & Mines	47.8
	TOTAL	1102.9 ha*

**Note -Total land is 1102.9 ha inter-alia including Forest land of 26.244 ha for which stage II forest clearance has been accorded by MoEF&CC vide letter no. 5-ORC264/2015-BHU dated 12/11/2020. Out of the total land, the land under possession and acquisition is 833.17 ha and 269.63 ha respectively. Out of 269.63 ha, 87.81 ha is in final stage of acquisition and land filed for acquisition is 183.7 ha. To this effect, PP has submitted a letter number IDCO LAE-7667/2021-4760 dated 12/03/2021 issued by IDCO. In addition, PP informed that the air strip was established and commissioned after obtaining approval from Airport Authority of India on 15/05/2006 and is not meant for commercial purpose. The said air strip does not require environmental clearance under the provisions of EIA, 1994 and EIA, 2006.*

c. Specific condition no.v of the EC dated 20/11/2015

For phase-III (6MTPA), the proponent shall acquire a land of 666 acres.

d. Specific condition no.xxiii of the EC dated 20/11/2015

Of the total area of 1102.54 ha, an area of 363.83 ha (33%) shall be developed into green belt. Of this, a total of 278.21 ha of green belt have been developed and the balance area of 85.62 ha shall also be brought under plantation, which includes plantation in a width of 15-20m along the remaining boundary wall of 3km of the 8km.

e. The Committee satisfied with the additional information submitted by the proponent with respect to red mud pond design report.

Recommendations of the Committee

11. In view of the foregoing and after deliberations, the Committee recommended for amendment in the EC dated 20/11/2015 as mentioned above at para number 10 subject to the stipulation of following additional specific conditions in addition to the EC conditions dated 20/11/2015:

- i. Project proponent shall abide by all orders and judicial pronouncements, made from time to time, passed by Hon'ble National Green Tribunal, in Appeal No. 1 of 2016.
- ii. Particulate matter emission from the stacks shall not exceed 30 mg/Nm³ for the expansion project i.e. 4 to 6 MTPA and existing project pollution control devices shall be retrofitted to achieve PM emissions less than 30 mg/Nm³ in next three years from the date of issue of the EC amendment letter.
- iii. Red Mud Pond (RMP) and Process Water Lake (PWL):
 - a. Installation of a warning system that provides immediate warning to the surrounding population and mine staff in the event of a dam break shall be provided.
 - b. Assessment of Dam Safety once a year (Dam Safety Assessment) in order to check the stability of the dykes of the RMP and the embankments of the PWL will be carried out and report submitted to the Regional Office of MoEFCC.
 - c. Avoidance of the construction of any infrastructure within the area immediately downstream of the dyke of the RMP or the embankment of the PWL in order to prevent congregations in zones where the warning time is shorter than 30 minutes.
 - d. A special Disaster Management Action Plan shall be prepared and implemented to address the risks and safety associated due to construction and operation of the red mud pond. This should also include the Site Specific Seismic Analysis. The necessary actions points arising out of this Action Plan / seismic analysis will be implemented and report submitted to the Regional Office of MoEFCC from time to time.
 - e. Mock drills exercise related to breach/failure of RMP shall be conducted once in six months and report submitted to the Regional Office of MoEFCC

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- f. All Instrumentation sensors shall have valid calibration certificate and shall be recalibrated before expiry of validation certificate.
- g. An independent agency having requisite expertise for the continuous monitoring, evaluation of the safety and environmental concerns of the proposed red mud pond shall be engaged. This shall also include, among all other things including the points listed above, study on rheology of the tailings, factor of safety analysis of red mud pond using appropriate scientific method, impact on red mud pond storage capacity, and schedule of stacking, limitation of storage capacity-based stack slope and drainage system for handling flash floods etc. Based on the reports, including monitoring reports, regularly submitted by this agency, the project proponent shall submit half yearly progress report on the status of implementation of mitigative measures to the Ministry and to its Regional Office.

Decision of MoEF&CC

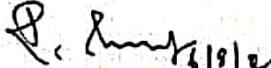
12. The undersigned is directed to inform that Ministry of Environment, Forest and Climate Change has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the Expert Appraisal Committee (Industry-1) hereby decided for amendment in the EC dated 20/11/2015 as mentioned above at para number 10 above subject to the stipulation of additional specific conditions as mentioned above at para number 11 in addition to the EC conditions dated 20/11/2015.
13. All other terms and conditions stated in the MoEF&CC letter of even number dated 20/11/2015 shall remain unchanged.
14. The project proponent shall obtain fresh Environment Clearance in case of change in scope of the project if any.
15. This issues with the approval of the Competent Authority.

Yours faithfully,


(Sundar Ramanathan)
Scientist 'E'

Copy to:-

1. Secretary, Department of Environment, Government of Odisha, Secretariat, Bhubaneswar.
2. Regional Officer, Ministry of Environment, Forest and Climate Change, Integrated Regional Office, A/3, Chandersekharapur, Bhubaneswar – 751023.
3. Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
4. Chairman, Odisha State Pollution Control Board, Parivesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012.
5. Chief Wildlife Warden, Govt. of Odisha, 5th Floor, BDA Apartments, Prakruti Bhawan, Nilakantha Nagar, Nayapalli, Bhubaneswar-751012
6. Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
7. District Collector, Kalahandi District, Odisha.
8. Guard File/Record File/Monitoring File.
9. MoEF&CC Website


(Sundar Ramanathan)
Scientist 'E'