

कार्यालय प्रधान मुख्य वन संरक्षक (कक्ष भू-प्रबंध), सतपुड़ा भवन, मध्यप्रदेश, भोपाल

क्रमांक/एफ-1/FP/MP/MIN/39881/2019/ 2091

भोपाल, दिनांक 23/05/23

प्रति,

वन महानिरीक्षक (एफ.सी.)

भारत सरकार, पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय

इंदिरा पर्यावरण भवन, अलीगंज, जोरबाग रोड,

नई दिल्ली-110003

विषय:- वन मंडल अनूपपुर के परिक्षेत्र कोतमा के विभिन्न वन कक्षों के रकबा 314.743 हे. वनभूमि तथा ग्राम फुलकोना, डूमरकछार व भलमुडी के विभिन्न खसरों के रकबा 39.515 हे. राजस्व वनभूमि कुल 354.258 हे. वनभूमि में झिरिया वेस्ट ओपन कास्ट पद्धति से कोयला उत्खनन के व्यपवर्तन का-SECL का आन लाईन प्रस्ताव क्र. FP/MP/MIN/39881/2019

संदर्भ:- भारत सरकार, पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय, नई दिल्ली का पत्र क्र./8-14/2020-FC दिनांक 07/02/2023

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विषयांकित प्रकरण में संदर्भित पत्र क्र./8-14/2020-FC दिनांक 07/02/2023 से 06 बिन्दुओं पर जानकारी चाही गई है। चाही गई जानकारी वन मंडल अधिकारी, अनूपपुर द्वारा पत्र क्रमांक 731 दिनांक 16/05/2023 से प्राप्त हुई है। प्राप्त जानकारी अनुसार बिन्दुवार जानकारी निम्नानुसार प्रस्तुत है:-

क्र.	चाही गई जानकारी	प्रस्तुत जानकारी
i	The CCF in his Site Inspection Report reported that out of 354.512 ha an area of 7.143 ha forest land will be considered for mining Safety Zone. The State Government informed that according to the revised mining plan area 427.993 ha, the area of the mining safety zone has been revised to 92.175 ha out of which 70.618 ha is forest land and balance 21.557 ha area is Non-Forest/ Revenue land. However, the revised Mining plan for Component wise breakup mentions that for Mining Safety Zone an area of 65.366 ha forest land and 26.809 ha non-Forest land is required. This variation needs clarification and revision besides approval of Mining Plan accordingly	मुख्य वन संरक्षक, शहडोल द्वारा अपने स्थल निरीक्षण प्रतिवेदन में माईनिंग सेफ्टी जोन हेतु 7.143 हे. वनभूमि की अनुशंसा की गई है। SECL द्वारा अपने पत्र क्रमांक/50 दिनांक 05/05/2023 से अवगत कराया है कि कोयला खदान के संचालन के खदान प्रबंधन को कोल माइंस रेगुलेशन, 2017 में निहित प्रावधनों का भी पालन करना होता है जिसके अनुसार "कोई सतही संरचना, जो खान प्रबंधन का नहीं है के 100 मीटर के भीतर कोई विस्फोट नहीं किया जाएगा" के पालन हेतु खदान क्षेत्र के चारों ओर 100 मीटर की पट्टी माइनिंग सेफ्टी जोन के उपयोग के लिए रखा गया है जिसका कुल क्षेत्रफल 92.175 हेक्टेयर है। (गेवरा ओपन कास्ट परियोजना में DGMS द्वारा प्रदत्त ब्लॉस्टिंग अनुमति की प्रति परिशिष्ट-1 पर संलग्न है। यह भी अवगत कराया है कि झिरिया वेस्ट ओपन कास्ट के कुल परियोजना क्षेत्र 427.993 हे. में 92.175 हेक्टेयर माईनिंग सेफ्टी जोन में शामिल है। राज्य शासन द्वारा की गयी अनुशंसा अनुसार 92.175 हेक्टेयर माईनिंग सेफ्टी जोन में 70.618 हेक्टेयर, वनभूमि है एवं शेष 21.557 हेक्टेयर क्षेत्र गैर-वन/राजस्व भूमि है। तदनुसार माईनिंग प्लान को दिनांक 26/04/2023 को आयोजित साउथ ईस्टर्न कोलफील्ड्स लिमिटेड के कार्यात्मक निदेशक समिति (सीओएफडी) की 172 वीं बैठक में संशोधित किया गया है। (सीओएफडी का अनुमोदन एवं अनुमोदित माईनिंग प्लान की प्रति परिशिष्ट-2 पर संलग्न है।)

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ii	The total width of safety zone around the mining lease has not been given in the proposal. The same needs to be provided.	SECL द्वारा अवगत कराया गया है कि खदान क्षेत्र के चारों ओर माईनिंग सेफ्टी जोन की कुल चौड़ाई 100 मीटर है जो माईनिंग लीज का एक भाग है जो लैंड यूज प्लान में दर्शित है। भारत सरकार, पर्यावरण वन एवंजलवायु परिवर्तन मंत्रालय, नई दिल्ली के दिशानिर्देश दिनांक 27/05/2015 के अनुसार सेफ्टी जोन (7.5 मीटर पट्टी) माईनिंग लीज के कुल क्षेत्र का एक भाग है एवं माईनिंग सेफ्टी जोन में शामिल है। KML File में दर्शित है।
iii	As per DSS analysis the width of the safety zone is found to be 100 meters all around the mining lease area. This needs clarification.	इस बिन्दु के सम्बन्ध में SECL द्वारा अवगत कराया गया है कि खदान क्षेत्र के चारों ओर माईनिंग सेफ्टी जोन की कुल चौड़ाई 100 मीटर है जैसा कि DSS Analysis में पाया गया है। कुल माइन्स रेगुलेखन, 2017 में निहित प्रावधानों का भी पालन करना होता है जिसके अनुसार "कोई सतही संरचना, जो खान प्रबंधन का नहीं है के 100 मीटर के भीतर कोई विस्फोट नहीं किया जाएगा" के पालन हेतु खदान क्षेत्र के चारों ओर 100 मीटर की पट्टी माईनिंग सेफ्टी जोन के उपयोग के लिए रखा गया है जिसका कुल क्षेत्रफल 92.175 हे. है। (गेवरा ओपन कास्ट परियोजना में DGMS द्वारा प्रदत्त ब्लॉस्टिंग अनुमति की प्रति परिशिष्ट-1 पर संलग्न है।
iv	It has not been clarified whether the components like external dumps, Belt, CHP & Sliding are proposed over forest or non-forest land. The same needs clarification	इस बिन्दु के सम्बन्ध में SECL द्वारा अवगत कराया गया है कि माईनिंग प्लान में प्रबंधन की पूर्व से निर्मित दूसरी परियोजना के संरचनाओं का उपयोग करना प्रस्तावित है। परियोजना में कोई बाह्य डम्प नहीं होगा।
v	As per DSS analysis, the total area of proposed CA land is found to be 798.718 ha instead of 810 ha CA area reported by the State Govt. whereas the CA area figures in Part-II of online form on PARIVESH still mentions that 710 ha degraded forest land has been proposed for CA in the instant proposal. This needs clarification and submission of correct KML files accordingly	झिरिया ओपन कास्ट परियोजना रकबा 354.258 हेक्टेयर के एवज में 810 हेक्टेयर वनक्षेत्र का चयन किया गया है। इस 810 हेक्टेयर में से रोपण हेतु उपयुक्त 710 हेक्टेयर में रोपण योजना तैयार की गई है। इस सम्पूर्ण 810 हेक्टेयर वनक्षेत्र का घेराव किया जावेगा।
vi	The CA scheme in Part-II of the online form has been given for 710 ha instead of 810 ha area reported to be proposed by the State Govt for Compensatory Afforestation. The CA scheme for the actual area proposed for compensatory afforestation is required to be submitted.	

अतः वन मंडल अधिकारी, अनूपपुर के पत्र क्रमांक/731 दिनांक 16.05.2023 से प्राप्त जानकारी संलग्न कर प्रकरण में अनुमति प्रदान करने का अनुरोध है।

संलग्न:- उपरोक्तानुसार।

[Handwritten Signature]
23/5/2023

(सुनील अग्रवाल)

प्रधान मुख्य वन संरक्षक (भू-प्रबंध)
मध्यप्रदेश, भोपाल

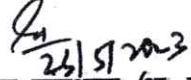
पृ. क्रमांक/एफ-1/ FP/MP/MIN/39881/2019/2७२

भोपाल, दिनांक 23/०९/23

प्रतिलिपि:-

1. मुख्य वन संरक्षक, शहडोल वृत्त शहडोल मध्य प्रदेश ।
2. वन मण्डल अधिकारी, सामान्य वन मण्डल, अनूपपुर मध्य प्रदेश
3. महाप्रबंधक, साउथ ईस्टर्न कोलफील्ड्स लिमिटेड, हंसदेव क्षेत्र, साउथ झगराखण्ड कालरी जिला करेरा, छत्तीसगढ़ ।

की ओर सूचनार्थ अग्रेषित ।


23/9/23
प्रधान मुख्य वन संरक्षक (भू-प्रबंध)
मध्यप्रदेश, भोपाल

कार्यालय वन मण्डलाधिकारी वन मण्डल, अनूपपुर (म०प्र०)

E-mail : dfotanppur@mp.gov.in;

Ph. No. (07659) 222038

क्रमांक/मा.चि./2023/ 731

अनूपपुर, दिनांक 16/5/2023

प्रति,

✓ प्रधान मुख्य वन संरक्षक
(भू-प्रबंध)
म०प्र० भोपाल।

विषय :- वन मण्डल अनूपपुर के परिक्षेत्र कोतमा के विभिन्न वन कक्षों के रकवा 314.743 हे. वनभूमि तथा ग्राम फुलकोना, डूमरकछार व भलमुड़ी के विभिन्न खसरों के रकवा 39.515 हे. राजस्व वनभूमि कुल 354.258 हे. वनभूमि में झिरिया वेस्ट ओपन कास्ट पद्धति से कोयला उत्खनन के व्यपवर्तन। (Proposal number- FP/MP/MIN/39881/2019)

संदर्भ :-

- 1- भारत सरकार पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय नई दिल्ली का पत्र क्रमांक/ 8-14/2020-एफ.सी. दिनांक 07.02.2023.
- 2- आपका पत्र क्रमांक/एफ-1/ FP/MP/MIN/39881/2019/662 दिनांक 10.02.2023.
- 3- महाप्रबंधक एस.ई.सी.एल. हसदेव क्षेत्र का पत्र क्रमांक/50 दिनांक 05.05.2023.

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उपरोक्त विषयांतर्गत निवेदन है कि वन मण्डल अनूपपुर के परिक्षेत्र कोतमा के विभिन्न वन कक्षों के रकवा 314.743 हे. वनभूमि तथा ग्राम फुलकोना, डूमरकछार व भलमुड़ी के विभिन्न खसरों के रकवा 39.515 हे. राजस्व वनभूमि कुल 354.258 हे. वनभूमि में झिरिया वेस्ट ओपन कास्ट पद्धति से कोयला उत्खनन के वनभूमि के व्यपवर्तन के संबंध में भारत सरकार के संदर्भित पत्र क्रमांक-1 द्वारा 6 बिन्दु की जानकारी चाही गई है। संदर्भित पत्र क्रमांक-3 द्वारा बिन्दु क्रमांक-1 से 4 तक की जानकारी इस कार्यालय में प्रस्तुत की गई है। बिन्दु क्रमांक 5 एवं 6 की जानकारी तैयार कर आपके अवलोकनार्थ एवं आवश्यक कार्यवाही हेतु सादर सम्प्रेषित है।

S.No.	Query raised by MoEF&CC, New Delhi	Reply by User Agency and Forest Department
i.	The CCF in his Site Inspection Report reported that out of 354.512 ha an area of 7.143 ha forest land will be considered for mining Safety Zone. The State Government informed that according to the revised mining plan area 427.993 ha, the area of the mining safety zone has been revised to 92.175 ha out of which 70.618 ha is forest land and balance 21.557 ha area is Non- Forest/ Revenue land. However, the revised Mining plan for Component wise breakup mentions that for Mining Safety Zone an area of 65.366 ha forest land and 26.809 ha non-Forest land is required. This variation needs clarification and revision besides approval of Mining Plan accordingly	It is agreed that CCF in his Site Inspection Report recommended 7.143 Ha Forest land to be left for Mining Safety Zone. However, for operating coal mine, mine management have to comply the provision laid down in Coal Mines Regulations as well which clearly stipulates that "no blasting shall be carried out within 100 metres of the surface structures not belonging to Mine management. 100 metres strip around the quarry area equates to 92.175 Ha of land proposed to be used for Mining Safety zone. (Permission copy of Blasting in Gevra OCP enclosed as reference) Total Project area of Jhiria West OCP is 427.993 Ha comprising 92.175 Ha of mining safety zone out of which 70.618 ha is forest land and balance 21.557 ha area is Non- Forest/ Revenue land as recommended by State Government. Accordingly, component wise breakup in Revised mining plan has been modified in 172 nd meeting of Committee of Functional Directors of South Eastern Coalfields Limited held on 26.04.2023 (Copy of CoFD Approval and approved mining plan enclosed).
ii.	The total width of safety zone around the mining lease has not been given in the proposal. The same needs to be provided.	Total width of Mining Safety zone <u>all around quarry area</u> is 100 metres and forms a part of Mining Lease as shown in Land use plan.

		As per MoEF&CC, New Delhi guideline dated 27.05.2015, safety zone (7.5 m strip) is a part of total area of mining lease and included in the <u>mining safety zone</u> .(Shown in kml)
iii.	As per DSS analysis the width of the safety zone is found to be 100 meters all around the mining lease area. This needs clarification.	The width of the mining safety zone is 100 meters all around the quarry areas found in DSS analysis. This is in accordance with the provisions of Coal Mines Regulations, 1957 as replaced by Coal Mines Regulations, 2017 and subsequent permission granted by Directorate-General of Mines Safety, in view of safety of the surface structures not belonging to Mine management. (Permission copy of Blasting in Gevra OCP enclosed as reference)
iv.	It has not been clarified whether the components like external dumps, Belt, CHP & Sliding are proposed over forest or non-forest land. The same needs clarification	It has been proposed in the mining plan to use existing infrastructure of adjacent mining projects. There will be no external dumps.
v.	As per DSS analysis, the total area of proposed CA land is found to be 798.718 ha instead of 810 ha CA area reported by the State Govt. whereas the CA area figures in Part-II of online form on PARIVESH still mentions that 710 ha degraded forest land has been proposed for CA in the instant proposal. This needs clarification and submission of correct KML files accordingly	झिरिया ओपन कास्ट परियोजना रकवा 354.258 हे. के एवज में दुगने बिगड़े वनक्षेत्र में 710 हे. की वनीकरण योजना तैयार की गई है इसमें 710 हे. के अतिरिक्त 100 हे. घेराव क्षेत्र भी शामिल किया गया है इस कारण से 810 हे.की केएमएल फाईल तैयार की गई है। विभिन्न प्रकार के साफ्टवेयर उपयोग में होने के कारण घेराव क्षेत्र 810 हे. क्षेत्र के स्थान पर 798.718 हे. दर्शित हो रहा है।
vi.	The CA scheme in Part-II of the online form has been given for 710 ha instead of 810 ha area reported to be proposed by the State Govt for Compensatory Afforestation. The CA scheme for the actual area proposed for compensatory afforestation is required to be submitted.	वनीकरण योजना परिवेश पोर्टल आनलाइन भाग-2 में अपलोड की गई है वह 710 हे. की प्रस्तावित की गई है। अतिरिक्त 100 हे. जो चट्टानी/पथरीला एवं कक्ष के स्वरूप के बनाए जाने हेतु अतिरिक्त जोड़ा गया, अतिरिक्त घेराव क्षेत्र 100 हे. में प्लांटेशन नहीं कराया जावेगा।

संलग्न :- उपरोक्तानुसार।

वन मण्डलाधिकारी

वन मण्डल अनूपपुर

पृ.क्रमांक/मा.चि./2023/न 32
प्रतिलिपि :-

अनूपपुर, दिनांक 16/5/2023

1- मुख्य वन संरक्षक वन वृत्त शहडोल की ओर सूचनार्थ सम्प्रेषित।

2- महाप्रबंधक एस.ई.सी.एल. हसदेव क्षेत्र की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

वन मण्डलाधिकारी

वन मण्डल अनूपपुर

साउथ ईस्टर्न कोल्फील्ड्स लिमिटेड

SOUTH EASTERN COALFIELDS LTD.

SEEPAT ROAD, Post Box No. - 60

BILASPUR-495006(CG)

“A MINI RATNA COMPANY”



Forest Department

Office of the General Manager, Hasdeo Area

Post Office : South Jhagrakhand Colliery

District : M.C.B. (C.G.) - 497448

Telephone No : 07771-243035

Fax No. : 07771-241359

Ref. No. SECL/HSD/Forest/2023/50

Date: 05.05.2023

Point-wise reply of queries in reference to MoEF&CC, New Delhi letter no 8-14/2020-FC dated 07.02.2023 against proposal no. FP/MP/MIN/39881/2019 is as follows:

S. No.	Query raised by MoEF&CC, New Delhi	Reply by User Agency
i.	The CCF in his Site Inspection Report reported that out of 354.512 ha an area of 7.143 ha forest land will be considered for mining Safety Zone. The State Government informed that according to the revised mining plan area 427.993 ha, the area of the mining safety zone has been revised to 92.175 ha out of which 70.618 ha is forest land and balance 21.557 ha area is Non-Forest/ Revenue land. However, the revised Mining plan for Component wise breakup mentions that for Mining Safety Zone an area of 65.366 ha forest land and 26.809 ha non-Forest land is required. This variation needs clarification and revision besides approval of Mining Plan accordingly	<p>It is agreed that CCF in his Site Inspection Report recommended 7.143 Ha Forest land to be left for Mining Safety Zone.</p> <p>However, for operating coal mine, mine management have to comply the provisions laid down in Coal Mines Regulations as well which clearly stipulates that “no blasting shall be carried out within 100 metres of the surface structures not belonging to Mine management. 100 metres strip around the quarry area equates to 92.175 Ha of land proposed to be used for Mining Safety zone. (Permission copy of Blasting in Gevra OCP enclosed as reference). It may be noted that 7.143 Ha Forest land is included in total mining safety zone area of 92.175 Ha.</p> <p>Total Project area of Jhiria West OCP is 427.993 Ha comprising 92.175 Ha of mining safety zone out of which 70.618 ha is forest land and balance 21.557 ha area is Non-Forest/ Revenue land as recommended by State Government. Accordingly, component wise breakup in Revised mining plan has been modified in 172nd meeting of Committee of Functional Directors of South Eastern Coalfields Limited held on 26.04.2023 (Copy of CoFD Approval and approved mining plan enclosed).</p>
ii.	The total width of safety zone around the mining lease has not been given in the proposal. The same needs to be provided.	<p>Total width of Mining Safety zone <u>all around quarry area</u> is 100 metres and forms a part of Mining Lease as shown in Land use plan.</p> <p>As per MoEF&CC, New Delhi guideline dated 27.05.2015, safety zone (7.5 m strip) is a part of total area of mining lease and included in the <u>mining safety zone</u>. (Shown in kml)</p>
iii.	As per DSS analysis the width of the safety zone is found to be 100 meters all around	The width of the mining safety zone is 100 meters all around the quarry area as found in

Area General Manager
Hasdeo, एस.ई.सी.एल.

	the mining lease area. This needs clarification.	DSS analysis. This is in accordance with the provisions of Coal Mines Regulations, 1957 as replaced by Coal Mines Regulations, 2017 and subsequent permission granted by Directorate-General of Mines Safety, in view of safety of the surface structures not belonging to Mine management. (Permission copy of Blasting in Gevra OCP enclosed as reference)
iv.	It has not been clarified whether the components like external dumps, Belt, CHP & Sliding are proposed over forest or non-forest land. The same needs clarification	It has been proposed in the mining plan to use existing infrastructure of adjacent mining projects. There will be no external dumps.
v.	As per DSS analysis, the total area of proposed CA land is found to be 798.718 ha instead of 810 ha CA area reported by the State Govt. whereas the CA area figures in Part-II of online form on PARIVESH still mentions that 710 ha degraded forest land has been proposed for CA in the instant proposal. This needs clarification and submission of correct KML files accordingly.	To be replied by State Forest Department.
vi.	The CA scheme in Part-II of the online form has been given for 710 ha instead of 810 ha area reported to be proposed by the State Govt for Compensatory Afforestation. The CA scheme for the actual area proposed for compensatory afforestation is required to be submitted.	To be replied by State Forest Department.

Submitted for your kind perusal and necessary action please.



(U.T. Kanzarkar)
Area General Manager
SECL Hasdeo Area

Government of India
Ministry of Environment, Forest and Climate Change
(Forest Conservation Division)

Indira Paryavaran Bhawan,
Jor Bag Road, Aliganj,
New Delhi - 110003

Dated: 7th February, 2023

To,

The Principal Secretary (Forests),
Government of Madhya Pradesh,
Bhopal.

Subject: Proposal for diversion of 354.258 ha. of forest land/revenue forest land (314.743 ha. of forest land + 39.515 ha. of revenue forest land = 354.258 ha. forest land) for Jhiria West Opencast Coal Mining in favour of M/s. South Eastern Coal Fields Limited, Anuppur District State of Madhya Pradesh (Online Proposal No. FP/MP/MIN/39881/2019) -regarding.

Madam/Sir,

I am directed to refer to the Principal Chief Conservator of Forests (Land Management) and Nodal Officer, the Forest (Conservation) Act, 1980, Government of Madhya Pradesh letter no. F-1/FP/MP/MIN/39881/2019/181 dated 12.01.2023 on the above cited subject and inform that the following shortcomings have been observed in the information submitted by the State Government:-

- i. The CCF in his Site Inspection Report reported that out of 354.512 ha an area of 7.143 ha forest land will be considered for mining Safety Zone. The State Government informed that according to the revised mining plan area 427.993 ha, the area of the mining safety zone has been revised to 92.175 ha out of which 70.618 ha is forest land and balance 21.557 ha area is Non-forest/ Revenue land. However the revised Mining plan for Component wise breakup mentions that for Mining Safety Zone an area of 65.366 ha forest land and 26.809 ha Non-Forest land is required. This variation needs clarification and revision besides approval of Mining Plan accordingly.
- ii. The total width of safety zone around the mining lease has not been given in the proposal. The same needs to be provided.
- iii. As per DSS analysis the width of the safety zone is found to be 100 meters all around the mining lease area. This needs clarification.
- iv. It has not been clarified whether the components like external dumps, Belt, CHP & Sliding are proposed over forest or non-forest

land. The same needs clarification.

- v. As per DSS analysis, the total area of proposed CA land is found to be 798.718 ha instead of 810 ha CA area reported by the State Govt. whereas the CA area figures in Part-II of online form on PARIVESH still mentions that 710 ha degraded forest land has been proposed for CA in the instant proposal. This needs clarification and submission of correct KML files accordingly.
- vi. The CA scheme in Part-II of the online form has been given for 710 ha instead of 810 ha area reported to be proposed by the State Govt for Compensatory Afforestation. The CA scheme for the actual area proposed for compensatory afforestation is required to be submitted.

Accordingly, it is requested to furnish the above mentioned information to this Ministry for further consideration of the proposal.

Yours sincerely,

Signed by Suneet Bhardwaj
Date: 07-02-2023 17:11:38

Sd/
(Suneet Bhardwaj)

Assistant Inspector General of Forests

Copy to:

1. The PCCF (HoFF), Department of Forest, Government of Madhya Pradesh, Bhopal;
2. The Regional Officer, Integrated Regional Office, MoEF&CC, Bhopal;
3. The Nodal Officer (FCA), Department of Forest, Government of Madhya Pradesh, Bhopal;
4. User Agency;
5. Monitoring Cell, FC Division, MoEF&CC, New Delhi for uploading on PARIVESH portal.

परिपत्रक-1

3/31/2020

Email

Email Letter

Letter No
010441|WZ|Bilaspur Region|Perm|2019|2020|PLCommon_CM2017|2



भारत सरकार
Govt of India
श्रम एवं रोजगार विभाग
Ministry of Labour & Employment
राज्य सुरक्षा महाविदेशालय
Directorate-General of Mines Safety



Date: 16/08/2019

NO: 010441|WZ|Bilaspur Region|Perm|2019|2020

From
Director of Mines Safety, BILASPUR REGION Region, WESTERN ZONE NAGPUR MAHARASHTRA

To
HEMANT SHARAD PANDE
office of General Manager office of General Manager

Sub: Permission under regulation 196(2) & 196(3) of Coal Mines Regulation, 1957 to conduct deep hole control blasting within 500m but beyond 100m from Amgaon, Umendibhata, Ralia, Bhatara, Naraibodh, Gevra village, PWD road etc at Gevra opencast project of M/S SECL.

Dear Sir

Please refer to your letter No. SECL/GM/GVR/PERMISSION/DGMS/2019/2620 dated 27.03.2019 and online application No. 42516 dated 28.03.2019, and subsequent letter No. SECL/GM/GVR/SAFETY/20/744 dated 12.03.2020, enclosing therewith scientific study report submitted by M/s CMPDIL, Bilaspur, corrected Surface plan No. SECL/GVR/SUR/2020/51/90 dated 11.03.2020 on the subject mentioned above. The matter has since been examined in the light of information furnished by you.

In exercise of the powers conferred on the Chief Inspector of Mines (also designated as Director-General of Mines Safety) under the provisions of Regulation 196(2) & 196(3) of the Coal Mines Regulations, 1957 and by virtue of the authorisation granted to me by the Chief Inspector of Mines (also designated as Director-General of Mines Safety) under Section 6(1) of the Mines Act, 1952. I, hereby grant you permission to conduct deep hole control blasting within 500m but beyond 100m from Amgaon, Umendibhata, Ralia, Bhatara, Naraibodh, Gevra villages, PWD road etc at Gevra opencast project of M/S SECL as shown in the Surface Plan no. SECL/GVR/SUR/2020/51/90 dated 11.03.2020 subject to the following conditions being strictly complied with:

- 1.0 No deep-hole blasting within 500 m but beyond 100 m of the above structures shall be carried out, except strictly as per the blasting parameters fixed, patterns established and the precautions suggested by M/s CMPDIL, Bilaspur in their report on Control Blasting study at Gevra Opencast Project.
- 2.0 **No blasting operations shall be conducted within 100m distances from Amgaon, Umendibhata, Ralia, Bhatara, Naraibodh, Gevra village, PWD road etc. and no hole of more than 250mm dia shall be blasted within 500 m distance from the said villages , PWD road etc.**
- 2.1 The place where drilling is to be done shall be thoroughly cleaned so that loose debris or loose rocks lying over the area are removed.
- 2.2 The drilling, stemming and blasting operations shall be carried out under direct personal supervision of an Assistant manager in accordance with the guidelines and directions of the manager.

श्रीवैद्य महाप्रबंधक
Area General Manager
हमदेव , एस.ई.सी.एल.
Headso Area, SECL

3.0 The size, depth, spacing, burden, charge weight per-delay, total quantity of explosives in a round of blast, sequence of delays and total span of the blast [total blast duration(time)] shall be such as to ensure that –

a) PPV at any point lying between 100m to 500 m from the site of blast shall not exceed the limits prescribed under **DGMS (Tech) Circular No. 7/1997**.

b) No deep hole blasting shall be done within 500 m but beyond 100 m of the above structures except in conjunction with effective muffling to ensure that no flying fragments fall more than 50m away from the blasting. All blasting operations within 500m of the villages shall only be conducted by using muffling with old conveyor belt / wire mesh overlain by 3-4 no. of 30 Kg sand bags/hole.

c) The depth of blast hole shall be uniform.

d) Safe charge per delay shall not exceed as recommended by M/s CMDIL, Bilaspur and is given below.

Blast distance In m from structure	Explosive type	RECOMMENDATION FOR SOFT STRATA					RECOMMENDATION FOR HARD STRATA				
		Max charge/delay	No of hole	Hole Depth m	Drill Dia. Mm	Burdenx Spacing	Max charge/delay	No of hole	Hole Depth m	Drill Dia. Mm	Burdenx Spacing
>100m≤130m	SME	22Kg	16	6	160	4x4.5m	22Kg	16	5.5	160	4x4m
>130m≤160m	SME	37 Kg	16	6	160	4.5x5m	37 Kg	16	6	160	4x4.5m
>160m≤200m	SME	57Kg	16	9	250	5x5.5m	57Kg	16	7.5	250	5x5m
			30	6	160	4.5x5m		16	6	160	4x4.5m
>200m-250m	SME	89Kg	22	9	250	5x5m	89Kg	16	9	250	5x5m
			33	6	160	4.5x5.5m		36	6	160	4x4.5m
>250m≤300m	SME	140Kg	22	9	250	5x6m	140Kg	16	10	250	5.5x6.5m
			51	6	160	4.5x5.5m		51	6	160	4x4.5m
>300 m ≤500 m	SME	189Kg	22	10	250	5x6.5m	189Kg	16	10	250	5.5x6.5m
			51	6	160	4.5x5.5m		51	6	160	4x4.5m

e) Sand shall be used as stemming material and shall be tamped hard religiously into the blast hole to restrict the fly of rock.

f) A free face shall always be maintained to achieve the existing load of ground vibration and all loose stone pieces from blast site shall be cleared off before blasting to restrict the fly.

g) The mine manager shall ensure that all the recommendations of the controlled deep hole blasting are strictly followed.

4.0 (a) Explosives when transported in vehicles, shall be carried in an Explosive Van approved by the Chief Controller of Explosive.

b. Explosives Vans used for transport of explosives shall be in safe operation condition and should be driven by the competent licensed drivers.

c. The Vans shall be kept in isolated locations while loaded.


 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हसन, एम.ई.सी.ए.
 Hazrat Area C

- d. The Vans shall be well locked except during times of placements and removal of stocks therefrom.
- e. No smoking or open flame shall be permitted in or near the vans containing explosives.
- 4.1 All the blast shall be charged with SME and connections shall be done with NONEL only .Only milli-second short delay detonators shall be used and skipping of more than one short delay number shall not be done.
- 4.2 All detonators and primed cartridges shall be kept in secure receptacles at a safe distance from the detonating fuse and the explosive until actually required for use.
- 4.3 The case or container of explosive shall not be opened unless the holes are ready for charging in every respect.
- 4.4 The cartridge of explosive shall be lowered carefully to avoid sticking of cartridges. The length of the stemming in each hole shall be measured to ascertain that the cartridges are in close contact and there is no air space. In case, the length of uncharged column in any hole is not as per calculation, indicating the presence of air space, attempt shall be made to push down the charge in case of slurry cartridges. The uncharged column in hole shall then be stemmed with moist sand.
- 5.0 Monitoring of each blast with the approved ground vibration measuring instrument shall be done with details as mentioned in para 3.0 of above, to ensure that, the ground vibrations are with in the safe limits as recommended.
- 6.0 The precautions of warning/removal of men etc., as laid down under Regulation 196(2) shall be observed in an area up to a distance of at least 500m measured in any direction from the place of blasting.
- 7.0 No person including shot firers shall take shelter except in a zone beyond 100m of the quarry workings and such shelter shall be of adequate construction to protect him from flying fragments.
- 8.0 Lines shall be drawn at a distance of 100m, 130 m, 160m, 200m, 250 m, 300m and 500m from the built-up position on all statutory plans of the mine. Such lines shall also be demarcated clearly on the ground.
- 9.0 In case any complaint of rattling of doors/windows during blasting is received, further blasting operations shall be suspended forthwith and intimation sent to this Directorate.
- 10.0 In case of flying fragments due to blasting traveling for more than 50 m from site of blasting, further blasting operations shall be suspended and an immediate intimation sent to this directorate. Blasting operations shall not be resumed without a fresh permission from this directorate.
- 11.0 A proper record of every blast showing the pattern of shot holes, particulars of charge/delay, charge/round and distance of site of blasting from surface structures and the observations regarding, ground vibration in terms of PPV, air over pressure and flying of rocks shall be carefully maintained by blasting officer which shall be counter signed by the Manager.
- 12.0 The management shall indemnity the occupants / owners of the houses/dwellings/buildings or other structures and the public authority concerned, if any, against danger to their property or injury to them or others present arising out of operation conducted under the permission.
- 13.0 Blasting operations shall be done at fixed hours during day time only, preferably mid-afternoon.
- 14.0 In the event of any change in the circumstances connected with this permission which is likely to endanger the life of workmen employed in the mine or endanger the mine, mining operations for which this permission has been granted shall be stopped forthwith and intimation thereof sent to this

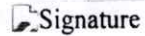
directorate. The said mining operations shall not be resumed without an express and fresh permission in writing.

15.0 If at any time any of the conditions subject to which this permission has been granted is violated or not complied with, this permission shall be deemed to have been revoked with immediate effect.

16.0 This permission is being issued specifically under the regulations mentioned above, and without prejudice to any other provisions of law which may be or may become applicable at any time. The above permission may be amended or withdrawn at any time, if considered necessary.

17.0 This permission shall remain valid for a period of **03 (three) years** from the date of issue of this letter.

Your Faithfully

Signature

SHYAM SUNDAR PRASAD (DIRECTOR - BILASPUR REGION)

THIS IS A SYSTEM GENERATED DOCUMENT, DOES NOT REQUIRE ANY SIGNATURE.

श्रीराम-2



South Eastern Coalfields Limited

(A MINIRATNA PSU)

CIN: U01027CT1982SGO1002163

Regd. Office: SEEPAT ROAD, BILASPUR (CG) 495 006

CORPORATE AFFAIRS DEPARTMENT

Phone: 07752-246340,246412 Cell: 09425531827

Website: www.secl-cil.in E mail: compsecy.secl@coalindia.in



Ref. No. SECL/BSP/CAD/172nd CoFD EXT/23-24/77

Date: 28.04.2023

The subject item mentioned below was discussed in the 172nd Meeting of the Committee of Functional Directors (CoFD) of South Eastern Coalfields Limited held on 26.04.2023 vide Item No.172.08. The extract of the approved Minutes of Meeting are quoted below:

QUOTE

Item No. 172.08

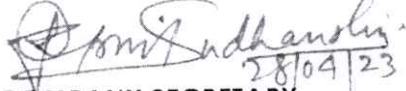
Sub: Approval of Mining Plan for Jhiria West OCP (1.50 MTY) of Hasdeo Area.

Ref: GM (P&P)-HOD's e-Office Noting (e-1038801) Dtd. 24.04.2023.

The Committee of Functional Directors (CoFD) discussed on the subject proposal and upon appraisal by Director (Tech.) P&P and further explained by GM (P&P)-HOD, the CoFD after detailed deliberations, approved the subject Mining Plan for Jhiria West OCP (1.50 MTY) of Hasdeo Area, as recommended by GM, Hasdeo Area, further vetted by RD, CMPDIL, RI-V, Project & Planning and Environment Departments, SECL HQ, as detailed and brought out in the e-Office Agenda.

UNQUOTE

Accordingly, the case file relating to the subject item is being returned herewith.


28/04/23
COMPANY SECRETARY

Director (Tech.) P&P


Encl: as above

Copy for kind information to:

Director (Tech.) Oprn./ Director (Finance) / Director (Personnel)

Distribution for action:

- 1) GM (P&P)-HOD
- 2) GM (Prod.)-HOD
- 3) GM (Envt.)-HOD
- 4) Area GM, Hasdeo, SECL


क्षेत्रीय महाप्रबंधक
Area General Manager
हसदेव, एस.ई.सी.एल.
Hasdeo Area, S.E.C.

MINING PLAN FOR JHIRIA WEST OCP

1.1 BACKGROUND OF THE PROJECT REPORT

The Jhiria West Opencast Project is situated in Sohagpur coalfields and is under administrative control of Hasdeo area of SECL. SECL Board after detailed deliberations approved the Project Report for Jhiria West Opencast (1.50Mty) for Partial Outsourcing Option (Coal Departmental and OB Outsourcing) involving a capital investment of Rs. 389.97 Crores vide 279th meeting of Board of Directors of SECL held on 28.11.2018 (Wednesday) at Raipur.

- PR for Jhiria West OC 1.5 Mty was prepared to mine out total mineable coal reserves of 14.35 Mt and OB of 115.33 Mcum with an average stripping ratio of 8.04 Mcum/t. It was approved with Partial Outsourcing Option (Coal Departmental and OB Outsourcing). Extraction of coal is done by surface miner in departmental mode.

As per this mine plan, PR for Jhiria West OC 1.5 Mty is prepared to mine out total mineable coal reserves of 13.16 Mt and OB of 107.95 Mcum with an average stripping ratio of 8.20 Mcum/t.

1.2 Salient Features of the Approved PR (1.50 MTY)

The Project Report for Jhiria West Opencast Project was prepared for a targeted capacity of 1.50 Mty of coal. The total mineable reserve in Jhiria West Opencast was estimated as 14.35 Mt which would give a life of 12 years at the targeted capacity of 1.50 Mty.

It was estimated that total 482.694 Ha land will be required for Jhiria West Opencast Project which includes land for quarry, external dumps, Land for infrastructures, Approach road, safety zone, Belt, CHP & siding etc, Belt, CHP & siding etc. Out of total land of 482.694 Ha, forest land was estimated as 323.737 Ha.

Coal is being mined by surface miner and transported to surface by dump trucks. At the surface, CHP has been provisioned for onward dispatch. The PR has been approved with Partial Outsourcing Option (Coal Departmental and OB Outsourcing). The salient features of the approved PR are as enumerated below: -

Mining Plan for Jhiria West OCP (1.5 Mty)

TABLE-1

Sl.	Particulars	Unit	Partial Outsourcing (Approved)
1	Total Mineable Reserves	M Te.	14.35
2	GCV Band		G-6 (GCV 5524)
3	Volume of OB	M.Cum	115.33
4	Stripping Ratio (Av.)	Cum/t	8.04
5	Target Output	Mt/Yr.	1.50
6	Peak OBR	Mcum/yr.	11.50
7	Project life	Year	12
8	Total capital investment	Rs. crores	389.97
9	a) Capital requirement of P&M	Rs. crores	82.30
10	Selling price	Rs./ t	2395.15
11	Estimated cost of production		
	a) at 100% level	Rs./t	1499.74
	b) at 85% level	Rs./t	1644.23
12	Profit per tonne		
	a) at 100% level	Rs./t	895.41
	b) at 85% level	Rs./t	750.92
13	Break-even-point (%)		47.76
	(Mty)		0.72
14	No. of personnel		304
15	OMS	Rs./t	17.46
16	EMS	Rs.	3360.90
17	Anticipated year of achieving target	Year	4 th YEAR
18	IRR at 100% level of production	%	55.57%
19	IRR at 85% level of production	%	41.87%
20	Completion capital	Rs. crores	433.69
21	NPV @ 12% at 100% level of production	Rs crores	520.69
22	NPV @ 12% at 85% level of production	Rs crores	348.29

2.0 JHIRIA WEST OC 1.5 MTY MINING PLAN

2.1 PROPOSED MINE WORKING

The Project of Jhiria West OC has lease area is 427.993 Ha. Based on the lease area of the project this mine plan has been prepared for an annual capacity of 1.50 Mty considering lease area of 427.993 Ha. Accordingly, the quarry area, safety zone and infrastructure area has been modified from approved project report.

2.2 LOCATION

The Jhiria West Opencast Project is about 12 km SW of Bijuri town, 13 km SW of Manendragrah town and 5 km SW of Rajnagar Colliery in Anuppur district of Madhya Pradesh. The area is included in the Survey of India Toposheet No. 64 I/4. The Manendragrah Pendra road passes through the Western side of the block.

2.3 COMMUNICATION AND ACCESSIBILITY

The Jhiria West Opencast Project, lying immediate West of old Rajnagar incline of Rajnagar lease hold Area. The Jhiria West OC Project can be approached from Rajnagar RO Siding. The distance from Rajnagar RO siding to Jhiria West OC Project is about 8.0 Km. The area can be approached by Manendragrah – Pendra road near village Phulwari-tola, located about 13 km. and 12 km. from Manendragrah and Bijuri township respectively. The district Head Quarter Anuppur is connected by an all-weather road. The Rajnagar RO siding is located in the north eastern side of the West Jhiria block. The Nearest rail head are Bijuri and Manendragrah.

2.4 BLOCK BOUNDARIES AND MINE BOUNDARIES

The boundary of the West Jhiria Block has been considered as follows as per the Geological Report submitted by Directorate of Geology and Mining, M.P:

1. In the **North** : An arbitrary line 200m north and parallel to the line joining the borehole no. MPWJH-09 and MPWJH-07.
2. In the **South** : An arbitrary line running east-west approximately 200m south of MPWJH-04 and .200m in the east up to confluence of Jhiria and Sautanchuanala and extending along the nala up to confluence of Kulharia nala in the east.
3. In the **East** : Kulharia Nala.
4. In the **West** : An arbitrary line 200m west of borehole no. MPWJH-09 and extended due south to join the southern boundary of the block.

The block boundary as defined above covers an area of 4.17 sq.km

The boundary of quarry are as given below: -

North : Incrop of LKII Seam

South : Fault F1F1 and 0.50m thickness line of seam LKII.

East : 100m safety distance from leasehold boundary.

West : Block boundary of West Jhiria Geological Block.

2.5 BRIEF GEOLOGY OF THE MINEABLE AREA

The sub-surface data from drilling in West Jhiria block reveals the presence of two prominent coal horizons i.e. seam-3 and seam-1 (LK-II). Both the seam split in top and bottom section viz. seam-3T, seam-3B and LK-IIT and LK-IIB. The topmost seam-3 (either 3T or 3B or both) is developed with workable thickness in patches in Jhiria and Amadand area located in south of present block. The seam thickness decreases towards eastern direction and developed in thin bands in Rajnagar Colliery. The area is affected by two E-W trending opposite thrown normal faults. The fault F1-F1 is situated on southern portion of the block. The fault has down throw of about 20m to 40m towards north and the throw is increasing towards east. Another fault F2-F2 is located on the northern part of the block which has down throw of about 5m-20m towards south. The throw amount is increasing towards west. Both the faults are diminishing towards E-W direction. In general coal beds exhibits gentle centripetal dip of 1° to 4° and formed sub-basinal structure. The coal shows frequent changing in their trend from WNW-ESE to E-W and NE-SW.

2.5.1 DETAILS OF SEQUENCE OF COAL SEAM AND THEIR PARTING

The sequence of coal seams with their thickness and parting range, grade is as shown below: -

TABLE-2

Coal Seam & Parting	Thickness (m)	Remarks
Weather mantle	3.65-27.58	Soil, weathered mantle
Seam-3T	0.35-2.14	Thickness reduces eastward. GCV varies from G2-G16, but average grade is G7.
Parting	1.56-8.35	
Seam-3B	0.86-2.95	Thickness reduces westward. GCV varies from G3-G11, but average grade is G6.
Parting	13.78-21.72	
LK-II	0.18-5.25	GCV varies from G5-G10 but average grade is G7.
LK-IIT	0.55-1.54	Developed as thin workable

Mining Plan for Jhiria West OCP (1.5 Mty)

Coal Seam & Parting	Thickness (m)	Remarks
		bands. GCV varies from G3-G9 but average grade is G6
Parting	1.00-2.11	
LK-IIB	0.40-3.25	Consistent in development. GCV varies from G5-G8 but average grade is G7.

2.5.2 NATURE OF OVERBURDEN

NATURE

The overburden is composed of soil, weathered mantle and mainly sandstones and shaly sandstone of varying grain size.

INSEAM BURDEN

The in-seam burden is composed mainly of shales, sandy shales, alternative shale and sandstone, carbonaceous shale and sandstones.

DEPTH OF EXCAVATION

The maximum depth of excavation would be about 60m up to the floor of bottom most seam LKIIIB.

2.5.3 MINE PARAMETERS

The Mining characteristics of the quarry have been tabulated as follows: -

TABLE-3

Sl. No.	Particulars	Unit	Thickness
1	Dominant Thickness of Seams Excluding Band		
	Seam 3T	Metre	0.50 – 2.14
	Seam 3B	Metre	0.86 – 2.95
	Seam LKIIT		0.55 – 1.54
	Seam LKIIB		0.50 – 3.25
	Seam LKII	Metre	0.55 – 5.25
2	Dominant Thickness of OB & Parting		
	Top OB	Metre	6.22 – 42.87
	Seam L3T & Seam L3B	Metre	1.56 – 8.35
	Seam L3B & Seam LKII & LKIIT		13.78 – 21.72
	Seam LKIIT & Seam LKIIB	Metre	1.00 – 2.11
3	Gradient		1 in 60

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Sl. No.	Particulars	Unit	Thickness
4	Average Grade of coal		G-6 with GCV 5524 Kcal/Kg
5	Mineable Reserves		
	Seam 3T	Mt	2.23
	Seam 3B	Mt	3.60
	Seam LKIIT	Mt	0.50
	Seam LKIIB		1.52
	Seam LKII		5.31
	TOTAL		13.16
6	Volume of OB		
	Top OB	Mcum	58.57
	Seam L3T & Seam L3B	Mcum	6.54
	Seam L3B & Seam LKII	Mcum	41.07
	Seam L3B & Seam LKIIT		0.58
	Seam LKIIT & Seam LKIIB		1.19
	TOTAL		107.95
7	Target output	Mty	1.50
8	Stripping Ratio (Av.)	Cum/t	8.20
9	Project life	Year	11
10	Main Customers		Miscellaneous
11	Anticipated year of achieving target	Year	4th
12	Total Land involved	Ha	427.993
II. Quarry Parameters			
1	Maximum width along strike		
	- at surface	m	2903
	- at floor	m	2792
2	Minimum width along strike		
	- at surface	m	1260
	- at floor	m	1206
3	Maximum length along dip		
	- at surface	m	1706
	- at floor	m	1648
4	Maximum depth	m	60.12
5	Minimum depth	m	10.62
6	Maximum lift	m	61.00
7	Area of excavation		
	- at surface	Ha	323.77
	- at floor	Ha	296.37

2.6 MINING METHOD & RESERVES

2.6.1 MINEABLE RESERVES AND VOLUME OF OB

The total mineable reserves within the quarry have been estimated as 13.16 Mt with a corresponding OB volume of 107.95 Mcum.

2.6.2 TARGET OUTPUT PLANNED & MINE LIFE

The mine is proposed coal production of 1.50 MTY and peak OB removal is of 12.00 Mcum and with this production of 1.50 Mty the mine life works out to 11 years.

Mine Life

The mine life for nominal production is 11 years. The break-up is as under:

- Construction period - 1 year
- Production build-up period - 3 years
- Production period - 6 years
- Tapering period - 1 year
- Total period - 11 years

2.6.3 MINING STRATEGY/MINING SEQUENCE

Due to flexibility of operation, Shovel-Dumper combination will be suitable for OB removal and coal will be extracted by surface miner. In Partial Outsourcing Option, the PR has been formulated to win coal by departmental HEMM & OB by Shovel Dumper combination by Outsourcing of HEMM.

Coal from face will be transported to pit top and then it will be transported to Rajnagar siding to dispatch coal by rail.

The salient feature of the mining system is as follows: -

- (i) Height & width of the benches in coal and OB will depend upon the size of the equipment. The provision of Coal Mine Regulation and related circulars shall be strictly followed for designing bench parameters in coal and OB.
- (ii) Dump bench height - 30m (each bench)
- (iii) Bench Slope
 - Coal / OB - 70°
 - Spoil - 37°
- (iv) Total Dump Height - total dump height is 80m from quarry floor & 50m from surface.

Considering the average mine floor gradient of about 1 in 60, the coal benches are proposed parallel to seam floor and self-draining

HAUL ROAD

Haul roads have been planned at a maximum gradient of 1 in 16, the width of the haul road has been kept as 30 m. The haul road may be maintained by outsourcing agencies.

2.6.4 SEQUENCE OF MINING

In the 1st year the acquisition of land and other development activities will be done. Initial box cut of quarry is proposed to be developed in the 2nd year of mine operation by grading properly the access trench and making its width 30 m wide. The access trench is to be graded at less than 6% to the mine floor of about 532 m R.L. The box cut is developed in such a manner so as to facilitate the proper drainage of water towards the sump. This would also facilitate extension of coal and OB bench for full development of mine. After creation of sufficient decoaled area, internal backfilling of OB will be started in the 4th year. The coal production will continue from the 2nd year of mine life and the target coal production of 1.50 Mty will be achieved in the 4th year. The target OB removal will be achieved in the 4th year of mine operation. The life of mine will be 11 years including construction period.

2.6.5 DUMPING STRATEGY

In the initial years i.e. upto 3rd year, OB quantities will go to the external dumps. Internal dumping will start from the 4th year onwards. The parting OB in case of older seam may be transported through central haul road, while mining in the multi seam zone.

Initially, the soil/alluvium from top bench of OB will be stacked and stored separately. The spoil dump benches in the internally backfilled OB will be in the form of benches. With the sufficient advance of coal production bench, the backfilled OB will be leveled with dozer. Dumper/Tipper will transport soil/alluvium OB from the top OB bench and will dump the soil directly on the leveled backfilled OB.

The OB dump will be terraced at the height of 30m. The barrier distance between internal dump and coal production bench will be 100 m to have smooth functioning of

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क्षेत्रीय महाप्रबंधक
Area General Manager
हसलेख, एस.ई.सी.एल.
Jharia Area, SFC

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machineries. While crossing the Fault F1F1 and F2F2 the fault surface should be benched to avoid any sliding of strata to working face. The surface of OB dump will be leveled and graded. Plantation will be made on the slope of OB heap to avoid the sliding of spoil.

The slope stability study should be done. According to study report the dump design like dump bench height, berm width, total dump height & slope etc. should be modified to avoid internal dump failure. In addition to that proper precautions / observations should be taken to avoid sliding of internal OB bench. Sufficient distance should be maintained from the toe of internal OB dump to fault on quarry floor to avoid sliding of strata to working face.

Box cut & initial external OB (19.08 Mcum) are proposed to be dumped within quarry area and safety zone area to keep the land requirement bare minimum. The OB so dumped is proposed to be rehandled back to the internal dump. More land would be required if external dump kept outside quarry area and there will be additional impact on environmental point of view. So OB externally dumped within quarry area is proposed to be rehandled back to decoaled area as internal dump.

OB quantity of 19.08 Mcum will be externally dumped within quarry area for which 80.96 Ha land will be required within quarry area and safety zone area. External dump has been made near western boundary. This temporary external dump will be rehandled to internal dump subsequently. From 7th year to 10th year the external dump will be rehandled back to internal dump.

In case of external dump, spoil bench height will be kept 30 m. There will be one bench and total dump height above surface will be 30m.

The break-up of OB quantity to be accommodated in various dumps is as follows: -

<u>Dump</u>	<u>OB accommodated in Mcum</u>
1. Internal dump	107.95
2. External dump outside Quarry area	0.00

Top soil will be removed and stored separately. This soil will be directly spread over the leveled graded backfilled spoil for reclamation of the quarried out land.

2.7 LEAD FOR OB AND COAL

For OB removal yearwise lead has been estimated and based on that average lead for OB removal is estimated to 1.60 Km. The average lead for Coal is estimated to 1.50 Km.

2.8 CALENDAR PROGRAMME OF EXCAVATION

Considering the average width of quarry and annual advance of quarry floor, the calendar programme has been prepared and given in the following table: -

TABLE-4

YEAR	TOTAL COAL	TOTAL OB	SR	OB REHANDLED
1	Construction Period			
2	0.50	4.00	8.00	
3	1.00	8.00	8.00	
4	1.50	12.00	8.00	
5	1.50	12.00	8.00	
6	1.50	12.00	8.00	
7	1.50	12.00	8.00	4.00
8	1.50	12.00	8.00	4.00
9	1.50	12.00	8.00	5.00
10	1.50	12.00	8.00	6.08
11	1.16	11.95	10.30	
TOTAL	13.16	107.95	8.20	19.08

2.9 PROJECTED COAL QUALITY

The average GCV of the seams considered for mining together comes to 5524Kcal/Kg. So, the average grade of coal 'G-6'.

The seamwise GCV and average GCV of mine area of Jhiria West OC are as given below.

TABLE-5

SL NO	SEAM NAME	GCV (Kcal/kg)	AVERAGE GRADE
1	Seam 3T	5464	G7
2	Seam 3B	5778	G6
3	Seam LKII	5313	G7
4	Seam LKIIT	5635	G6
5	Seam LKIIB	5583	G6
	Average	5524	G6

2.10 PUMPING & DRAINAGE

Three numbers of main pumps each of 225lps, 70m head have been provided to meet the requirements. Provisions have been made considering the peak demand which is occasional, so no standby pumps have been provided. Further the pumps may be repaired and kept ready for use in rainy season. Main pumps will be installed on pontoons.

One diesel engine operated pump of 80lps capacity, 60m head has been provided for operation in the initial period and then as standby for use in case of emergency. Similarly, electrically operated pump of same capacity has also been provided.

All the main pumps will be provided with pressure gauges on delivery side and suction side for measuring the head developed so that corrective action will be taken for operating the pump at the duty point. The main pumps have been provided considering life of the mine. ent. During heavy rainfall, overburden may be washed away from edges of slopes and internal dumps, pumps capable of slurry handling will be required.

2.11 CRUSHING, INPIT COAL TRANSPORT AND COAL HANDLING PLANT

- Coal will be mined by surface miner as such no crushing arrangement is required.
- Coal mined by surface miner will be transported by trucks/dumpers to pit top.
- Coal from pit top will be transported to Rajnagar siding about 6.0 KM by road.
- A wharf wall or mechanical loading arrangement suitable for loading of one rack (59 box N) will be constructed at the siding.
- Coal from siding to various customer will be transported by rail through Rajnagar Railway siding.

2.12 WORKSHOP AND STORES

An E&M workshop, Excavation workshop and store have been proposed, in which repair and maintenance will be done for departmental & partial hiring option and An E&M workshop and store have been proposed, in which repair and maintenance will be done for outsourcing option.

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2.13 POWER SUPPLY, ILLUMINATION AND COMMUNICATION

Source of Power

Jhiria West Opencast Project is located in the close proximity of existing Rajnagar RO UG mine of SECL in Hasdeo Area. The source of power supply for this Project shall be from Rajnagar Substation of CSPDCL located at around 6.5 km from the Project site. This project shall receive power at 33kV by means of DCDS overhead line (AAAC, WOLF equivalent) on steel towers drawn from Rajnagar RO Substation.

The power demand for outsourcing option, the maximum power demand comes to around 866 kVA for which 2x1000 kVA, 33/3.4 kV substation shall be adequate. For partial outsourcing option shall be around 882 kVA for which 2x1000 kVA, 33/3.4 kV substation shall be adequate. For departmental option shall be around 3296 kVA for which 2x5000 kVA, 33/3.4 kV substation shall be adequate.

Energy Consumption

The energy consumption has been calculated considering active power, annual number of working hours of equipment/ installation wise.

For Outsourcing Option, the specific energy consumption will be approximately 5.02 kWh / tonne. For Partial Outsourcing Option, the specific energy consumption will be approximately 5.72 kWh / tonne. For Deptt. Option, the specific energy consumption will be approximately 13.23 kWh / tonne.

2.14 LAND REQUIREMENT

The break-up of land involved in the project is as follows: -

S.No.	Component	Forest Land (in Ha)	Non-Forest Land (in Ha)	Total (in Ha)
1	Quarry Area	280.399	43.371	323.770
2	Mining Safety Zone	70.618	21.557	92.175
3	Infrastructure	0.000	4.778	4.778
4	Road	3.241	4.029	7.270
Total		354.258	73.735	427.993

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क्षेत्रीय महाप्रबंधक
Area General Manager
उत्तर क्षेत्रीय एस.ई.सी.एल.
Jhiria Area SFC

2.15 STATUS OF LAND ACQUISITION

The area is free from any industrial activity, and is also devoid of any monument of historical or archaeological importance. Jhiria West OC project is being planned on a virgin block. Total land 427.993 Ha has been notified under section 4(i) on dated 12/08/2016, 7(i) on dated 06/01/2018, 9(i) on dated 09/03/2019, 11(i) on dated 15.05.2019. compensation for 73.735 Ha. land acquisition is under process of approval at SECL Head Quarter.

FOREST LAND

Proposal for 354.258 Ha. Forest Land is under processed for stage- I clearance at MOEF.

2.16 R & R Details

The part of five villages i.e Bhalmuri, Fulkona, Dumarkachhar, Bangawan, Padritola are located within the mine area. The Project Affected Family of these villages are about 220 Nos.

2.17 MINE CLOSURE PLANNING

2.17.1 INTRODUCTION

Mine Closure in real sense is reclamation/ rehabilitation of mined-out area along with other disturbed area to achieve sustainable development through land and other natural resources improvement. This chapter is prepared as per the "Guidelines for preparation of Mining plan for the coal and lignite blocks" issued by MoC, Gol on 16.12.2019 and 29.05.2020. The mine closure plan (progressive and final) shall be approved along with the approval of Mining plans/ Feasibility report/ Project Report as applicable.

Although, the mining activities may last a few decades, but they are liable to leave a long-lasting impact on the landscape, ecology and on local inhabitants. Hence the mine closure details of the mining plan should be oriented towards the restoration of the land back to its original condition as far as practicable. The mine closure plan contains two components viz., Progressive or concurrent mine closure and Final mine closure activities. Progressive mine closure would include various land use activities to be done continuously and sequentially during the entire period of mining operations. Final mine closure activities would start towards the end of

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mine life and may continue even after the resources are exhausted or/and mining is discontinued till the mining area is restored to an acceptable level.

Progressive mine closure plan shall be prepared for every 5 years from the beginning of mining operations and it shall be monitored by central government party agency. The cost estimates of Various project specific activities viz., mined-out land details and their technical, biological reclamation/restoration plan, water quality management, infrastructure to be retained and demolished, disposal of mining machinery etc will be updated and approved 5 years prior to the actual closure time of the mine.

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क्षेत्रीय महाप्रबंधक
Area General Manager
हल्द्वी, एस.ई.सी.एल.
Haldwari Area S.E.C.I.

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2.17.2 Land degradation and restoration schedule

The tentative details of cumulative Land degradation and technical reclamation is tabulated in Table 7. The tentative details of biological reclamation are tabulated in Table 8.

Table 7: Details of Land degradation and technical reclamation

Stage	Cumulative Land degraded area in Ha				Cumulative Technically reclaimed area in Ha			
	Excavated	Dump (Extn + Top Soil)	Infrastructure /others	Total	Back filling	Dump (Extn + Top Soil)	Others	Total
Base yr (22-23)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y-1	0.000	0.000	4.778	4.778	0.000	0.000	0.000	0.000
Y-3	57.140	56.510	4.778	118.428	0.000	0.000	0.000	0.000
Y-5	142.980	80.960	4.778	228.718	59.530	0.000	0.000	59.530
Y-10	268.880	0.000	4.778	273.658	224.660	0.000	0.000	224.660
Y-11/Final	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706
Post closure 1	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706
Post closure 2	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706
Post closure 3	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706
Post closure 4	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706
Post closure 5	323.770	0.000	4.778	328.548	259.706	0.000	0.000	259.706

2.17.3 Biological Reclamation

In opencast mining, the original vegetation is completely stripped off and the soil profile sequences may be disturbed. It is therefore necessary that utmost care be taken in handling the top soil so that the same can be reused for re-vegetation of the area during reclamation. The purpose of biological reclamation is to bring back the vegetation and biodiversity that exist in pre-mining condition. After technical reclamation of OB dumps and redistribution of top soil over it, the dumps will be biologically reclaimed by plantation as shown in Figure 17.3, Figure 17.4 and Figure 17.5.

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Table 8: Details of biological reclamation

Stage	Biologically reclaimed area (Cumulative in Ha.)					Forest land (Return)	Undisturbed/ to be left for public/com use	Total
	Agriculture	Plantation	Water body	Public/Company use	Total			
Base yr (20-21)								
Y-1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y-3	0.000	30.000	0.000	0.000	30.000	0.000	0.000	30.000
Y-5	0.000	86.400	0.000	0.000	86.400	0.000	0.000	86.400
Y-10	0.000	241.040	0.000	0.000	241.040	0.000	0.000	241.040
Y-11	0.000	283.353	64.064	0.000	347.417	0.000	0.000	347.417
Post Closure1	0.000	325.864	64.064	2.750	392.678	0.000	0.000	392.678
Post Closure2	0.000	361.179	64.064	2.750	427.993	0.000	0.000	427.993
Post Closure3	0.000	361.179	64.064	2.750	427.993	0.000	0.000	427.993
Post Closure4	0.000	361.179	64.064	2.750	427.993	0.000	0.000	427.993
Post Closure5	0.000	361.179	64.064	2.750	427.993	0.000	0.000	427.993

* Biologically reclaimed area can be used alternatively for Agriculture, Solar power or other utility subject to the prevailing conditions & Laws. The same will be finalized in the Final MCP.

As per Letter F. No. 22-34/2018-IA.III, Dated: 16th January 2020 of Ministry of Environment, Forest and Climate Change, Government of India, the mining lease holders shall, after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder for flora & fauna etc.

A nursery is a prerequisite for supply of seedlings of suitable species of right size to the extent required. Rajya Van Vikas Nigam may be contacted for supply. As far as possible local plant species may be preferred.

Species for plantation: -

- **Fruit bearing trees**
 - Jamun, Mango, Imlı, Sitaphal, Bel, Ganga Imlı, etc.
- **Medicinal trees**
 - Neem, Karanj, Harra, Behara, Aonla, Arjun, Mahua, Kusum
- **Timber value trees**
 - Teak, Shivan / Ghamar, Sissoo, Sisham, Safed Sirus, Bamboo, Peltaforum, Babool,
- **Ornamental trees**
 - Gulmohur, Kachnar, Amaltas, Saptaparnı, Grevelia, Peepal, Palm tree

2.17.4 Post closure Water quality management

Different activities of coal mining substantially affect hydrological and topographical characteristics of the mining areas which in turn affect the surface runoff, soil moisture, and evapotranspiration and groundwater behavior. Hence; suitable measures to be taken to minimize impacts on water resources (surface and groundwater) in an acceptable manner throughout the life of mine and post-closure.

Post closure of mine the water quality will be monitored in stations as prescribed by the state pollution control board. In case of any higher value observed due to direct or indirect impact caused by reclaimed mine area, necessary action would be taken by management.

The water bodies generated in the mine leasehold area like mine void filled with water shall be protected properly in terms of quality and quantity. In this regard, water quality monitoring of major ion chemistry, biological parameters and the PTEs shall be monitored yearly once and if found any quality deterioration, proper treatment shall be adopted prior to supplying water to the local populace for various uses alongside ensuring no contaminant leaching into the neighbouring aquifer units. Furthermore, it is imperative to undertake the periodic maintenance of mine void filled with water in terms of the development of green patch and proper fencing along the periphery of the

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mine void. This, in turn, will arrest the settling of dust particles into the mine void, decrease the evaporation losses from the water body, increase the infiltration of water, and enhance natural beauty of the structure. Also, it is recommended to take up the desilting of mine void, if found can result in a drastic reduction in its capacity.

Water table level and ground water quality should be monitored at regular interval, suitable measures may be taken to avoid ground water pollution.

2.17.5 Post closure Air quality management

Regular Environmental monitoring of Air for 05 parameters (PM100, PM10, PM2.5, SOx and NOx) will be carried out in monitoring stations fixed as per Environmental Clearance for minimum three years after final closure of mine at a frequency of twice in a month. Apart from this Heavy metals in air in above stations will be monitored at a frequency of twice in a year for minimum three years. Based on the reports obtained required corrective measures will be implemented. The general corrective measures will be as follows,

1. Suitable green belt will be developed to curtail dust pollution.
2. Biological reclamation will be done immediately after technical reclamation of OB dumps.

2.17.6 Waste management

The waste in OC mine is mainly removed over burden (OB). The details of waste management are clearly explained in Table 9.

Table 9: The details of waste management (Figures in Mm³)

Stage	OB Removal (Cumulative) (Mm ³)			External Dump (Cumulative) (Mm ³)		Internal Backfilling (Cumulative) (Mm ³)	
	Top Soil	OB	Total	Top Soil	OB	Top Soil	OB
Y-1	0.00	-	-	0.000	-	0.000	-
Y-3	0.17	11.83	12.00	0.000	11.83	0.000	-
Y-5	0.43	35.57	36.00	0.000	19.08	0.12	16.49
Y-10	0.81	95.19	96.00	0.000	0.000	0.80	95.19
Y-11	0.97	106.98	107.95	0.000	0.000	0.97	106.98
MC 1	0.97	106.98	107.95	0.000	0.000	0.97	106.98
MC 2	0.97	106.98	107.95	0.000	0.000	0.97	106.98
MC 3	0.97	106.98	107.95	0.000	0.000	0.97	106.98
MC 4	0.97	106.98	107.95	0.000	0.000	0.97	106.98
MC 5	0.97	106.98	107.95	0.000	0.000	0.97	106.98

2.17.7 Topsoil management

Proper handling and management of topsoil is necessary for future vegetation growth in the mine reclaimed area.

The objectives of Top Soil Management are,

- * Maintain a topsoil balance that achieves rehabilitation objectives during the life of mine.
- * Ensure effective topsoil removal techniques are employed to maximise volumes of suitable topsoil removed and minimise wastage.
- * Maintain topsoil viability during stripping, spreading, and stockpiling, through best practices, effective stockpile design and treatment.

In accordance with the objectives the following strategies will be adopted in providing sufficient stable soil material for rehabilitation.

Stripping:

Prior to the commencement of stripping, area will be cleared of vegetation. Soil stripping will be undertaken by dozers and hydraulic backhoe excavators to maximise the preservation of the quality of the soil. The HEMM operators and supervisors should be trained and made aware for the same. This will ensure that the entire topsoil is salvaged and the quality of topsoil is not reduced through contamination with unsuitable excavated material.

Stock piling:

Wherever possible, the stripped topsoil will be spread directly onto areas being reclaimed. Wherever this is not possible, the topsoil will be stored in stockpiles. Stock piles will be dumped at places where they would not be disturbed by future mining. Sediment fences or other barriers can be used wherever necessary to retain sediment. Stockpiles will be located on the dip side of the proposed mine boundary. The proposed site will be marked in the land use plan and will be updated accordingly. The overall topography for the graded surface should be designed to minimize the uncontrolled flow of runoff. Dispersed sheet flow should be broken up by terraces or benches along the slope that also follow topographic contours. On a fine scale the ground surface can be roughened by the tracks of a bulldozer perpendicular to the slope. Construction of stockpiles with a "rough" surface condition will reduce erosion hazard, improve drainage and promote re-vegetation.

Stockpile preservation:

Stockpiling topsoil may result in disruption and loss of beneficial soil microorganisms and nutritional values, hence needs the following amendments during preservation: -

1. Re-vegetation of the stockpile will be done as scheduled below to protect the soil from erosion, discourage weeds and maintain active populations of beneficial soil microbes.

* Temporary Seeding: within 30 days after the formation of the stockpile.

* Permanent Vegetation: If stockpiles will not be used within 12 months, they will be stabilized with permanent vegetation to control erosion and weeds like green panic, Japanese millet (spring sowing), Oats (winter sowing), Dry land Lucerne, Seaton park sub-clover. Topsoil can be mixed with organic material or manufactured soil amendments to improve the growing capability.

2. To the extent practicable, above ground vegetation, including tree litter should be mixed or otherwise incorporated into the topsoil.

3. Application of Fertilizers: Stockpiled topsoil needs significant fertilizer application for the establishment and maintenance of vegetation.

4. Soil amendments: Soil amendments should be applied before seeding or planting. Common soil amendments used are bio-solids, compost, manure, and lime and coal combustion by-products.

Prior to the placement, the top of stockpile material should be mixed with the remainder of stockpile to ensure that living organisms are distributed throughout the topsoil material at the time of final placement. In case, the material has been stockpiled for over nine-month period, use of microorganisms inoculates may be necessary to re-establish microorganisms in the topsoil material.

Site Preparation:

Before spreading topsoil, establish erosion and sedimentation control structures such as diversions, berms, dikes, waterways and sediment basins. Adjust grades and elevations for receipt of topsoil. Roughening - Immediately prior to spreading the topsoil, loosen the subgrade to a proper depth to ensure bonding of the topsoil and subsoil. Soil horizons will be replaced in the same order that they were removed. Top soil will be uniformly distributed to pre-

010/2011/05/05
क्षेत्रीय महाप्रबंधक
Area General Manager
लखनौ, एस.ई.सी.एल.
Hastina Area, S.E.C.I.

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mining thickness. If sufficient top soil is available, it is suggested that a minimum compacted depth of a half metre on 3:1 slope and one metre on flatter slope. Topsoil will not be spread while it is frozen or muddy. The topsoil will be compacted to ensure good contact with the underlying soil, but excessive compaction will be avoided, as it increases runoff and inhibits seed germination. Light compaction with roller will be done where turf is to be established.

On slopes and areas that will not be mowed, the surface will be left rough after spreading topsoil.

Monitoring:

Specific team / manpower is to be deployed for this most important step of topsoil management. The team will monitor the area and quantum of top soil management with the authorities of mine on quarterly basis and regularly monitor the given points of significant importance:

- * Monitoring Erosion Control: This step is necessary during stock piling as well as reclamation stage of topsoil management. Take corrective measure in areas showing evidence of erosion, sedimentation or slope failure. This is a serious problem, because erosion causes fertile farmland to lose nutrients and water retention ability. Because the first thing to go is precious topsoil, the soil removed by erosion contains about three times more nutrients and 1.5 to five times more organic matter than that which remains behind.
- * Soil fertility maintenance: Organic or inorganic fertilizer should be applied periodically if vegetation growth is poor.
- * Regular monitoring of top soil management should be done until vegetation is demonstrated to be successfully established.

The action plan for topsoil management is given in Table 10.

Table 10: The action plan for topsoil management

Year	Top soil removed, Mcum	Top soil removed cumulative, Mcum	Top soil spread, Mcum			Top Soil Stacked Cumulative, Mcum
			External dump	Internal dump	Total	
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.09	0.09	0.00	0.00	0.00	0.09
3	0.09	0.17	0.00	0.00	0.00	0.17
4	0.13	0.30	0.00	0.00	0.00	0.30
5	0.13	0.43	0.00	0.12	0.12	0.31

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6	0.08	0.50	0.00	0.13	0.13	0.25
7	0.08	0.58	0.00	0.13	0.13	0.15
8	0.08	0.66	0.00	0.13	0.13	0.13
9	0.08	0.73	0.00	0.13	0.13	0.09
10	0.08	0.81	0.00	0.13	0.13	0.04
11	0.16	0.97	0.00	0.17	0.17	0.03
MC 1	0.16	0.97	0.00	0.03	0.03	0.00
MC 2	0.16	0.97	0.00	0.00	0.00	0.00
MC 3	0.16	0.97	0.00	0.00	0.00	0.00
MC 4	0.16	0.97	0.00	0.00	0.00	0.00
MC 5	0.16	0.97	0.00	0.00	0.00	0.00

2.17.8 Restoration of Land used for Infrastructure

Infrastructure to be retained will be determined in the Final Mine Closure Plan. In case of retaining of infrastructure for use by other projects or other Misc. use, all appropriate measures for strengthening & stabilizing of the same may be done, which may be firmed in final MCP.

2.17.9 Disposal of mining machinery

The different mining machinery proposed for this project and their disposal plan is tabulated in Table 11.

Table 11: Disposal plan for mining machinery

S No.	Particulars	Proposed Disposal Practice
a	Disposal or reuse of existing HEMM, workshop and railway siding for OC.	The disposal mode & dismantling plan of Mine Infrastructure & equipment will be detailed in final mine closure plan after considering all possible alternatives
b	Disposal or reuse of transmission and sub-station.	The disposal mode & dismantling plan of Mine Infrastructure & equipment will be detailed in final mine closure plan after considering all possible alternatives

2.17.10 Safety and security

Table 12: Proposed safety and security practices

Sl. No.	Particulars	Proposed safety Practice
A	Surface grading and Fencing around abandoned quarry.	At the end of Mining Operation, there will be a void/water body. Suitable surface fencing/guarding may be provided around void/water body to avoid falling of faunal species in it.
B	Providing one-time lighting arrangement.	Provision for Lighting is Provided in the PR.

07/05/2011
 क्षेत्रीय महाप्रबंधक
 Area General Manager
 इलाहाबाद, एस.ई.सी.एल.
 Lucknow Area, S.E.C.I.

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C	Slope stability arrangement for high wall and back filled dumps.	Proper benching / Terracing of slopes will be done. Proper Signage to be used at appropriate places.
----------	--	--

2.17.11 Abandonment cost and financial assurances

The different activities considered for mine closure are mentioned in Figure 17.1 and Figure 17.2 along with their schedule for implementation.

S. No	Activities in Reclamation Phase, each phase@5year	1 st	2 nd	MC
	11 Years of Life			
1	Backfilling and Grading of Dump			
2	Provision of water coursing channels			
3	Provision of sedimentation pond			
4	Provision of garland drains			
5	Provision of check dams at high velocity points			
6	Top soil preservation			
7	Top soil application			
8	Site preparation and plantation			
9	Plantation in Internal Dump			
10	Environmental Monitoring			

Figure 17.1: Schedule for implementation of mine closure activities

Sl. No	Activities	Half Yearly												
		1	2	3	4	5	6	7	8	9	10			
1	Preparation of Survey & Disposal Report													
2	Slope Stability study for high walls and internal dumps													
3	Disposal of P&M including HEMM, CHP, W/S, Siding													
4	Backfilling of mined out Area (OC)													
5	Dismantling of Industrial structure													
6	Grading & dozing of high walls for OC													
7	Fencing of quarry													
8	Clearing of Coal Stock and Infrastructural Area.													
9	Disposal / Dismantling of Residential colony													
10	Plantation & landscaping on backfilled area.													
11	Plantation over cleaned land of Infrastructure.													
12	Environmental Monitoring													

Figure 17.2: Implementation schedule specific to final mine closure activities

2.17.2 Cost of Activities to be taken up for closure of the mine

The cost to be incurred in different activities involved in the mine closure activities are given in Table 13

Table 13: Proposed cost of different mine closure activities

COST OF ACTIVITIES TO BE TAKEN UP FOR PROGRESSIVE CLOSURE OF MINE			
Head	PARAMETERS	Unit	Amount "Rs. Cr"
Progressive Closure	Water Quality Management	LS	1.23
	Air Quality Management	LS	2.22
	Waste Management	LS	0.98
	Barbed Wire fencing	LS	0.27
	Barbed Wire fencing around the Pit	LS	0.27
	Filling of Void- Rehandling of Crown Dump	LS	2.49
	Top Soil Management	LS	3.08
	Technical Reclamation of Mined out land and OB Dump	LS	21.10
	Biological Reclamation of Mined out land and OB Dump		
	Plantation over Virgin area including green belt	LS	2.77
	Manpower cost and supervision	LS	2.48
	Toe Wall around the dump	LS	0.40
	Garland Drain	LS	0.50
	Garland Drain around the dump	LS	0.33
	Any Other Activity	LS	0.41
Dismantling of Infrastructure & Disposal/ rehabilitation of mining Machinery	Dismantling of Workshop	LS	
	Rehabilitation of the dismantled facilities	LS	
	Dismantling of pumps and pipes/ other facilities	LS	
	Dismantling of stowing bunker, provisioning of pumps for bore well pumping arrangement	LS	
	Dismantling of UG equipment	LS	
	Re-arranging water pipeline to dump top park/ Agricultural land	LS	
	Dismantling of power lines	LS	1.77
Safety and Security	Barbed Wire fencing	LS	0.27
	Barbed Wire fencing around the Pit	LS	0.10
	Barbed wire fencing with masonry pillars	LS	0.03
	Concrete wall with masonry pillars around the pit	LS	
	Securing air shaft and installation of bore well pump	LS	
	Securing of incline	LS	0.00
	Concrete wall fencing around the water body	LS	
	Boundary wall around the water body	LS	1.07

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क्षेत्रीय महाप्रबंधक
Area General Manager
लखनौ, एस.ई.सी.एल
Area SFC

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COST OF ACTIVITIES TO BE TAKEN UP FOR PROGRESSIVE CLOSURE OF MINE			
Head	PARAMETERS	Unit	Amount "Rs. Cr"
	Stabilisation viz benching, pitching etc of side walls of water body	LS	
	Toe Wall around the dump	LS	0.4
	Garland Drain		
	Garland drain around the dump		0.46
	Misc. Safety Works	LS	0.27
Technical and Biological Reclamation of Mined out land and OB dump	Drainage Channel from main OB dump	LS	0.56
	Filling of Void	LS	6.23
	Top Soil Management	LS	0.97
	OB Rehandling for backfilling	LS	6.29
	Terracing, Blanketing with Soil and vegetation of External OB dump	LS	0.73
	Peripheral Roads, gates, view point, cemented steps on bank	LS	0.5
	Expenditure on development of Agricultural land	LS	0.11
	Landscaping and Plantation	LS	0.9
Post Closure Management and Supervision	Power Cost	LS	0.1
	Post mining water quality management	LS	0.2
	Post mining air quality management	LS	0.39
	Subsidence monitoring for 05 years	LS	0
	Waste Management	LS	0.2
	Manpower cost and supervision	LS	0.1
Others	Entrepreneurship development (Vocational/ Skill Development training for sustainable income of Affected people	LS	0.52
	Golden Handshake/ Retrenchment benefits to 100 employees of OC	LS	
	Golden Handshake/ Retrenchment benefits to 200 employees of UG	LS	
	One-time final grant to societies/ institutions/ organisations which is dependent upon the project	LS	1.12
	Provide jobs in other mines of the company	LS	
	Continuation of other services like running of schools etc	LS	
Total	COST FOR THE ENTIRE LIFE (Prog and Final)		61.82
Total	TOTAL ANNUAL COST		2.58
Total	PROGRESSIVE COST FOR THE ENTIRE LIFE		41.03
Total	ANNUAL PROGRESSIVE COST		1.71

2.17.3 Financial assurance

The amount to be deposited in Escrow account as a security against the mine activities to be carried out for the closure of the mine is based on the project area. As per the guidelines of the MoC, vide letter no: 34011/28/2019-CPAM DI: 16th December, 2019 the mine closure cost estimation is as in Table 14 and the amount to be deposited in Escrow account is as in Table 15.

Table 14: The mine closure cost estimation

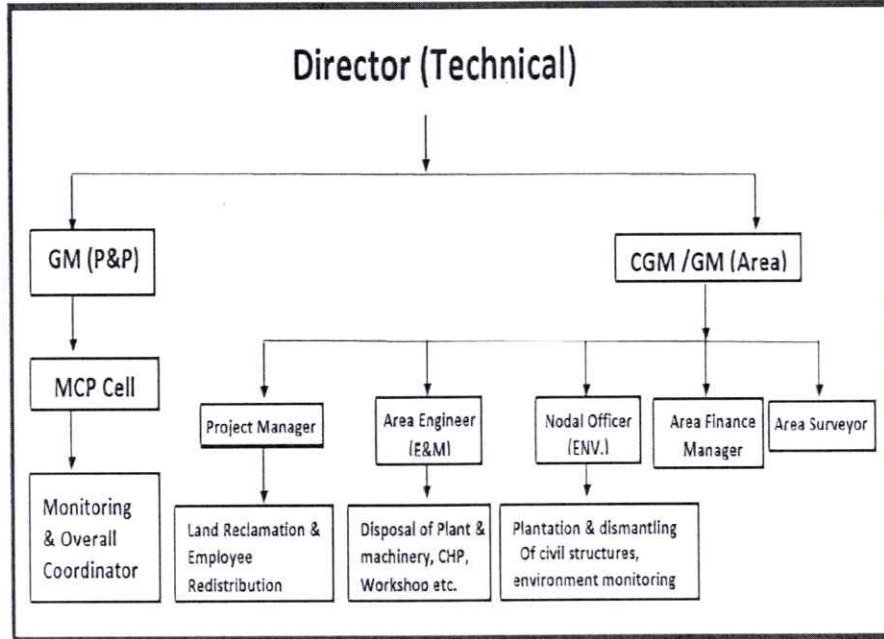
WPI as on	April 2019	121.100
WPI as on base date (Provisional)	December 2022	150.500
Escalation rate of Closure cost		5%
Base Rate of Closure cost "Rs. Lakhs per Hectare"		9.00
Present rate of closure cost "Rs. Lakhs per Hectare"		11.185
Total Project Area in Ha		427.993
Amount to be deposited into escrow account "Rs. In Lakhs"		4787.089
Total life of mine in years		11
Annual Closure cost "Rs. In lakhs"		435.190
Amount to be deposited into escrow account after compounding @ 5% "Rs. In Lakhs"		6182.652

Table 15: Amount to be deposited in Escrow account

Year	Year No	Fund schedule in Rs. Lakhs	Fund to be reimbursed (maximum) in Rs. Lakhs
2023-24	1	435.190	
2024-25	2	456.949	
2025-26	3	479.797	
2026-27	4	503.787	
2027-28	5	528.976	
Progressive	Phase I	2404.699	50% of the balance amount at the end of Phase I
2028-29	6	555.425	
2029-30	7	583.196	
2030-31	8	612.356	
2031-32	9	642.974	
2032-33	10	675.122	
Progressive	Phase II	3069.073	50% of the balance amount at the end of Phase II
2033-34	11	708.879	
MC1	12		
MC2	13		
MC3	14		
MC4	15		
MC5	16		
Final Phase		708.879	
Grand Total		6182.652	100% of the balance amount at the end of Final Phase.

2.17.4 Implementation Protocol

For implementing the mine closure activities, the following organizational structure has been proposed:



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If needed, proper mitigation measures will be taken up after evaluating the environmental quality. The funds for this have been provided in the cost estimate. Before closure of the mine, Area GM will make arrangements to prepare a survey and disposal report and the same will be submitted to DGMS for acceptance.

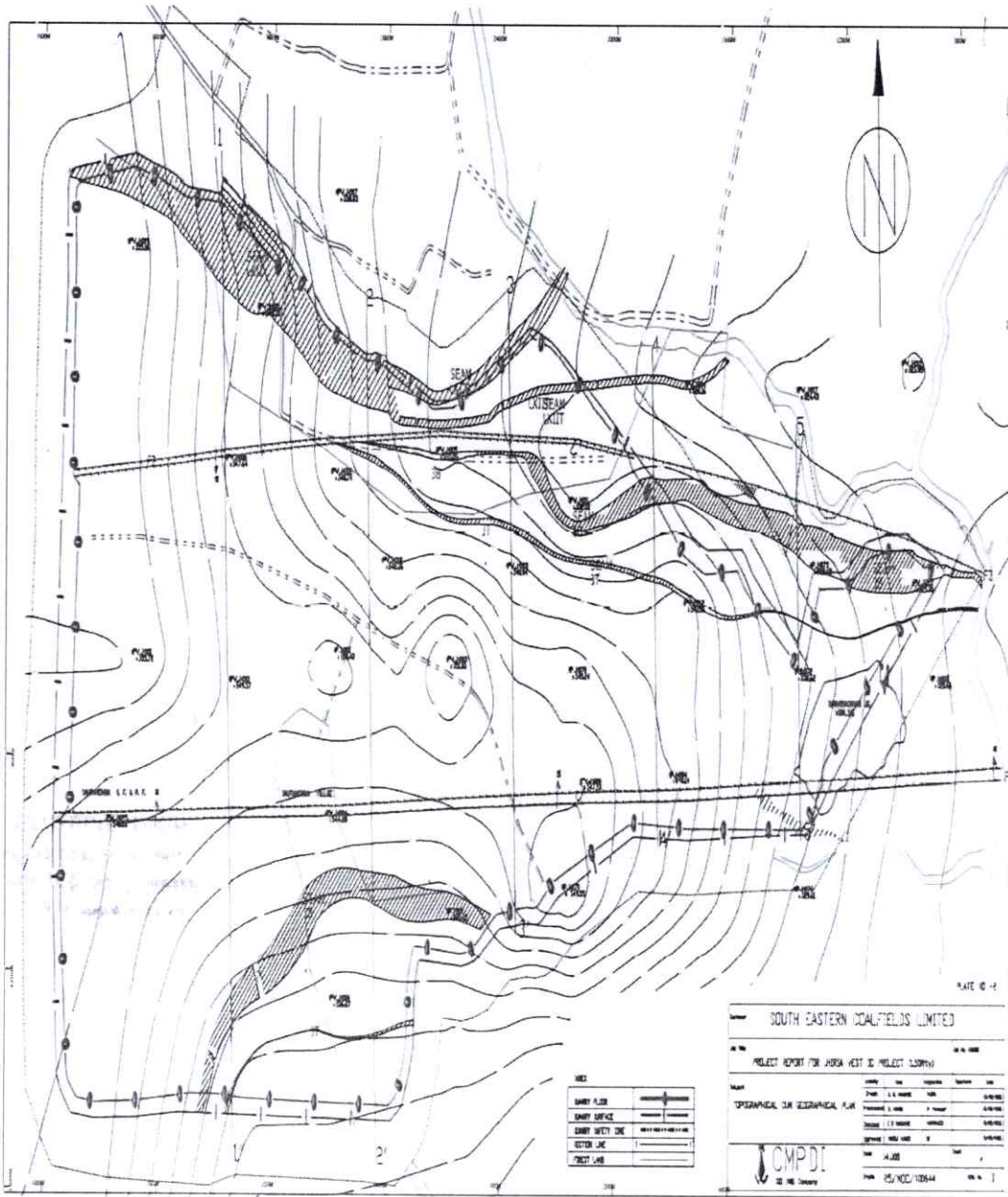
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क्षत्रीय महाप्रबंधक
Area General Manager
हमदेव, एच.ई.सी.एल.
Hasdeo Area S.E.C.L.

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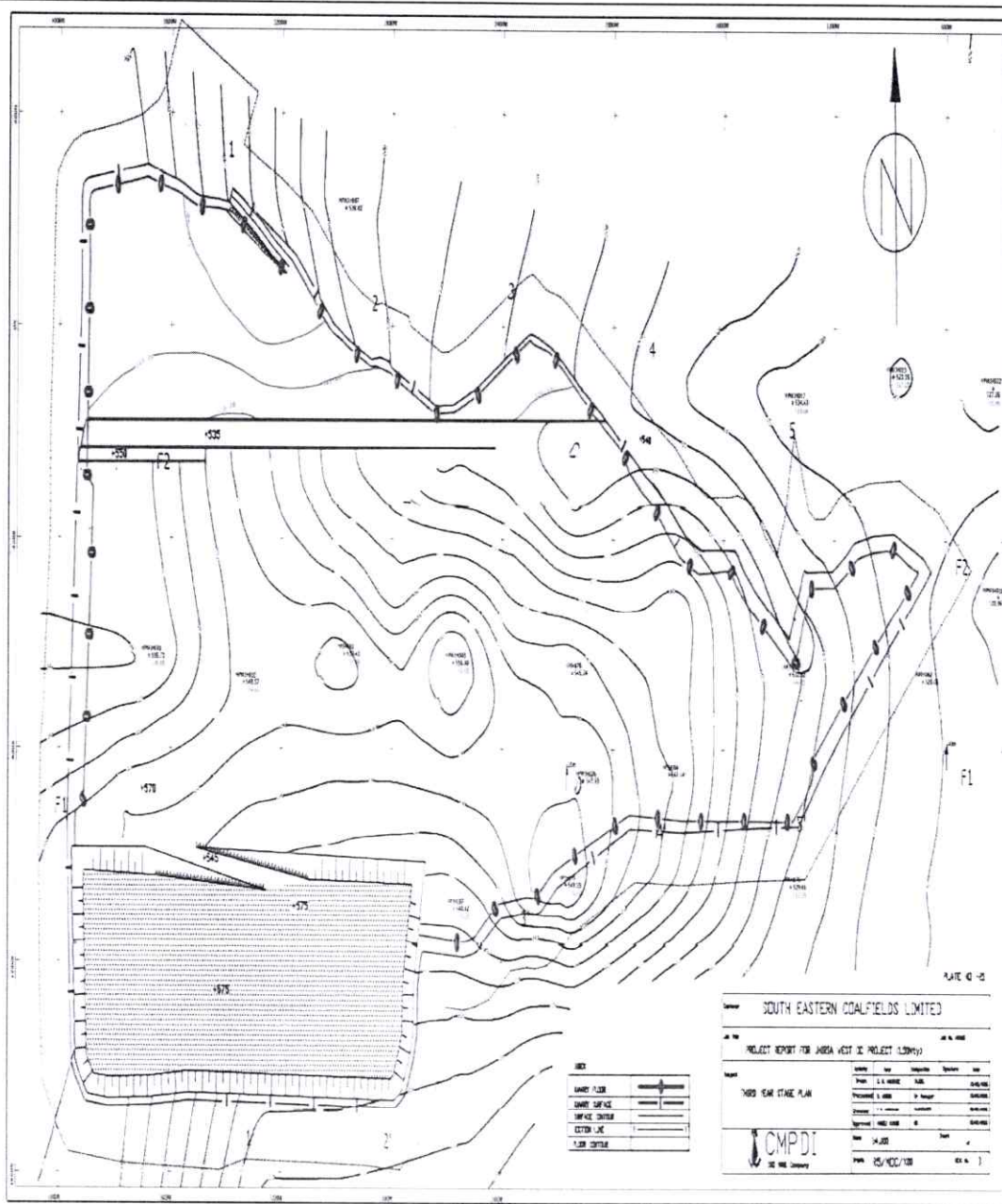
STAGE PLANS:



Topographical Plan

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क्षेत्रीय महाप्रबंधक
Area General Manager
रामदेव, एस.ई.सी.एल.
Area SEC

Mining Plan for Jharia West OCP (1.5 Mty)

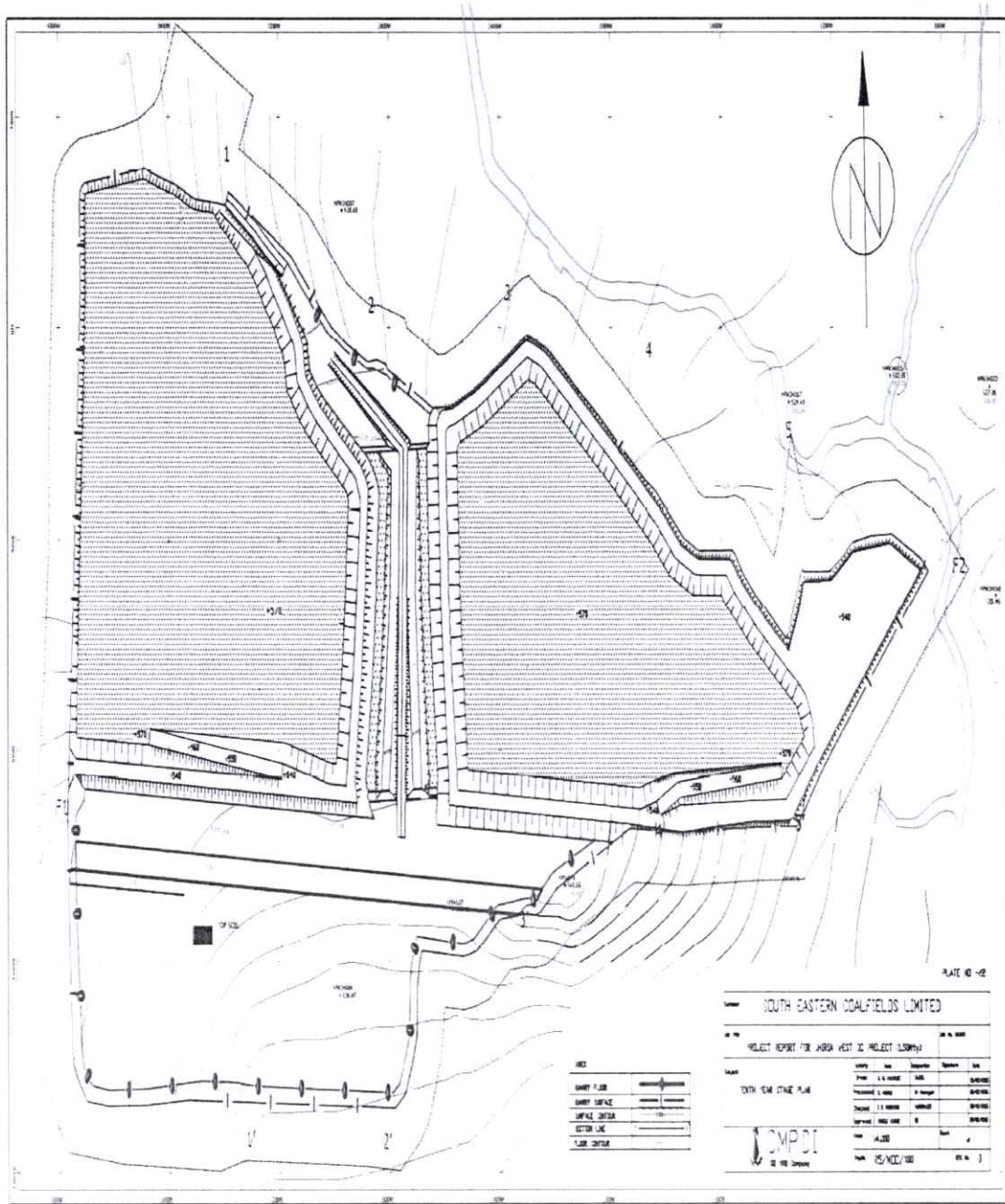


3rd Year Stage Plan

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 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हसनदेव, एल.ई.सी.एल.
 Hasdeo Area, S.E.C.L.

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 05/05
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Mining Plan for Jhiria West OCP (1.5 Mty)



10th Year Stage Plan

10/3/2011
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 क्षेत्राध्यक्ष महाप्रबंधक
 Area General Manager
 हस्तेय, एस.ई.सी.एल.
 Hasdeo Area, S.E.C.L.

10/3/2011
 8/5/11
 क्षेत्राध्यक्ष महाप्रबंधक
 Area General Manager
 हस्तेय, एस.ई.सी.एल.
 Hasdeo Area, S.E.C.L.

2.18 MANPOWER & PRODUCTIVITY

The manpower requirement for proposed project has been calculated on the basis of 3 shift operation for 330 days in a year. The breakup of the manpower requirement of this project has been summarized as follows:

Table 16: Manpower Requirement

Sl. No	Particular	Partial Outsourcing Option. (Nos)
1	Workers	170
2	Monthly paid staff	108
3	Officers	26
	Total	304

2.19 PROJECT IMPLEMENTATION SCHEDULE

It is well known fact that for timely implementation of a project, it is essential that all the activities related with project construction are properly planned, closely monitored and effectively supervised.

All implementing departments should have their own implementation manuals which are followed for monitoring and construction of the project, so that, man, materials and money are made available to the project in time as spelt in the project report, with a view to prevent cost and time over-run. Responsibility, power for each executive to be included in the implementation manual to prevent overlapping of operational areas. Sufficient administrative and financial power to be defined for key executive to take timely and effective decisions for the implementation of the project. Time estimates are broad and indicative only, necessary modifications to suit local site conditions are to be incorporated subsequently.

The life of the proposed mine will be 11 years including construction period. The maximum quarry depth will be around 60.12 m. The Production Program proposed is as given below: -

Table 17

YEAR	TOTAL COAL	TOTAL OB
1		
2	0.50	4.00
3	1.00	8.00
4	1.50	12.00

Mining Plan for Jhiria West OCP (1.5 Mty)

5	1.50	12.00
6	1.50	12.00
7	1.50	12.00
8	1.50	12.00
9	1.50	12.00
10	1.50	12.00
11	1.16	11.95
TOTAL	13.16	107.95

2.19.1 Technically, zero date has been adopted as the date of approval and/or date of environmental clearance or the date of the land acquisition whichever is later.

2.20 CRITICAL ACTIVITY

CONSTRAINTS ON MINE DEVELOPMENT

- (i) A nalla named as "Kulharia nalla" is flowing along the periphery of the eastern boundary of the Project. Sufficient care should be taken to avoid inrush of water from Kulharia Nalla into the mine.
- (ii) Rehabilitation & resettlement of five villages is involved in the project. Acquisition of land along with R&R of PAP is a critical activity and should be done for opening of the project. No of PAP is 220.

2.21 ENVIRONMENT MANAGEMENT

2.21.1 Introduction

Environmental management is necessary for planning different developmental activities, in order to optimal utilization of the earth's resources. It also helps in preserving the quality of environment for healthy growth of society.

This chapter deals with the existing environmental quality along with impact of different activities during operation of the project over environment and management strategies to mitigate adverse impacts resulted by these activities.

2.21.2 Existing Environment Quality

The baseline data generation was carried out during October to December 2020 which is a no monsoon period. This data has been used to give a basic idea of existing environmental quality in the proposed project area.

2.21.3 Ambient Air quality in buffer zone

The summarized air quality monitoring data for PM₁₀, PM_{2.5}, SO₂, & NO_x at different locations (Ref Figure 21.1) has been shown in Table 18.

Table 18: Ambient Air quality

Sample Location	Concentration of 24 Hrs average						MoEF/CPCB Coal Mines Standards
	Mini.	Max.	98 th Percentile	AM	GM	SD	
PM ₁₀ Concentration (µg/m ³)							
Sautanchua Village	54.30	83.00	83.00	74.78	74.35	7.68	250
Manjholi Village*	57.40	96.50	96.50	85.32	84.58	10.60	250
Harri Village	47.60	72.60	72.60	64.78	64.40	6.79	100
Dumarkachar Village	38.10	66.80	66.80	59.34	58.70	8.11	100
Amadand Village	44.30	87.00	87.00	73.94	73.09	10.59	100
Gulutola Village	37.40	72.90	72.90	64.38	63.35	10.55	100
Bhad Village	48.30	79.90	79.90	68.25	67.67	8.57	100
Chukan Village	42.10	82.90	82.90	72.25	71.37	10.37	100
Phejatola Village	37.80	74.20	74.20	63.13	62.40	8.94	100
PM _{2.5} Concentration (µg/m ³)							
Sautanchua Village	29.30	45.50	45.50	40.60	40.39	4.00	----
Manjholi Village*	30.50	50.10	50.10	44.27	43.98	4.84	----
Harri Village	19.40	42.70	42.70	36.90	36.38	5.57	60
Dumarkachar Village	20.70	36.50	36.50	32.42	32.05	4.51	60
Amadand Village	26.10	51.20	51.20	43.45	42.94	6.24	60
Gulutola Village	18.80	37.00	37.00	32.62	32.09	5.38	60
Bhad Village	25.70	42.70	42.70	36.63	36.32	4.65	60
Chukan Village	22.20	43.80	43.80	38.06	37.59	5.47	60
Phejatola Village	20.00	39.90	39.90	33.90	33.50	4.85	60
SO ₂ Concentration (µg/m ³)							
Sautanchua Village	12.10	36.70	36.70	29.06	28.20	6.18	120
Manjholi Village*	16.60	33.60	33.60	28.73	28.43	3.80	120
Harri Village	6.40	16.10	16.10	11.37	11.58	2.54	80
Dumarkachar Village	5.70	14.40	14.40	10.60	10.44	2.79	80
Amadand Village	17.40	31.30	31.30	25.64	25.42	3.28	80
Gulutola Village	8.50	23.10	23.10	16.88	16.42	3.77	80
Bhad Village	10.60	19.60	19.60	15.62	15.36	2.81	80
Chukan Village	5.10	19.30	19.30	14.16	13.66	3.42	80
Phejatola Village	6.80	14.30	14.30	10.38	10.65	3.73	80
NO _x Concentration (µg/m ³)							
Sautanchua Village	8.40	28.90	28.90	22.41	21.65	4.99	120
Manjholi Village*	11.90	23.80	23.80	18.43	18.23	2.63	120
Harri Village	6.30	13.40	13.40	9.43	9.22	3.28	80
Dumarkachar Village	5.20	12.90	12.90	8.47	8.25	3.08	80
Amadand Village	11.50	23.40	23.40	16.07	15.81	3.09	80
Gulutola Village	6.50	19.20	19.20	12.92	12.52	4.06	80

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Sample Location	Concentration of 24 Hrs average						MoEF/CPCB Coal Mines Standards
	Mini.	Max.	98 th Percentile	AM	GM	SD	
Bhad Village	6.10	16.10	16.10	11.91	11.53	2.89	80
Chukan Village	5.70	15.70	15.70	11.53	11.20	3.52	80
Phejatola Village	5.30	11.80	11.80	8.12	7.88	3.03	80

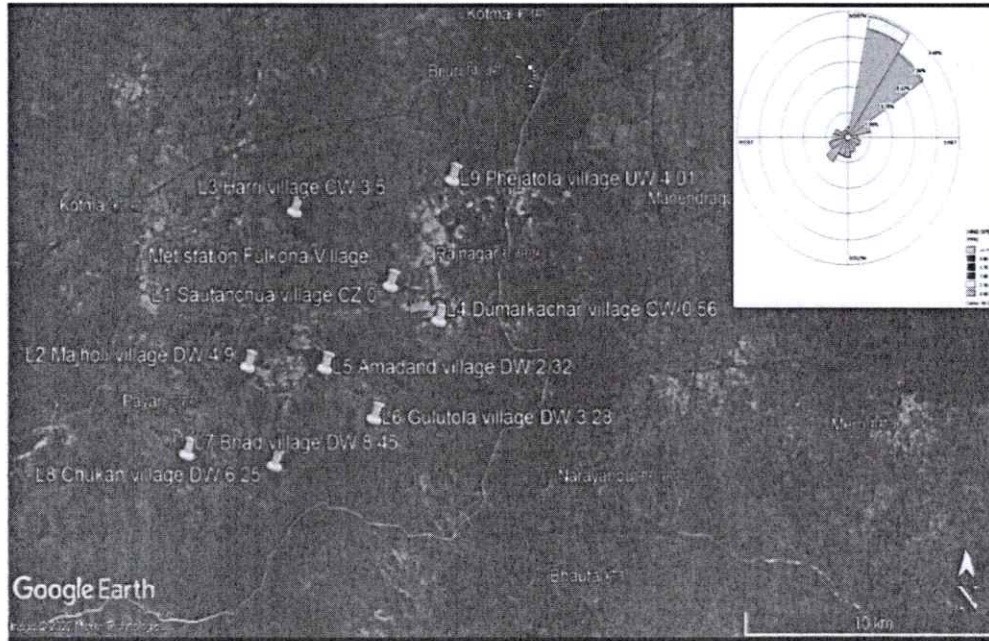


Figure 21.1: Locations of Air quality monitoring stations

2.21.4 Water Quality

a) Water quality status of surface and ground water

The water quality data at different locations is shown in Table 19

Table 19 Surface and Ground Water Quality

Criteria Pollutants	Unit	Max	Min	Acceptable Limit	Permissible Limit
Ground Water as Per IS 10500:2012					
pH	-	7.42	6.92	6.5 to 8.5	No Relaxation
Total Dissolved Solids	mg/l	626	255.6	500	2000
Total hardness as CaCO ₃	mg/l	424	122	200	600
Chlorides	mg/l	115	55	250	1000
Fluoride	mg/l	0.77	0.06	1	1.5
Calcium as Ca	mg/l	120.2	28.1	75	200
Iron	mg/l	4.6	0.09	0.3	No Relaxation
Total suspended solids	mg/l	< 5	< 5	---	---
Nitrate	mg/l	15.5	8.8	45	No Relaxation
Surface Water as Per IS 2296:1982 Class-C					
pH	-	7.19	6.58		6.5 to 8.5
DO	mg/l	6.9	5.6		4
BOD	mg/l	9	2		3

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क्षेत्रीय महाप्रबंधक
Area General Manager
 हसदेव, एस.ई.सी.ए.
 धरमपुरा, रा.प.

Mining Plan for Jhiria West OCP (1.5 Mty)

COD	mg/l	30.0	< 5	---
Total Dissolved Solids	mg/l	456	154	1500
Feacal Coliform	MPN/	23	absent	---
Total Coliform	100ml	54	24	500
Nitrate	mg/l	13	6.6	50

b) Effluent Water Quality

The effluent water quality data at different locations (Ref Figure 21.2) is shown in Table 20

Table 20: Effluent water quality

S. No.	Parameter	Unit	Value	GSR No. 422 E
1.	pH at 25 °C	--	6.61	5.5 to 9.0
2.	Temperature °C	°C	26.4	NE 5°C receiving temp
3.	Colour	CU	12.0	15
4.	Odour	...	Agreeable	-
5.	Turbidity	NTU	16.0	-
6.	Chloride	mg/L	42.0	-
7.	Fluoride	mg/L	0.57	2.0
8.	Sulphate	mg/L	172.0	-
9.	COD	mg/L	30.0	250
10.	BOD	mg/L	9.3	30
11.	Nitrate Nitrogen	mg/L	10.2	10
12.	Aluminium	mg/L	0.35	-
13.	Cadmium (As Cd)	mg/L	<0.01	2.0
14.	Copper (As Cu)	mg/L	<0.1	3.0
15.	Arsenic (as As)	mg/L	<0.02	0.2
16.	Lead (As Pb)	mg/L	<0.02	0.1
17.	Mercury (As Hg)	mg/L	<0.001	0.01
18.	Nickel (Ni)	mg/L	<0.05	3.0
19.	Zinc (As Zn)	mg/L	<0.1	5.0
20.	Iron	mg/L	0.50	3.0
21.	Total Chromium	mg/L	<0.1	2.0
22.	Manganese (As Mn)	mg/L	<0.1	2.0
23.	Phenolic Compounds	mg/L	<0.1	1.0
24.	Orthophosphate	mg/L	<0.5	5.0
25.	TSS	mg/L	31.2	100
26.	Vanadium (As V)	mg/L	<0.1	0.2
27.	Cyanide	mg/L	<0.1	0.2
28.	Hexavalent Chromium as Cr ⁶⁺	mg/L	<0.05	0.1
29.	Total Kijheldal Nitrogen as TKN	mg/L	40.3	100
30.	Ammonical Nitrogen as NH ₃	mg/L	6.2	50
31.	Oil & Grease	mg/L	<2)	10
32.	Calcium as Ca	mg/L	60.9	-
33.	Total Hardness as CaCo ₃	mg/L	256.0	-
34.	Residual Chlorine	mg/L	<0.1)	-
35.	Selenium (As Se)	mg/L	<0.02)	0.05
36.	Boron (As B)	mg/L	<0.1)	-
37.	Sulphide	mg/L	1.6	2.0

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क्षेत्रीय महाप्रबंधक
Area General Manager
हमदेय, एम.ई.सी.एल.
Lusden Area S.T.

Mining Plan for Jhiria West OCP (1.5 Mty)

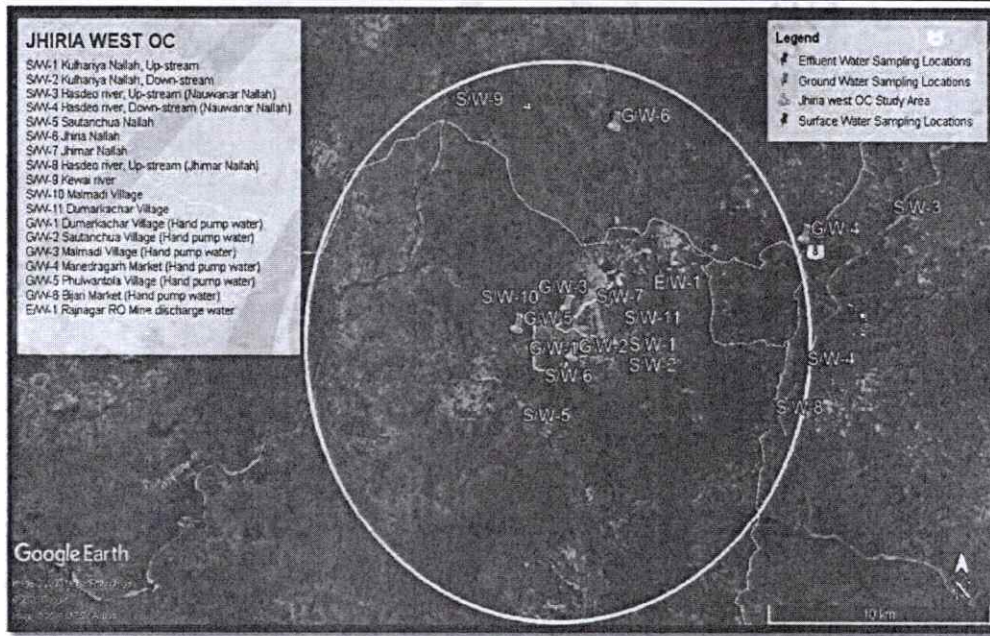


Figure 21.2: Locations of water quality monitoring stations

2.21.5 Noise levels

The noise quality data at different locations (Ref Figure 21.1) is shown in Table 21

Table 21: Noise quality

S	Name of Location	Category	Noise Level in dB(A)			
			Day		Night	
			Min.	Max.	Min.	Max.
N	CPCB Standards of 2000					
	Industrial area	A	75		70	
	Commercial area	B	65		55	
	Residential area	C	55		45	
	Silence zone	D	50		40	
1	Sautanchua Village	A	50.9	53.8	40.5	43.9
2	Manjholi Village*	A	50.9	54.3	38.9	40.5
3	Harri Village	C	52.7	53.2	40.7	42.1
4	Dumarkachar Village	C	50.7	54.2	42.9	44.9
5	Amadand Village	C	53.3	54.2	40.4	44.2
6	Gulutola Village	C	49.7	52.9	38.9	41.5
7	Bhad Village	C	48.9	54.7	38.7	42.7
8	Chukan Village	C	51.7	53.0	40.7	44.2
9	Phejatola Village	C	49.8	53.1	40.8	44.2

2.21.6 Flora and Fauna

The ecology and bio-diversity study mainly consists of identification of different flora and fauna present in the study area and determining their diversity. The

Handwritten signature and stamp:
 क्षेत्रीय विहा प्रबंधक
 Area General Manager
 हस्देव, एस.ई.सी.एफ.
 Hasden Area, S.F.

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bio-diversity index of core zone and buffer zone were separately determined with the help of quadrat sampling of 10m x 10 m by using Simpson's index method. Malga RF, Kora RF, Hadibari RF, part of Nandalal Patera RF forms a part of the study area. The survey was conducted from 04.10.2021 to 06.10.2021. The summary of floral diversity is tabulated in Table 22. The average biodiversity in core zone is 0.32 and buffer zone is 0.39. The detailed list of flora and fauna identified in core zone and buffer zone of the project is in Table 23. During survey, it is observed that endangered, endemic and migratory species are not present in the study area. Also, migratory corridors, flight paths and spawning grounds are not present in the study area.

Table 22: The summary of Bio diversity

Quadrant (Q)	Species (Scientific name) in Core Zone	Number of trees (n)	%Simpsons biodiversity Index
Q1	<i>Butea monosperma</i> (Lam.) Taub.	3	0.37
	<i>Diospyros melanoxylon</i> Roxb.	25	
	<i>Mangifera indica</i> L.	1	
	<i>Shorea robusta</i> Roth	1	
Q2	<i>Gardenia gummifera</i> L.f.	1	0.5
	<i>Shorea robusta</i> Roth	2	
	<i>Terminalia chebula</i> Retz.	1	
Q3	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	1	0.25
	<i>Shorea robusta</i> Roth	3	
Q4	<i>Shorea robusta</i> Roth	5	0
Q5	<i>Diospyros melanoxylon</i> Roxb.	2	0.5
	<i>Shorea robusta</i> Roth	2	
Quadrant (Q)	Species (Scientific name) in Buffer Zone	Number of trees (n)	%Simpsons biodiversity Index
Q1	<i>Butea monosperma</i> (Lam.) Taub.	5	0.5
	<i>Ziziphus jujuba</i> Mill.	7	
	<i>Leucaena leucocephala</i> (Lam.) de Wit	2	
Q2	<i>Sterculia urens</i> Roxb.	1	0.5
	<i>Butea monosperma</i> (Lam.) Taub.	2	
	<i>Lagerstroemia parviflora</i> Roxb.	5	
	<i>Chloroxylon swietenia</i> (Roxb.) DC.	2	
Q3	<i>Shorea robusta</i> Roth	1	0.07
	<i>Diospyros melanoxylon</i> Roxb.	30	
	<i>Gardenia gummifera</i> L.f.	1	
Q4	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	4	0
Q5	<i>Shorea robusta</i> Roth	1	0.5
	<i>Mangifera indica</i> L.	1	
Q6	<i>Shorea robusta</i> Roth	4	0
Q7	<i>Shorea robusta</i> Roth	5	0.17
	<i>Diospyros melanoxylon</i> Roxb.	1	
Q8	<i>Careya arborea</i> Roxb.	1	0.34
	<i>Diospyros melanoxylon</i> Roxb.	1	
	<i>Shorea robusta</i> Roth	4	
Q9	<i>Semecarpus anacardium</i> L.	1	0.67
	<i>Diospyros melanoxylon</i> Roxb.	1	
	<i>Shorea robusta</i> Roth	1	
Q10	<i>Shorea robusta</i> Roth	1	0.67

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05/05
क्षेत्रीय महाप्रबंधक
Area General Manager
रमदेव, एम.ई.सी.एल.
Jhiria Area, SECL

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	<i>Lagerstroemia parviflora</i> Roxb.	1	
	<i>Diospyros melanoxylon</i> Roxb.	1	
Q11	<i>Shorea robusta</i> Roth	3	0.25
	<i>Boswellia serrata</i> Roxb.	1	
Q12	<i>Shorea robusta</i> Roth	3	0.25
	<i>Terminalia chebula</i> Retz.	1	
Q13	<i>Shorea robusta</i> Roth	2	0.8
	<i>Semecarpus anacardium</i> L.	1	
	<i>Diospyros melanoxylon</i> Roxb.	1	
	<i>Butea monosperma</i> (Lam.) Taub.	1	
Q14	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	2	0.6
	<i>Shorea robusta</i> Roth	2	
	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.	1	
Q15	<i>Diospyros melanoxylon</i> Roxb.	1	0.6
	<i>Lagerstroemia parviflora</i> Roxb.	2	
	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	1	
	<i>Butea monosperma</i> (Lam.) Taub.	1	

Table 23: Detailed list of flora and fauna identified

Common name	Local name	Botanical name	Name of class/Family
List of Vegetables in the Core Zone			
Bitter Gourd	Karela	<i>Momordica charantia</i> L.	Cucurbitaceae
Bottle guard	Laukee	<i>Lagenaria siceraria</i> (Molina) Standl	Cucurbitaceae
Brinjal	Baingan	<i>Solanum melongena</i> L.	Solanaceae
Chilly	Lalmirchi	<i>Capsicum annum</i> L.	Solanaceae
Coriander,	Dhanya	<i>Coriandrum sativum</i> L.	Apiaceae
Lemon	Nimbu	<i>Citrus limon</i> (L.) Burm f	Rutaceae
Pumpkin	Kaddoo	<i>Cucurbita maxima</i> Duch ex Lam.	Cucurbitaceae
Ridged guard	Turee	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae
Tomato	Tamatar	<i>Lycopersicon esculentum</i> L.	Solanaceae
List of Vegetables in the Buffer Zone			
Amaranthus	Cauleyi	<i>Amaranthus hybridus</i> L.	Amaranthaceae
Bitter Gourd	Karela	<i>Momordica charantia</i> L.	Cucurbitaceae
Bottle guard	Laukee	<i>Lagenaria siceraria</i> (Molina) Standl	Cucurbitaceae
Brinjal	Baingan	<i>Solanum melongena</i> L.	Solanaceae
Chilly	Lalmirchi	<i>Capsicum annum</i> L.	Solanaceae
Coriander	Dhanya	<i>Coriandrum sativum</i> L.	Apiaceae
Lady finger	Bhindi	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae
Lemon	Nimbu	<i>Citrus limon</i> (L.) Burm f	Rutaceae
Pointed guard	Parwal	<i>Trichosanthes dioica</i> Roxb.	Cucurbitaceae
Potato	Aloo	<i>Solanum tuberosum</i> L.	Solanaceae
Pumpkin	Kaddoo	<i>Cucurbita maxima</i> Duch ex Lam.	Cucurbitaceae
Purple yam	Ratalu	<i>Dioscorea alata</i> L.	Dioscoreaceae
Ridged guard	Turee	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae
Sweet potato	Shakarakand	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae
Tomato	Tamatar	<i>Lycopersicon esculentum</i> L.	Solanaceae
List of Commercial Crops in Core Zone			
Paddy	Chawal	<i>Oryza sativa</i> L.	Poaceae
Maize	Makki	<i>Zea mays</i> L.	Poaceae
List of Commercial Crops in Buffer Zone			
Bengal gram	Toor	<i>Cajanus cajan</i> L.	Leguminosae
Niger seed	Ramtil	<i>Guizotia abyssinica</i> CASS.	Asteraceae
Paddy	Chawal	<i>Oryza sativa</i> L.	Poaceae
Pearl millet	Bhajra	<i>Pennisetum glaucum</i> (L.) R. Brown	Poaceae
Mat bean	Mot	<i>Phaseolus aconitifolius</i> Jacq.	Leguminosae

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Green gram	Moong	<i>Phaseolus mungo</i> L.	Leguminosae
Pea	Matar	<i>Pisum sativum</i> L.	Leguminosae
Maize	Makki	<i>Zea mays</i> L.	Poaceae

Status of Natural Vegetation/Shrub/Climber species in Study Area

Species Name	Abundance		Average		Minimum		IUCN Status
	Core	Buffer	Core	Buffer	Core	Buffer	
<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.		1		1.00		1	-
<i>Boswellia serrata</i> Roxb.		1		1.00		1	-
<i>Butea monosperma</i> (Lam.) Taub.	3	9	3	2.25	3	1	LC
<i>Careya arborea</i> Roxb.		1		1.00		1	-
<i>Chloroxylon swietenia</i> (Roxb.) DC.		2		2.00		2	VU
<i>Diospyros melanoxylon</i> Roxb.	27	36	13.5	5.14	2	1	-
<i>Gardenia gummifera</i> L.f.	1	1	1	1.00	1	1	LC
<i>Hymenodictyon orixense</i> (Roxb.) Mabb.		1		1.00		1	-
<i>Lagerstroemia parviflora</i> Roxb.		8		2.67		1	-
<i>Leucaena leucocephala</i> (Lam.) de Wit		2		2.00		2	-
<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	1	6	1	3.00	1	2	-
<i>Mangifera indica</i> L.	1	1	1	1.00	1	1	DD
<i>Semecarpus anacardium</i> L.		2		1.00		1	-
<i>Shorea robusta</i> Roth	13	27	2.6	2.45	1	1	LC
<i>Sterculia urens</i> Roxb.		1		1.00		1	-
<i>Terminalia chabula</i> Retz.	1	1	1	1.00	1	1	LC
<i>Ziziphus jujuba</i> Mill.		7		7.00		7	LC

List of Plants in Core Zone

Scientific name	Common name	Habitant	Family average	Abundance	Avg.	Min.	IUCN
Shrubs/Climbers							
<i>Gloriosa superba</i> L.		Wild	2	2	2	2	-
<i>Lantana camera</i> L.	Wild sage	Invasive	5	5	5	5	-
<i>Rivea omata</i> (Roxb.) Choisy.		Wild	28.5	2	2	2	-
<i>Senna occidentalis</i> (L.) Link.		Wild	12	4	4	4	-
Herbs/Grasses							
<i>Aristida setacea</i> Retz.	Broom grass	Wild	17.71	13	13	13	-
<i>Bothriochloa pertusa</i> (L.) A. Camus		Wild	17.71	14	14	14	-
<i>Cyperus squarrosus</i> L.		Wild	7.00	7	7	7	-
<i>Elephantopus scaber</i> L.	Bull's tongue	Wild	22.50	40	20	20	-
<i>Emilia sonchifolia</i> (L.) DC.		Wild	22.50	5	2.5	1	-
<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.		Wild	17.71	27	13.5	7	-
<i>Eragrostis viscosa</i> (Retz.) Trin.		Wild	17.71	12	6	4	-
<i>Evolvulus nummularius</i> (L.) L.		Wild	28.50	55	18.3	7	-
<i>Grona triflora</i> (L.) H. Ohashi & K. Ohashi		Wild	12.00	25	25	25	-
<i>Hedyotis pinifolia</i> Wall. ex G. Don		Wild	12.67	7	3.5	2	-
<i>Lindernia antipoda</i> (L.) Alston.		Wild	34.00	34	17	9	-
<i>Mitracarpus hirtus</i> (L.) DC.		Wild	12.67	25	25	25	-
<i>Oldenlandia herbacea</i> (L.) Roxb.		Wild	12.67	6	6	6	-
<i>Oplismenus compositus</i> (L.) P. Beauv.		Wild	17.71	56	28	22	-
<i>Paspalidium flavidum</i> (Retz.) A. Camus		Wild	17.71	0	0	0	-
<i>Phyllanthus virgatus</i> G. Forst.		Wild	6.00	6	6	6	-
<i>Senna tora</i> (L.) Roxb.	panwar	Invasive	12.00	7	7	7	-
<i>Sporobolus diandrus</i> (Retz.)	Smut grass	Wild	17.71	2	2	2	-


 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हस्करेव, एस.ई.सी.एल.
 Hazarwan Area, S.E.C.I.

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Scientific name	Common name	Habitant	Family average	Abundance	Avg.	Min.	IUCN
P.Beauv.							

List of Plants in Buffer Zone

Scientific name	Common name	Habitant	Family Avg	Abundance	Avg.	Min	IUCN
Shrub / Climber							
<i>Annona squamosa</i> L.	Custard apple	Wild	11.0	11	5.5	4	LC
<i>Dioscorea alata</i> L.		Cultivated	4.0	4	4	4	-
<i>Hemidesmus indicus</i> (L.) R. Br.		Wild climber	7.0	7	3.5	2	-
<i>Lantana camera</i> L.	Wild sage	Invasive	131.0	131	11.9	3	-
<i>Senna occidentalis</i> (L.) Link.		Wild	12.3	8	4	2	LC
<i>Sida mysorensis</i> Wight & Arn.		Wild	31.4	4	4	4	-
<i>Stephania japonica</i> (Thunb.) Miers		Wild	1.0	1	1	1	-
<i>Xanthium strumarium</i> L.		Weed	48.8	38	7.6	2	-
Herbs							
<i>Acanthospermum hispidum</i> D.C.		Weed	48.8	22	11	10	-
<i>Achyranthes aspera</i> L.		Weed	27.0	7	7	7	-
<i>Ageratum conyzoides</i> L.		Weed	48.8	74	24.67	8	-
<i>Alternanthera ficoidea</i> (L.) P. Beauv.		Invasive	27.0	47	15.67	12	-
<i>Anisomeles heyneana</i> Benth.		Wild	89.7	10	10	10	-
<i>Aristida setacea</i> Retz.	Broom grass	Wild	44.5	73	9.13	2	-
<i>Biophytum sensitivum</i> DC.		Wild	2.0	2	2	2	-
<i>Bothriochloa pertusa</i> (L.) A. Camus		Wild	44.5	4	4	4	-
<i>Cleome viscosa</i> L.		Weed	4.0	4	4	4	-
<i>Dicliptera paniculata</i> (Forssk.) I. Darbysh.		Wild	5.0	5	5	5	-
<i>Digitaria bicornis</i> (Lam.) Roem. & Schult.		Wild	44.5	14	7	7	-
<i>Elephantopus scaber</i> L.	Bull's tongue	Wild	48.8	61	10.17	2	-
<i>Eleusine indica</i> (L.) Gaertn.		Invaded	44.5	40	40	40	LC
<i>Eragrostiella bifaria</i> (Vahl) Bor		Wild	44.5	30	15	5	-
<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.		Wild	44.5	62	12.4	6	LC
<i>Eragrostis viscosa</i> (Retz.) Trin.	sticky love grass	Wild	44.5	4	4	4	-
<i>Euphorbia hirta</i> L.		Wild	20.0	20	20	20	-
<i>Grona triflora</i> (L.) H. Ohashi & K. Ohashi		Invaded	12.3	4	4	4	-
<i>Hedyotis pinifolia</i> Wall. ex G. Don		Wild	75.5	12	12	12	-
<i>Lindernia antipoda.</i> (L.) Alston.		Wild	28.0	28	28	28	LC
<i>Mesosphaerum suaveolens</i> (L.) Kuntze		Weed	89.7	253	36.14	4	-
<i>Mitracarpus hirtus</i> (L.) DC.		Wild	75.5	139	23.17	10	-
<i>Murdannia nudiflora</i> (L.) Brenan.		Wild	8.0	8	4	4	-
<i>Oplismenus compositus</i> (L.) P. Beauv.		Wild	44.5	127	63.5	27	-
<i>Phyllanthus virgatus</i> G. Forst.		Wild	12.0	12	6	2	-
<i>Plectranthus mollis</i> (Aiton) Spreng.		Wild	89.7	6	6	6	-
<i>Senna tora</i> (L.) Roxb.	Panwar	Invasive	12.3	25	8.33	7	-
<i>Sida acuta</i> L.	Wire	Wild	31.4	114	28.50	4	-

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क्षेत्रीय महाप्रबंधक
Area General Manager
हस्तेक, एस.ई.सी.एन.
Hastek, S.E.C.N.

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Scientific name	Common name	Habitant	Family Avg	Abundance	Avg.	Min	IUCN
	weed						
<i>Sida rhombifolia</i> L.		Wild	31.4	15	15	15	-
<i>Sporobolus diandrus</i> (Retz.) P.Beauv.	Smut grass	Wild	44.5	109	18.17	4	-
<i>Triumfetta pentandra</i> A.Rich.		Wild	31.4	18	6	4	-
<i>Urena lobata</i> L.	Caesar's weed	Wild	31.4	6	3	2	LC
<i>Urochloa ramosa</i> (L.) T.Q.Nguyen		Wild	44.5	0	0	0	LC
Grasses							
<i>Cynodon dactylon</i> (L.) Pers.		Wild	44.5	115	38.33	10	-
<i>Cyperus compressus</i> L.		Wild	44.5	4	4	4	LC
<i>Scleria lithosperma</i> (L.) Sw.		Wild	44.5	4	4	4	LC
<i>Setaria pumila</i> (Poir.) Roem. & Schult.		Wild	44.5	25	18.5	12	-

List of Aquatic flora in the Study Area

Common name	Local name	Botanical name	Class/Family	IUCN Status
Blue Lotus	Neelkamal	<i>Nymphaea nouchali</i> Burm f	<i>Nymphaeaceae</i>	LC
Dense flower Knotweed	Bihagni	<i>Persicaria glabra</i> (Willd.) M.Gómez		LC
Lesser Bulrush	Patera	<i>Typha angustifolia</i> L.	<i>Typhaceae</i>	LC
Pangorai	Nagar motha	<i>Cyperus corymbosus</i> Rottb.	<i>Cyperaceae</i>	LC
Pickereel Weed	Panpatta	<i>Monochoria vaginalis</i> (Burm.f.) C.Presl	<i>Pontederaceae</i>	LC
Sacred lotus	Kamal	<i>Nelumbo nucifera</i> Gaertn.	<i>Nelumbonaceae</i>	-
Turkey Tangle Frogfruit	bukkan	<i>Phyla nodiflora</i> (L.) Grene	<i>Verbenaceae</i>	LC
Water Morning Glory	Nali	<i>Ipomoea aquatica</i> Forssk.	<i>Convolvulaceae</i>	LC
Water Shamrock	Caupatiya	<i>Marsilea quadrifolia</i> L.	<i>Marsiliaceae</i>	LC
Water Snowflake	Kumudini	<i>Nymphoides indica</i> (L.) Kuntze.	<i>Menyanthaceae</i>	LC
Wild Taro	Arvi, Kachalu	<i>Colocasia esculenta</i> (L.) Schott	<i>Araceae</i>	LC

List of Terrestrial Fauna in the Core Zone

Sl. No.	Name			WPA, 1972 Status	ICUN Status
	Common	Local	Scientific		
Mammal					
1	Spotted Deer	Chital	<i>Axis axis</i>	III	LC
2	Bandicoot Rat	Chuha	<i>Bandicota bengalensis</i>	IV/V	LC
3	Jackal	Geedhad	<i>Canis aureus</i>	II	LC
4	Sambar	Hiran	<i>Cervus unicolor</i>	III	VU
5	3 Strip Palm squirrel	Gilahari	<i>Funambulus pennanti</i>	IV	LC
6	Common Mongoose	Nevlaa	<i>Herpestes edwardsi</i>	II	LC
7	Hyaena	Lakadbagga	<i>Hyaena hyaena</i>	III	NT
8	Indian Field Mouse	Chuha	<i>Mus booduga</i>	V	LC
9	Rhesus Macaque	Bandar	<i>Presbytis entellus</i>	-	-
10	Common House Rat	Chuha	<i>Rattus rattus</i>	IV/V	LC
11	Indian Fox	Lomri	<i>Vulpes bengalensis</i>	II	LC
Birds					
1	Common Myna	Myna	<i>Acridotheres tristis</i>	IV	LC
2	Small blue kingfisher	Ramchiraya	<i>Alcedoathis</i>	IV	LC
3	House Swift		<i>Apus affinis</i>		LC
4	Indian pond heron	Andhabagula	<i>Ardeola grayii</i>	IV	LC
5	Cattle egret	Bagula	<i>Bubulcus ibis</i>	IV	LC
6	Crow pheasant	Couckoo	<i>Cantropus sinensis</i>	IV	LC
7	Indian roller		<i>Coracias benghalensis</i>		LC

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Sl. No.	Name			WPA, 1972 Status	ICUN Status
	Common	Local	Scientific		
8	House Crow	Kauva	<i>Corvus splendens</i>	V	LC
9	Little egret	KilchiaBagla	<i>Egretta garzetta</i>	IV	LC
10	Koel	Koyal	<i>Eudynamys scolopacea</i>	IV	LC
11	Rose ringed parakeet	Tota	<i>Psittacula kramera</i>	IV	LC
Reptile					
1	Smooth water snake	Sanmp	<i>Enhydryis enhydryis</i>	-	LC
2	House lizard	Chipkali	<i>Hemidactylus sp.</i>	-	LC
3	Cobra	Cobra	<i>NajaNaja</i>	II	-
4	Rat snake	Sanmp	<i>Ptyas mucosus</i>	II	-
5	Olive keel back snake		<i>Natrix piscator</i>		
Amphibian					
1	Common toad	Medhak	<i>Bufo melanostictus</i>	-	LC
2	Common frog	Medhak	<i>Euphlyctis hexadactyla</i>	-	-
3	Indian bull frog	Medhak	<i>Rana tigrine</i>	-	-
Insects					
1	Dragon flies	Vyaadh-Patang	<i>Anisoptera</i>	-	-
2	Grasshopper	Tidda	<i>Bacillus rossi</i>	-	-
Butterflies					
1	Common Emigrant	Tidli	<i>Catopsiliapomona (Fabricius)</i>	-	-
2	Blue Tiger	Tidli	<i>Tirumala limniaceleopardus (Butler)</i>	-	-
3	Striped tiger		<i>Danaus genutia</i>		

List of Terrestrial Fauna in the Buffer Zone

Sl. No.	Name			WPA, 1972 Status	ICUN Status
	Common	Local	Scientific		
Mammal					
1	Spotted Deer	Chital	<i>Axis axis</i>	III	LC
2	Bandicoot Rat	Chuha	<i>Bandicota bengalensis</i>	IV/V	LC
3	Jackal	Geedhad	<i>Canis aureus</i>	II	LC
4	Sambar	Hiran	<i>Cervus unicolor</i>	III	VU
5	Jungle Cat	Jangli Billi	<i>Felis chaus</i>	II	LC
6	3 Strip Palm squirrel	Gilahari	<i>Funambulus pennanti</i>	IV	LC
7	Common Mongoose	Nevlaa	<i>Herpestes edwardsi</i>	II	LC
8	Hyaena	Lakadbagga	<i>Hyaena hyaena</i>	III	NT
9	Indian Hare	Khargosh	<i>Lepus nigricollis</i>	IV	LC
10	Indian Field Mouse	Chuha	<i>Mus booduga</i>	IV/V	LC
11	Rhesus Macaque	Bandar	<i>Presbytis entellus</i>	-	-
12	Common House Rat	Chuha	<i>Rattus rattus</i>	IV/V	LC
13	Wild Pig		<i>Sus scrofa</i>		
14	Indian Fox	Lomri	<i>Vulpes bengalensis</i>	II	LC
Birds					
1	Common Myna	Myna	<i>Acridotheres tristis</i>	IV	LC
2	Small blue kingfisher	Ramchiraya	<i>Alcedo atthis</i>	IV	LC
3	House Swift	Babeela	<i>Apus affinis</i>	-	LC
4	Indian pond heron	Andhabagula	<i>Ardeola grayii</i>	IV	LC
5	Cattle egret	Bagula	<i>Bubulcus ibis</i>	IV	LC
6	Indian roller		<i>Coracias benghalensis</i>	-	LC
7	House Crow	Kauva	<i>Corvus splendens</i>	V	LC
8	Crow pheasant	Couckoo	<i>Centropus sinensis</i>	IV	LC
9	Little egret	KilchiaBagla	<i>Egretta garzetta</i>	IV	LC
10	Koel	Koyal	<i>Eudynamys scolopacea</i>	IV	LC
11	Painted partirideg	Kala teetar	<i>Francolinus pictus</i>	IV	LC
12	Bastar Hill Myna	Kali Myna	<i>Gracula religiosa</i>	IV	LC

07/05/2022
 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हसनपुर, एम.ई.सी.एल.
 Hasdeo Area, S.E.C.

Mining Plan for Jhiria West OCP (1.5 Mty)

Sl. No.	Name			WPA, 1972 Status	ICUN Status
	Common	Local	Scientific		
13	Black-rumped flameback		<i>Dinopium benghalensis</i>		LC
14	Baya weaver		<i>Ploceus philippinus</i>		
15	Asian Green Bee-eater		<i>Merops orientalis</i>		
16	House sparrow	Gauriyya	<i>Passer domesticus</i>	-	LC
17	Woodpecker	Sutar	<i>Picidae</i>	IV	-
18	Rose ringed parakeet	Tota	<i>Psittacula kramera</i>	IV	LC
19	Red-vented bulbul	Bulbul	<i>Pycnonotus cafer</i>	IV	LC
20	Spotted Dove	Kabutar	<i>Streptopelia chinensis</i>	IV	-
21	Asian pied starling	Maina	<i>Sturnus contra</i>	IV	-
22	Common Babbler	Gaigai	<i>Turdoides caudatus</i>	IV	LC
23	Common Hoopoe		<i>Upupa epops</i>	-	LC
24	Red-wattled lapwing	Titeeri	<i>Vanellus indicus</i>	-	LC
Reptile					
1	Krait	Sanmp	<i>Bungarus caeruleus</i>	-	-
2	Smooth water snake	Sanmp	<i>Enhydria enhydria</i>	-	LC
3	Garden Lizard		<i>Calotes versicolor</i>	-	-
4	House lizard	Chipkali	<i>Hemidactylus sp.</i>	-	LC
5	Cobra	Cobra	<i>Naja Naja</i>	II	-
6	Common water snake	Sanmp	<i>Natrix piscator</i>	-	-
7	Rat snake	Sanmp	<i>Ptyas mucosus</i>	II	-
8	Russel's viper	Sanmp	<i>Vipera russeli</i>	II	-
Amphibian					
1	Common toad	Medhak	<i>Bufo melanostictus</i>	-	LC
2	Common frog	Medhak	<i>Euphylyctis hexadactyla</i>	-	-
3	Green pond frog	Medhak	<i>Rana hexadactyla</i>	-	-
4	Common green frog	Medhak	<i>Ramnella variegata</i>	-	-
5	-	Medhak	<i>Rana cyanophlyctis</i>	-	LC
6	Indian bull frog	Medhak	<i>Rana tigrina</i>	-	-
Insects					
1	Dragon flies	Vyaadh-Patang	<i>Anisoptera</i>	-	-
2	Grasshopper	Tidda	<i>Bacillus rossi</i>	-	-
Butterflies					
1	Common hedge blue	Tidi	<i>Acytrolepis puspa</i>	-	-
2	Ciliate blue	Tidi	<i>Anthene emolus</i>	-	-
3	Forget-me-not	Tidi	<i>Catochrysops strabo fem</i>	-	-
4	Mottled emigrant	Tidi	<i>Catopsilia pyranthe</i>	-	-
5	Common emigrant	Tidi	<i>Catopsilia pomona (Fabricius)</i>	-	-
6	Cycad blue	Tidi	<i>Chilades pandava</i>	-	-
7	Common grass yellow	Tidi	<i>Eurema hecabe</i>	-	-
8	The common cerulean	Tidi	<i>Jamides celeno</i>	-	-
9	Blue tiger	Tidi	<i>Tirumala limniaceleopardus (Butler)</i>	-	-

List of Aquatic Fauna found in the Study Area

Sl. No.	Name			ICUN Status
	Common	Local	Scientific	
1	Murrai	Catla	<i>Catla catla (Ham)</i>	-
2	Maggri	Spotted murrel	<i>Channa punctatus</i>	LC
3	Murgol	Murgol	<i>Cirrhinus mrigala</i>	LC
4	Boyi	Magur	<i>Clarias batrachus (Lin)</i>	LC
6		Common carp	<i>Cyprinus carpio</i>	VU
7	Ronu	Rohu	<i>Labeo rohita</i>	LC
3	Carp	Carp	<i>Labeo gonious</i>	-

(Source: Field survey, discussion with locals and Forest dept. officials)


 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हसनवेत, एस.ई.सी.एन.
 Hasdeo Aron SFC

2.21.7 Environment Impact

2.21.7.1 Air Quality:

The extent of pollution created by mining operation mainly depends upon, the type of minerals to be exploited. As such, the extent of pollution possible from handling and transportation of coal and that due to other activities associated with the processes of open cast mining has only been taken into consideration. The impact on air quality has been considered due to the dust and smoke. The sources of dust are envisaged as,

- i) Operation of blast hole drills: The operation of heavy drills engaged in making holes for blasting generates some quantity of dust.
- ii) Blasting: The number of particles below 5-micron size that is injurious to health is very low in dust generated by blasting.
- iii) Deployment of heavy equipment: Major sources of dust in opencast mine operation have been identified to be from haul roads, due to spillage from dumpers and tippers and abrasion by their wheels.
- iv) Coal transportation: Coal from the face is proposed to be hauled up to pit head CHP located near access trench by dumpers. This will generate some quantity of dust at the site of CHP.
- v) Wind: Wind plays a very important role in the formation of dust from dry dusty surface and carries it over some distances down wind. The detailed impact assessment on air quality has been shown in Table 24.

Table 24: Detailed impact assessment on air quality

S.No.	Parameters	Sources	Impacts
A.	Operational		
1.00	Meteorological Condition	Mines and combustion of coal	Dusts, Fires and smokes.
2.00	Ambient air quality		
2.01		Drilling and blasting	SPM, PM10, and PM 2.5
2.02		Coal Handling	SPM, PM10, and PM 2.5
2.03		OB generation	SPM, PM10, and PM 2.5
2.04		OB handling	SPM and exhaust fumes from dumpers
2.05		Dump (internal and external)	SPM, PM10, and PM 2.5 till development of green coverings.
2.06		Haul Road	SPM and PM10, PM 2.5
2.07		Transportation and Movement of vehicle	SPM, PM10, PM2.5, NOx and SO2
B.	Post-operational		
1.00	Meteorological condition	---	---
2.00	Ambient air quality	Reclamation of dump area	
2.01		Salvaging and shifting operation of mining equipment	SPM, PM10, and PM 2.5

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क्षेत्रीय महाप्रबंधक
Area General Manager
हल्द्वी, एस.ई.ए.
Western Area

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S.No.	Parameters	Sources	Impacts
2.02		Clearing of coal and other materials besides restoration of infrastructure area to the extent possible	SPM, NOx and SO2

2.21.7.2 Water Quality

The water will be consumed in various activities associated with Project and pollution thereof have been broadly identified as:

- i) Water pollution from vehicle washing & workshop.
- ii) Water pollution from dust suppression on haul road spraying.
- iii) Water pollution after domestic use.
- iv) Water pollution from mine water.

The impact assessment on water is shown in Table 25.

Table 25: The impact assessment on water

Sl. No.	Parameters	Impacts Assessment
1.00		Hydro-Geological-Ground water
1.01	Topography and Drainage	Topography and drainage by developing micro basins
1.02	Aquifer geometry	Changes in aquifer geometry, water level in the vicinity of the mine and disturb ground water flow direction. This can also create secondary fractures and higher permeability zones within the aquifer.
1.03	Water levels	After the mining activity, the aquifer restores its original water level and mined out area acts as a good reservoir. The project is an opencast mine, the impact of mining activity on unconfined aquifer will be to a maximum of 56m. (approx.)
2.00		Water Quality- Physico-Chemical and Bacteriological ones
2.01	Ground Water Quality	Leaching of different salts from OB dump and coal stock will contaminate ground water.
2.02	Surface Water Quality	Oil & grease from workshop, TDS, TSS from ETP will degrade surface water quality.

2.21.7.3 Ground Water Resource

The Ground water resource potential and likely impact would be assessed during preparation of E.M.P for this mine by considering aquifer parameters. Probable Impact of Mining on Local Water Regime will also be studied during EMP preparation.

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 क्षेत्रीय महाप्रबंधक
 Area General Manager
 हसनखेत, एस.ई.सी.एल.
 Hasdeo Area, S.E.

2.21.7.4 Noise Impact

The noise impact will involve the following area considering the sound level greater than 90 dB in continued exposure.

- i. The operators of stripping & coal winning equipment.
- ii. Fixed plant equipment with high noise level.
- iii. Exhaust system internal combustion engine.
- iv. Machinery of aerodynamic origin.
- v. Worn out parts of moving machinery.

The nearby villagers will also have some exposure of high noise level.

Impulsive sources of noise are movement and operation of HEMM like dumpers, trippers, shovels etc. and operation of workshop equipment like compressor, drill etc. and blasting. Suitable mitigatory measures are to be taken for the impulsive impact of noise at the equipment emitting the higher noise levels at working place so that it is kept below the level as prescribed by Directorate General of Mine Safety (DGMS).

2.21.7.5 Flora and Fauna

Impact assessment on flora & fauna has been shown below in Table 26

Table 26: Impact on flora and fauna

S. No	Parameters	Impact Assessment
1.00	Negative	
1.01	Vegetation Cover	Except the area such as used for quarry excavation, erection & development of plants, service & allied structures, colony, roads, diversions, culverts, etc, no other area is going to be affected directly or indirectly by mining activities. Hence, impact on flora and fauna will not be of appreciable level.
1.02	Forests degradation	Forests land is going to be affected by mining activity. afforested area will be generated by way of reclamation of dump areas, plantation in other available areas etc. By coal & OB transportation air pollution may affect photosynthesis and transpiration in plants by plugging their leaves pores. SO ₂ causes Necrosis disease in plants. Hence, major impact on flora and fauna.
1.03	Ecological change	Being an opencast project, there is minor change expected in ecological parameters on which survival of flora and fauna depends directly or indirectly, and hence, expected impact on flora and fauna are not going to an appreciable level.
1.04	Hydro- geological aspects	Owing to opencast project, water level and draw down are likely to be affected to a nominal value, ground water and

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		surface water on which the flora and fauna of the area directly or indirectly depend upon are not going to be affected to an appreciable level. After mine closure, the Mine void will act a stable water source for the flora & fauna.
2.00		Positive
2.01	Plantation work and forest & wild life conservation	Plantation work and forest & wild life conservation in a scientific way by project authorities in mine area will increase aestheticism of the area.

2.21.7.6 Land Use

Impact assessment on land use has been shown in Table 27.

Table 27: Impact on land use

SI No.	Parameters	Impact Assessment	
		Within mining area	Outside mining area
1	Topography	In the quarry area, the dump area and the mining equipment area, there will be a marked change in topography.	No appreciable damage is envisaged.
2	Damage to vegetation	Visual impact-loss of aesthetic beauty, ugly scar on land; deforestation-loss of surface soil and vegetation cover.	Visual impact-loss of aesthetic beauty, ugly scar on land; deforestation-loss of surface soil and vegetation cover.
3	Change in Landscape and Land use pattern	Total scenario of landscape and land use pattern will undergo a stark change. This involves depletion of top soil.	Landscape and land use pattern will change where erection and development of plants, service /allied services buildings are established.
4	Change in Surface Drainage	There will be a stark change in surface drainage; rather a new pattern drainage will be developed.	Surface drainage is likely to change where construction of colony, roads and drains is to be executed.

2.21.8 Environment Management

2.21.8.1 Air Quality Management

Following air pollution control measures will be practiced within the mining area, at coal handling plant and at railway siding.

1. Surface minor may be used to assure better air quality.
2. Water spraying will be done regularly on approach roads within the mining area to minimize the dust generation.
3. Water sprinkling arrangement will be provided at the transfer point of coal.
4. Intensive plantation of adequate width all along the coal transportation road and other road will be raised to minimize transport-generated pollutants.

06/05/2011

क्षेत्रीय महाप्रबंधक
Area General Manager
जयपुर, एस.ई.सी.एल.
Harden Area S.E.C.I.

Mining Plan for Jhiria West OCP (1.5 Mty)

5. Coal transportation to railway siding will be done in covered trucks or through belt conveyor.
6. Fogging Machine/Sweeping Machine/Misting Spray Sprinkler will be used when and where found required.
7. Regular monitoring of ambient air quality of project area through Continuous Ambient Air Quality Monitoring Station (CAAQMS).
8. Regular cleaning of coal transport network to remove the spilled-up coal.
9. Green belt along transportation road and around the railway siding will be developed to curtail dust pollution (Figure 21.3).

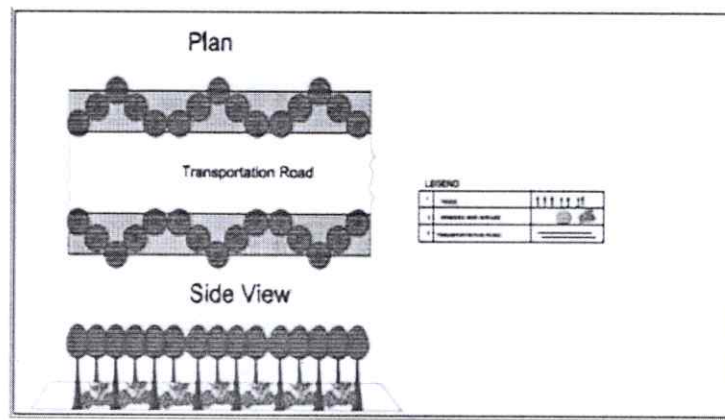


Figure 21.3: Green belt plan

2.21.8.2 Water Quality

(a) Management of surface water drainage:

Garland drains are made around the periphery of the mine and OB dumps. These drains are connected to the natural nalla(s) which will not be disturbed by mining operation. In the face workings, pumps are deployed which deliver water into settling tanks at the surface. Thereafter the accumulated water is discharged into these garland drains.

(b) Mine Water Discharge:

The mine water discharge needs treatment before discharge to the surface water drainage. The collected water at the floor of mine will be pumped to the settling tank where suspended solids will get settled. The clear water after sedimentation will be re-used for water sprinkling, plantation, mining operations, etc.

(c) Domestic Effluent Treatment:

Domestic effluent will be treated in Sewage Treatment Plant for the Colony and

conventional Soak-Pit system for Service Buildings.

(d) Oil & Grease Trap:

Oil and grease trap are being provided in the workshop to check the oil and grease generated in the workshop during maintenance of the Continuous Miner and other machinery.

(e) Water Conservation:

The recycled water will be used for dust suppression, vehicle washing purposes and horticulture.

(f) Water Quality Monitoring:

For compliance of the statutory provision of MOEF&CC and Pollution Control Board, water quality will be monitored and evaluated as per the prevailing norms. The corrective measures will be taken on the basis of monitoring results.

2.21.8.3 Noise Management

Suitable measures will be adopted to maintain the noise level within permissible limits at working zone. The following measures will be adopted,

1. Planting of rows of trees with thick foliage along roads and other noise generating centers to act as acoustic barriers.
2. Isolating/enclosing the noisy machines/sources by using resilient mounting/altering structures.
3. Routine maintenance schedules for machineries & equipment to eliminate noise as far as possible.
4. Balanced and properly aligned conditioning of machines to reduce vibration.
5. Provision of ear muffs/ear plugs to workers subjected to noise level above recommended limits.
6. Regular monitoring of noise level of project area.

2.21.8.4 Flora and Fauna Management

Massive plantation work in a scientific way by project authorities may attract birds and other fauna in future. As the area is thinly populated (consequent to the opencast mining operation) deterioration in quality of life or loss of amenity is not envisaged. Conservation plans of schedule I & II animals, if any, will be prepared and implemented.

2.21.8.5 Land Resource Management

Present land use would be converted into external dump, internal dump, green belt, built up area, surface infrastructure, final void/water body & other surface water body etc. after the cessation of mining operation

Present Land Use: The type of lease area is shown in table 28.

Table 28: Present land use of the project

S. No	Land Use	Within ML area (Ha.)	Outside ML Area (Ha.)	Total
1	Agricultural Land	59.720	0.00	59.720
2	Forest Land	354.258	0.00	354.258
3	Waste land*	0.866	0.00	0.866
4	Grazing land	0.000	0.00	0.000
5	Water body*	1.665	0.00	1.665
6	Other specific (Govt. land)	14.014	0.00	14.015
	Total	427.993	0.00	427.993

*Included in Govt. land

During mining and Post mining land use is Tabulated table 29, table 30.

Table29: During Mining land use of the project

S. No	During Mining Land Use	Total Land (Ha)
1	Quarry Area	323.770
2	Mining safety zone	92.175
3	Infrastructure	4.778
4	Road	7.270
	Total	427.993

Table30: Post Mining land use of the project

S. No	Land use	Afforested area	Final Void (Water Body)	Built-up area	Total
1	Excavated Area	259.706 (Internal OB Dump)	64.064	0.000	323.770
2	External OB Dump	0.000	0.000	0.000	0.000
3	Safety Zone as Green belt	92.175	0.000	0.000	92.175
4	Infra and Others	9.298	0.000	2.750	12.048
	Total	361.179	64.064	2.750	427.993

2.21.9 Environment Management System

Monitoring Schedule

Environmental monitoring will be carried out following the monitoring schedule for Air, Water, and Noise levels as per Standards of MOEF (Vide GSR 742 (E) dated 25.9.2000).

Plantation Monitoring

The Project Authorities at field level will continue to monitor continuously, the growth and survival/mortality rates of the plantations till the end of 3 years. Once trees attain desired growth, no further monitoring is required.

2.21.10 Organizational Structure

For implementing the environment management plan (EMP) of the project, the organizational structure as shown in Figure 21.4 has been proposed.

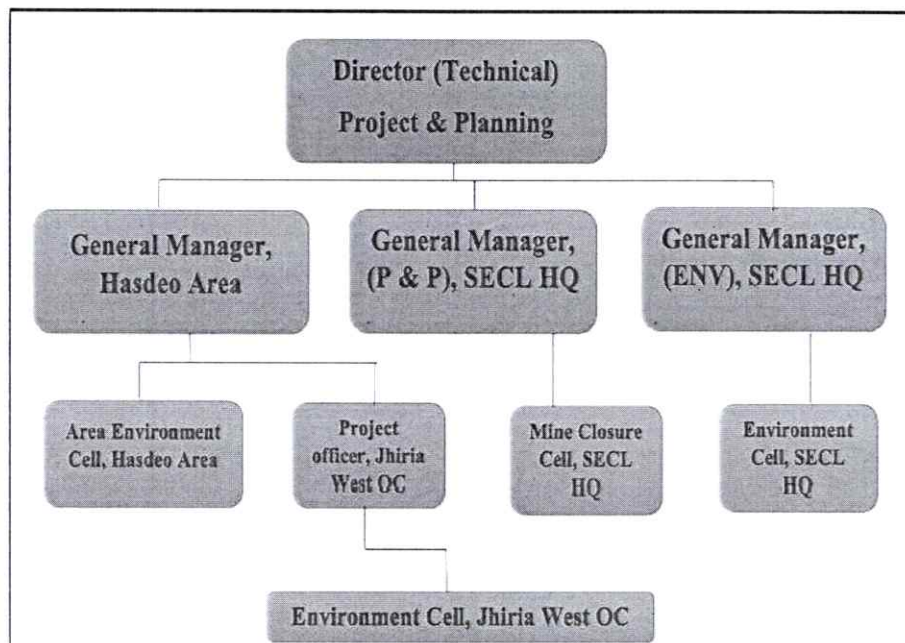


Figure 21.4: Organizational structure

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क्षेत्रीय महाप्रबंधक
Area General Manager
हसदेव, एस.ई.सी.एल.
Hasdeo Area

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2.21.11 Capital Provision

Statement showing the estimated capital requirement for environmental protection measures is as shown in Table 31.

Table 31: estimated capital requirement for environmental protection

S.N.	PARTICULARS	AMOUNT
1	COST OF REHABILITATION	
i)	Total No. of Displaced Family likely to be rehabilitated	220
A.	CAPITAL ESTIMATE	Amt. Rs. in Lakhs
	Total Cost of R&R	
a)	Total cost of R&R as per second schedule of RFCTLARR Act 2013	3616.81
b)	Total cost for provision of infrastructure as per third schedule of RFCTLARR Act 2013	888.48
c)	Land for R&R site etc (5.825 Ha).	227.48
	Sub-total of (1)	4732.77
Note: 1. Total number of displaced family is as supplied by area authority. 2. Total cost of R&R as per RFCTLARR Act 2013 as supplied by SECL		
2	CAPITAL FOR RESTORATION	
a	Piezometers for measuring water level (6 Nos)	40.00
b	Green belt fencing 15m width along safety zone of the Project (approx.11.0 km)	22.00
	Sub-Total (2)	62.00
3	CAPITAL FOR ANTI-POLLUTION MEASURE IN MINE & INDUSTRIAL AREA	
a	Settling tank for mine water disposal(Appendix-A.8.3.(A)	47.20
b	Chain Link Fencing double row around the Project (approx.2x11.0 km) (Appendix-A.8.1)	220.00
c	Oil and grease trap (Appendix-A.2.1)	5.90
d	Other development measures in industrial site viz. drains,tree guards etc. (Appendix-A.8.2.1)	87.89
e	Garland drains (Appendix-A.8.1)	110.00
f	Arboriculture/plantation in industrial area (Appendix-A.8.1.)	2.50
g	Misc. and Contingency	200.00
h	Dust suppression arrangement at CHP (Appendix-A.3.5, A.3.6)	60.00
i	Dust suppression at Railway siding (Appendix-A.5)	20.00
j	Water Treatment Plant for mines(LS) (Appendix-A.8.1)	200.00
k	Real Time Slope Monitoring System (AppA81)	700.00
	Sub-Total (3)	1653.49
4	ENVIRONMENTAL CONTROL MEASURES IN TOWNSHIP	
a	Aboriculture/plantation (Appendix-A.8.1)	2.50
b	Rain Water Harvesting (Appendix-A.2.2)	10.62
c	Water Treatment Plant for colony (Appendix-A.8.3)	17.16
d	Sewerage Treatment Plant (Appendix-A.8.3(A)	472.00
e	Other development measures in township to improve cleanliness & aesthetics parks-play- grounds & tree guards (App-A.8.2)	5.90
	Sub Total (4)	508.18

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5.	Stone pitching of Embankment on nallah side (App.-A.8.1)	50.00
6.	Cost of EMP preparation(Appendix-A.8.4)	50.00
7.	Community development in surrounding villages (Appendix-A.8.1)	20.00
Total capital from 1 to 7		7076.44
B. Different type of Revenue nature cost to be considered in cost of production per tonne of Coal: -		
1.	Land reclamation/restoration@1.25 lakhs/Ha for technical and biological reclamation (lakhs/annum)	50.280
2.	Environment Audit Rs @ 1.5 lakhs/annum	1.500
3.	Environment monitoring Rs @250 lakhs/annum	250.000
4.	Monitoring of landuse through satellite surveillance lakhs/annum	8.000
5.	Mine Closure cost lakhs/annum	420.154
6.	Monitoring of CSR and RR plan lakhs/annum	2.000
7.	CTE	6.250
Total Revenue nature cost per annum		738.184

2.21.12 Commitment from the project proponent

All the relevant conditions stipulated in Environment clearance will comply by project proponent i.e SECL.

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क्षेत्रीय महाप्रबंधक
Area General Manager
हमदेव, एस.ई.सी.एल.
Hasdeo Area. S.E.C.I