**维西县洛爪河水电站水土保持设施验收鉴定书**

**项目名称：维西县洛爪河水电站建设项目**

**建设地点：维西县叶枝镇**

**验收单位：维西恒发水电有限公司**

**2023年7月**

**一、生产建设水土保持设施验收基本情况表**

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| --- | --- | --- | --- |
| 项目名称 | 洛爪河水电站建设项目 | 行业类别 | 水利行业 |
| 主管部门（或主要投资方） | 维西恒发水电有限公司 | 项目性质 | 新建 |
| 水土保持方案批复机关、文号及时间 | 无 |
| 水土保持方案变更批复机关、文号及时间 | 无 |
| 水土保持初步设计批复机关、文号及时间 | 2006年12月20日，云南省迪庆州水利水电局下发了《维西县洛爪河水电站水土保持方案报告书的批复》（迪水电发﹝2006﹞105号）。 |
| 项目建设起止时间 | 2020年10月10日-2023年6月1日 |
| 水土保持初步设计编制单位 | 曲靖市水利勘测设计研究院设计所 |
| 水土保持监测单位 | 云南恒成工程设计咨询有限公司 |
| 水土保持施工单位 | 福建省崇禹水利水电建筑工程有限公司 |
| 水土保持监理单位 | 丹江口汉江工程咨询责任有限公司 |
| 水土保持设施验收报告编制单位 | 香格里拉市华辰水电咨询设计有限公司 |

**二、验收意见**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 2023年7月18日由建设业主单位维西恒发水电有限公司主持，召开了洛爪河水电站水土保持设施验收会议；主要参加单位有：水土保持监测单位云南恒成工程设计咨询有限公司，水土保持监理单位丹江口汉江工程咨询责任有限公司，水土保持施工单位福建省崇禹水利水电建筑工程有限公司。会议邀请水土保持专家5人，组成专家组（专家组名单附后），会议认真听取了监测单位、监理单位、施工单位的汇报，专家组认真审阅了验收文件，得出以下结论：（一）项目概况地理位置：洛爪河为澜沧江中游右岸的一级支流，地处维西傈僳族自治县叶枝镇境内，地理位置为东经98°49′～99°02′、北纬27°36′～27°44′。洛爪河流域位于碧罗雪山与云岭之间的澜沧江峡谷，总体地势由西向东倾斜，河流由西向东流入澜沧江。流域地形呈山高谷深的特征，流域最高点海拔高程4553.6m，最低点即洛爪河与澜沧江的汇合口处，海拔高程约1700m。洛爪河全流域面积131.7km2，河道全长21.8km，河道平均坡降90.6‰。洛爪河水电站是引水式水电站，是单一的发电工程，没有航运、过木要求。洛爪河水电站正常蓄水位为2696.00m，拦河坝为C20底格拦栅坝，最大坝高5.8m。底格拦栅坝后接72m长的引水箱涵，引水箱涵后接前池，前池后接直径1.5m，长度132m的钢管，钢管尾端后接5202m长的压力引水主隧洞，主隧洞在1#支流处设支洞，并将1#支流引入主隧洞。支流拉波洛河上将支流滤水水量引入2#引水支洞，再通过2#引水支洞汇流到主隧洞，隧洞内桩号4+843接压力钢管，主管长1899m。其中，压力钢管沿着地形坡面至16#镇墩后接入深度354m的竖井，再经坡度10%的引水套管洞（460m）引入岔管和支管。厂址座落在洛爪河与支流拉波洛河汇合口处，电站装机容量3×8000kW冲击卧式水轮发电机组。水轮机型号为CJA475-W-140/2×9，发电机型号为SFW8000-8/2150，调速器型号CJWT-2/4.0。装机年利用小时数为5208小时。110KV送出线路洛爪河水电站至拉波洛电站全长4.43Km。本工程规模为小（1）型，工程等级为Ⅳ等。主要建筑物等按4级建筑物设计，次要建筑物为5级建为5级建物，临时性建筑物为5级建筑物。**表 1-1 主要技术经济指标表**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 序号 | 项 目 | 单位 | 数量 | 备 注 |
| 一、 | 水文 |  |  |  |
| 1. | 流域面积 |  |  |  |
|  | 全流域 | km2 | 135.2 |  |
|  | 坝址以上 | km2 | 62.4 |  |
|  | 1#支流坝址以上 | km2 | 3.3 |  |
|  | 2#支流坝址以上 | km2 | 6.9 |  |
|  | 3#支流坝址以上 |  | 2.6 |  |
| 2. | 利用的水文系列年限 | 年 | 43 | 1960年～2002年 |
| 3. | 代表性流量 |  |  |  |
|  | 坝址多年平均流量 | m3/s | 2.74 |  |
|  | 坝址设计洪水流量(P=2.0%) | m3/s | 259 |  |
|  | 坝址校核洪水流量(P=0.5%) | m3/s | 334 |  |
|  | 施工导流流量(P=20%) | m3/s | 12.9 | 坝址11月～2月 |
| 4. | 泥沙 |  |  |  |
|  | 坝址多年平均悬移质输沙量 | 万t | 2.88 |  |
|  | 坝址多年平均含沙量 | kg/m3 | 0.33 |  |
|  | 坝址多年平均推移质输沙量 | 万t | 0.86 |  |
|  | 坝址多年平均输沙总量 | 万t | 3.74 |  |
| 二、 | 工程规模 |  |  |  |
| 1． | 水库水位 |  |  |  |
|  | 正常蓄水位 | m | 2691.00 |  |
|  | 设计洪水位 | m | 2693.86 |  |
|  | 校核洪水位 | m | 2694.54 |  |
| 2. | 调节特性 |  | 无调节 |  |
| 3. | 水量利用系数 | % | 73.95 |  |
| 三、 | 下泄流量及相应下游水位 |  |  |  |
| 1. | 设计洪水位时最大泄量 | m3/s | 259.00 | P=2.0% |
|  | 相应下游水位（坝址） | m | 2686.61 |  |
| 2. | 校核洪水位时最大泄量 | m3/s | 334 | P=0.5% |
|  | 相应下游水位（坝址） | m | 2687.01 |  |
| 3 | 厂址校核洪水位时最大泄量 | m3/s | 337 | P=1.0% |
|  | 相应下游水位（厂址） | m | 1962.80 |  |
| 四、 | 工程效益指标 |  |  |  |
|  | 装机容量 | kW | 3×8000 |  |
|  | 保证出力（p=90%） | kW | 6170 |  |
|  | 多年平均发电量 | 万kW.h | 12180 |  |
|  | 年利用小时数 | h | 5075 |  |
| 五、 | 淹没损失及工程永久占地 |  |  |  |
| 1 | 淹没林地 | 亩 | 4.2 |  |
| 2 | 工程永久占地 | 亩 | 35 |  |
| 六、 | 主要建筑物及设备 |  |  |  |
| 1. | 挡水建筑物  |  |  |  |
|  | 型式 |  | C15细石砼砌石重力坝 |
|  | 地基特性 |  | 长石英细砂岩 |
|  | 地震基本烈度/设防烈度 | 度 | Ⅶ |  |
|  | 地震动峰值加速度 | g | 0.10 |  |
|  | 坝顶高程 | m | 2695.30 |  |
|  | 最大坝高 | m | 13.30 |  |
|  | 坝顶长度 | m | 43.50 |  |
| 2. | 泄水建筑物 |  |  |  |
|  | 溢流堰型式 |  | 堰顶自由溢流 |
|  | 堰顶高程 | m | 2691.00 |  |
|  | 溢流堰净宽 | m | 15.00 |  |
|  | 冲沙孔孔口尺寸 | m | 5×3 | 宽×高 |
|  | 冲沙孔底高程 | m | 2688.00 |  |
|  | 设计单宽流量 | m3/s.m | 12.95 |  |
|  | 校核单宽流量 | m3/s.m | 17.20 |  |
|  | 消能方式 |  | 底流消能 |
|  | 冲沙闸门型式 |  | 露顶平面钢闸门 |
|  | 启闭机型号 | kN | QPQ2×125 |  |
| 3. | 引水建筑物 |  |  |  |
|  | 最大引用流量 | m3/s | 4.59 |  |
| （1） | 进水口 |  |  |  |
|  | 型式 |  | 岸边压力墙式 |
|  | 孔口尺寸 | m | 3.0×1.55 | 宽×高 |
|  | 底板高程 | m | 2689.45 |  |
|  | 闸门型式 |  | 潜孔平面钢闸门 |
|  | 启闭机型号 | kN | QPQ2×125 |  |
| （2） | 无压引水主隧洞 |  |  |  |
|  | 洞长 | m | 4777 |  |
|  | 纵坡 | ‰ | 2 |  |
|  | 断面型式 |  | 城门形 |  |
|  | 开挖断面尺寸 | m | 2.4×2.8 | 宽×高 |
|  | 衬砌型式 |  | 钢筋砼、喷砼 |  |
| （3） | 支流引水建筑物 |  |  |  |
|  | 1#支流滤水坝宽度 | m | 5.0 |  |
|  | 2#支流滤水坝宽度 | m | 10.0 |  |
|  | 3#支流滤水坝宽度 | m | 4.0 |  |
|  | 拉波洛河引水支洞 |  |  |  |
|  | 洞长 | m | 1818.33 |  |
|  | 纵坡 | ‰ | 1 |  |
|  | 断面型式 |  | 城门形 |  |
|  | 开挖断面尺寸 | m | 1.8×2.0 | 宽×高 |
|  | 衬砌型式 |  | 钢筋砼 |  |
| （4） | 压力前池 |  |  |  |
|  | 正常蓄水位 | m | 2860.67 |  |
|  | 最低水位 | m | 2679.27 |  |
|  | 最高水位 | m | 2681.27 |  |
|  | 进水室尺寸 | m | 2.742×2.0 | 长×宽 |
|  | 进水室底高程 | m | 2675.665 |  |
|  | 闸门型式 |  | 潜孔平面钢闸门 |  |
|  | 启闭机型号 | kN | QPK2×100 |  |
| （5） | 压力管道 |  |  |  |
|  | 型式 |  | 地面压力明钢管 |  |
|  | 主管长 | m | 1330 |  |
|  | 主管管内径 | m | 1.2 |  |
|  | 支管总长 | m | 60 |  |
|  | 支管管内径 | m | 0.55 |  |
|  | 2156.12m高程以上材料 |  | Q235 |  |
|  | 2156.12m高程以下材料 |  | X60 |  |
| 4 | 厂房 |  |  |  |
|  | 型式 |  | 地面厂房 |  |
|  | 地基特性 |  | 砂砾层或基岩 |  |
|  | 主厂房尺寸（长×宽×高） | m | 39.9×15.6×10.9 | 长×宽×高 |
|  | 水轮机安装高程 | m | 1965.80 |  |
| 5 | 开关站 |  |  |  |
|  | 型式 |  | 户外式 |  |
|  | 地基特性 |  | 砂砾层或基岩 |  |
|  | 面积（长×宽） | m | 46×21 | 长×宽 |
|  | 地面高程 | m | 1964.96 |  |
| 6 | 主要机电设备 |  |  |  |
| （1） | 水轮机 |  |  |  |
|  | 台数 | 台 | 3 |  |
|  | 型号 |  | CJA475-W-140/2×9 |
|  | 额定出力 | kW | 8421.1 |  |
|  | 额定转速 | r/min | 750 |  |
|  | 最大工作水头 | m | 715.18 |  |
|  | 最小工作水头 | m | 696.70 |  |
|  | 额定水头 | m | 696.70 |  |
|  | 额定流量 | m3/s | 1.378 |  |
| （2） | 发电机 |  |  |  |
|  | 台数 | 台 | 3 |  |
|  | 型号 |  | SFW8000-8/2150 |  |
|  | 单机容量 | kW | 8000 |  |
|  | 发电机功率因素 |  | 0.8 |  |
|  | 额定电压 | kV | 6.3 |  |
| （3） | 其它主要设备 |  |  |  |
|  | 主厂房桥吊 | t | QD32/5 | 电动双钩桥式起重机 |
|  | 主变压器 | 台 | 2 |  |
|  | 主变型号 |  | SF9-10000/110、SF9-20000/110 |
|  | 主阀型号 |  | QF1000-WY-55 | 卧式球阀 |
|  | 台数 | 台 | 3 |  |
|  | 调速器 | 台 | 3 | CJWT-2/4.0 |
| 7. | 输电线 |  |  |  |
|  | 电压 | kV | 110 |  |
|  | 回路数 | 回路 | 1 |
|  | 输电目的地 |  | 拉波洛水电站 |
|  | 输电距离 | km | 6 |  |
| 七、 | 施工 |  |  |  |
| 1. | 主体工程量 |  |  |  |
|  | 明挖土石方 | m3 | 73148 |  |
|  | 洞挖石方 | m3 | 38623 |  |
|  | 浆砌石 | m3 | 19262 |  |
|  | 混凝土和钢筋混凝土 | m3 | 29819 |  |
|  | 钢材 | t | 2564 |  |
| 2. | 主要建筑材料 |  |  |  |
|  | 木材 | m3 | 1500 |  |
|  | 水泥 | t | 11000 |  |
|  | 钢材 | t | 2564 |  |
| 3. | 所需劳动力 |  |  |  |
|  | 总工日 | 万工日 | 63.0 |  |
|  | 平均上场人数 | 人 | 840 |  |
|  | 高峰工人数 | 人 | 1100 |  |
| 7. | 施工导流 |  |  |  |
|  | 施工导流方式 |  |  | 隧洞导流 |
|  | 施工导流标准 |  | 20% | 11月～2月 |
|  | 施工导流流量 | m3/s | 12.9 |  |
| 8. | 施工占地 | 亩 | 20 |  |
| 9. | 施工期限 |  |  |  |
|  | 总工期 | 年 | 2.5 |  |
| 八、 | 经济指标 |  |  |  |
| 1. | 静态总投资 | 万元 | 11374.88 | 含送出工程 |
| 2. | 总投资 | 万元 | 12008.91 | 100% |
|  | 建筑工程 | 万元 | 5184.74 | 43.17% |
|  | 机电设备及安装工程 | 万元 | 2395.65 | 19.95% |
|  | 金属结构设备及安装工程 | 万元 | 1017.15 | 8.47% |
|  | 临时工程 | 万元 | 799.29 | 6.66% |
|  | 其它费用 | 万元 | 1072.93 | 8.93% |
|  | 基本预备费 | 万元 | 523.50 | 4.36% |
|  | 建设期还贷利息 | 万元 | 634.03 | 5.28% |
|  | 水库淹没处理补偿费 | 万元 | 291.62 | 2.43% |
|  | 送出工程 | 万元 | 90.00 | 0.75% |
| 3. | 综合利用经济指标 |  |  |  |
|  | 水电站单位千瓦投资 | 元/kW | 5004 |  |
|  | 单位电度投资 | 元/kW.h | 0.986 |  |
|  | 财务内部收益率 | % | 9.96 | 全部投资所得税后 |
|  | 资本金财务内部收益率 | % | 12.25 |  |
|  | 上网电价 | 元 | 0.186 |  |
|  | 投资回收期 | 年 | 11.08 | 所得税后 |
|  | 贷款偿还年限 | 年 | 15.08 | 含建设期 |

项目投资：工程静态总投资12008.91万元，单位千瓦投资5004元/kw。（二）水土保持方案批复情况：2006年3月洛爪河水电站建设业主维西恒发水电有限公司委托曲靖市水利勘测设计研究院设计所编制《迪庆州维西傈僳族自治县洛爪河水电工程水土保持方案可行性研究报告》；2006年12月20日迪庆藏族自治州水利水电局关于《迪庆州维西县洛爪河水水土保持方案报告书的专家审查意见及批复》（迪水电发【2006】105号）。（三）水土保持监测情况：根据水土保持工作情况分析，建设单位较为注重工程水土保持工作，在施工过程中根据批复的《水土保持方案》，结合实际情况主体工程、临时工程和植物措施，基本按照水土保持方案中的要求进行了施工，水土保持工程措施到位，效果较好。通过各项水土保持措施的实施，截至2023年7月，项目区内土地整治度为95.4%，水土流失总治理度为95%，拦渣率为95.02%，土壤流失控制比为1.5，林草植被恢复率为95.25%，林草覆盖率为43.58%，均达到水土保持方案初步设计报告书中的防治目标，可以通过水土保持竣工验收。（四）水土保持监理情况洛爪河水电站的设计及施工均充分注意并努力消除与减少了工程区对水土流失的影响，对水土保持生态环境的恢复与重建高度重视，严格按照水土保持方案上的规定建设水土保持设施，加大了水土保持措施的建设投资，使水土保持工程措施建设的进度、数量与质量符合国家标准和规范要求，目前均处于安全、正常、良好的运行状态中，较好地实现了经批复发水土保持方案水土保持目标。整个工程关于水土保持工程的设计、施工质量及工程进度都得到了充分保证，最大限度地保护项目区的生态环境。通过一系列水土保持措施的实施，项目水土保持防治效果明显：项目建设防治责任范围内扰动土地整治率达到95.4%，水土流失总治理度达到95%，土壤流失控制比达到1.5，拦渣率达到95.02%，林草植被恢复率达到95.25%，林草覆盖率达到43.58%，六项指标均能达到防治目标值。（五）验收报告编制情况：《洛爪河水电站水土保持设施竣工验收报告书》于2023年7月由香格里拉市华辰水电咨询设计有限公司编制，验收报告主要结论为：核定的永久占地面积为2.333hm2，其中：林地1.866 hm2,荒山荒坡0.467hm2。临时占地为1.334hm2，其中荒山荒坡1.334hm2。水库面积为0.28hm2，其中林地0.28hm2，水库淹没区无民房、耕地及专项设施等。工程现已建设完毕，落实水土保持措施工程量为：挡渣墙678m，排水沟829m，浆砌块石9057m3，土石方开挖3372m3；植物措施工程量为：人工植树4070株，人工植草0.38hm2，覆土1433m3，抚育2.22hm2。洛爪河水电站水土保持总投资为488.39万元，其中主体工程中有水土保持功能的投资173.85万元，本方案新增水土保持投资314.54万元，其中建筑工程措施费169.69万元，植物措施费2.15万元，临时工程费13.17万元，水土保持独立费用91.81万元，基本预备费8.30万元，水土保持设施补偿费1.87万元，静态投资285.132万元。（六）验收结论根据《中华人民共和国水土保持法》、《水利部关于加强事中事后监管规范生产建设项目水土保持设施自主验收的通知》（水保〔2017〕365号）及《云南省水利厅转发水利部关于加强事中事后监管规范生产建设项目水土保持设施自主验收文件的通知》（云水保〔2017〕97号）要求，认真复核维西县洛爪河水电站水土保持设施落实情况，得出验收结论：工程已按《维西县洛爪河水电站水土保持方案初步设计报告》的设计要求完成水保措施，目前各防治区域防治效果良好，通过1年的运行，未发生较大的水土流失现象，运行过程中出现的部分缺陷已得到处理；总之该项目已完成水土流失预防和治理任务，各个水土保持防治指标均达到设计目标值，各措施均符合水土保持设施的验收条件，同意维西县洛爪河水电站水土保持设施通过验收。（七）后续管护要求1.加强对项目区各水土保持设施的日常维护、管理，及时发现问题及时处理；2. 对地形、地貌较为复杂的易发生水土流失危害的塔基应设专人定期巡查；3. 运行期与当地水行政主管部门共同配合，进一步加强水土保持监督执法、广泛传播水土保持知识，提高当地群众水土保持意识，以利于该项目水土保持的开展和维护。  验收单位：维西恒发水电有限公司 验收组长： 2023年7月18日 |