MHPL
MPATAMANGA HYDRO POWER LIMITED

Mpatamanga Hydro Power Project

Environmental & Social Impact Assessment

ESIA Public Disclosure Meetings

Blantyre

July 2024

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1

Purpose of this Meeting and Project Description

Purpose of this Meeting

1. Present the Mpatamanga project components and the project delivery schedule

2. Describe and discuss the main social and environmental impacts and planned mitigation measures on:
   - River flow and erosion
   - Communities
   - Ecology
   - Recommendations from you to improve mitigation of environmental and social impacts

Context

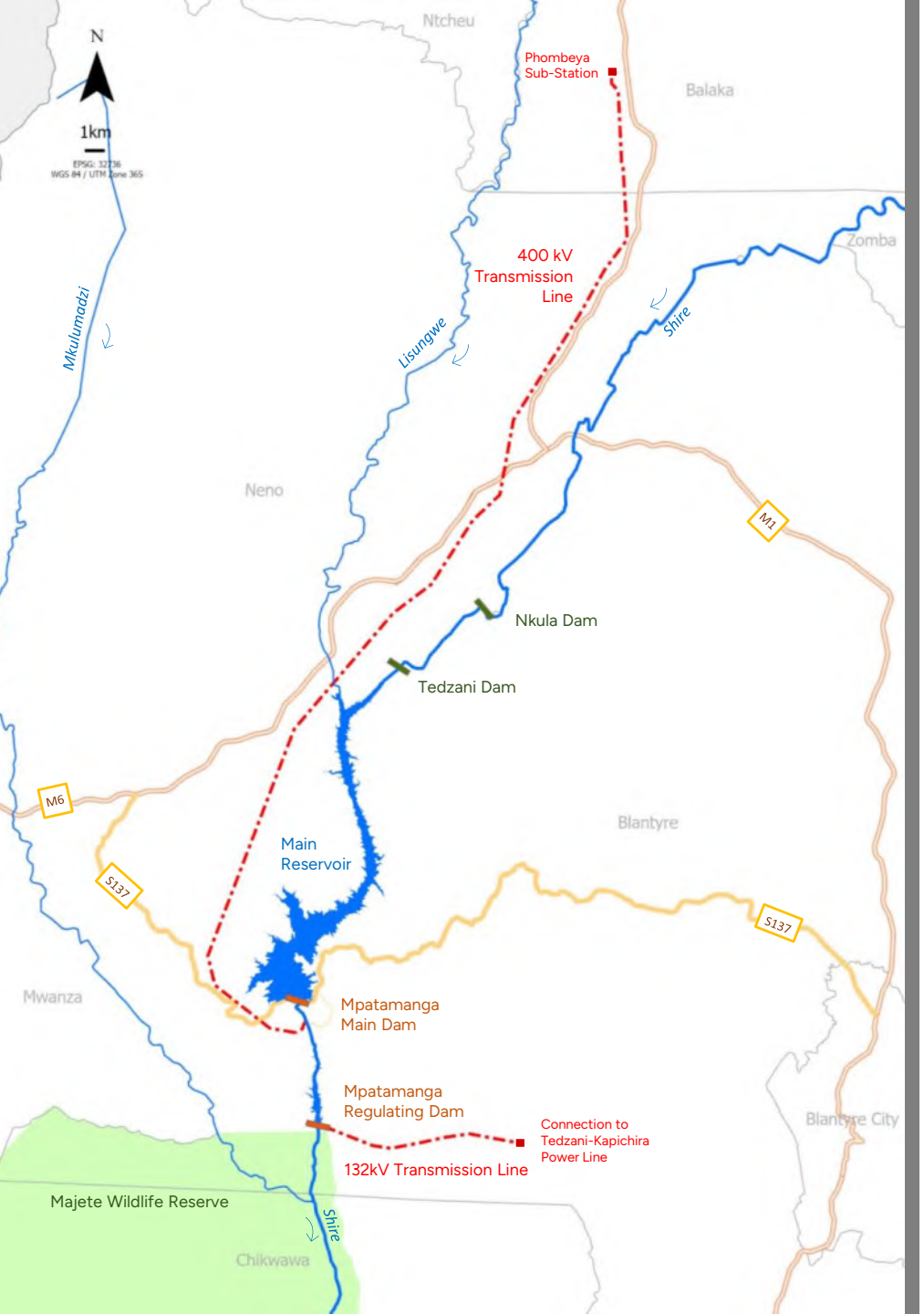
1. Project developed by the Government of Malawi, EDF, SCATEC and IFC, in a PPP who established a dedicated company in 2022: MHPL
2. Financed by the World Bank Group and International Financing Institutions
3. Several technical, environmental and social studies undertaken since 2020; delayed by COVID-19
4. In 2023-2024, MHPL finalised:
   - Engineering studies to design all facilities and specify the works
   - Detailed environmental and social studies to predict the effects on communities, businesses and ecology and plan the mitigation strategy
5. This presentation is being made by the MHPL Environmental and Social Team

Need for the Project

Objective: Increase hydropower generation capacity in Malawi

Mpatamanga Project will:

- Double the national hydroelectricity generation capacity
- Reduce energy shortages and enhance energy security
- Enable further introduction of solar photovoltaic electricity in Malawi, balancing its intermittency



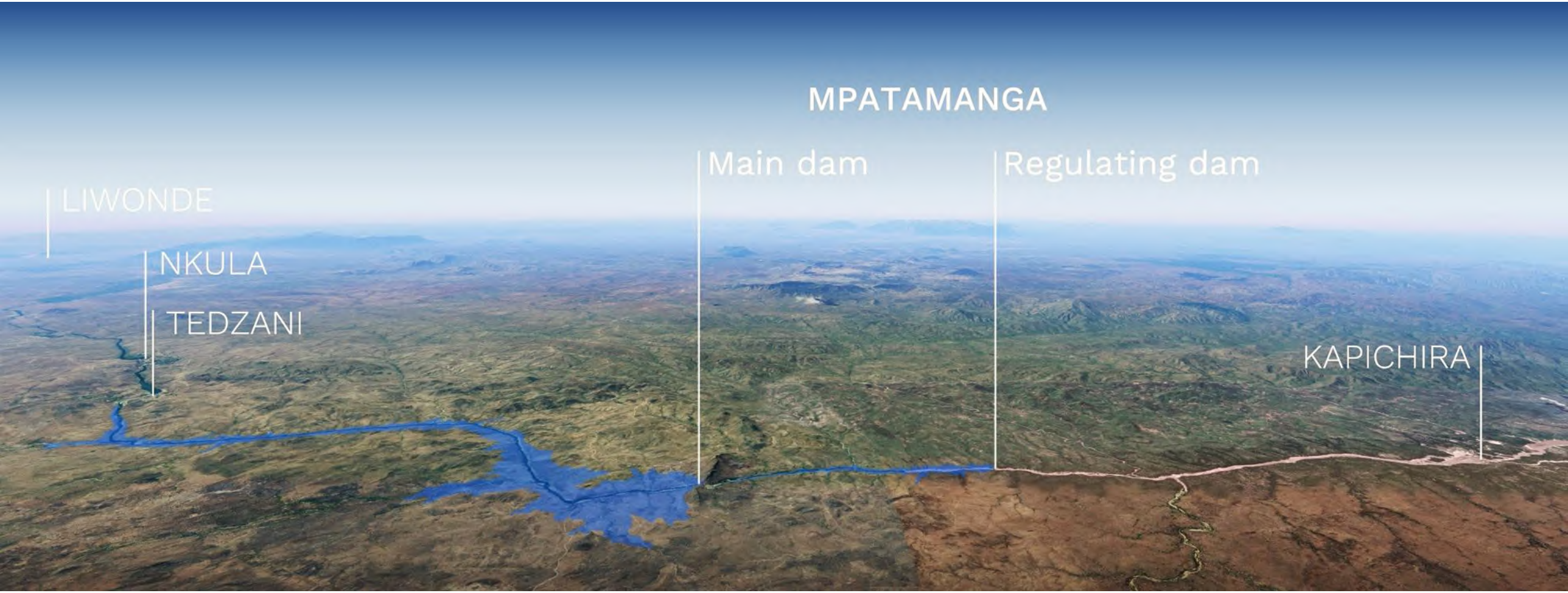
Main Features

1. Hydropower scheme comprising 2 dams, with 2 reservoirs and 2 powerhouses

2. Two Transmission Lines to transport the electricity generated at the powerhouses to the grid (400kV and 132kV)

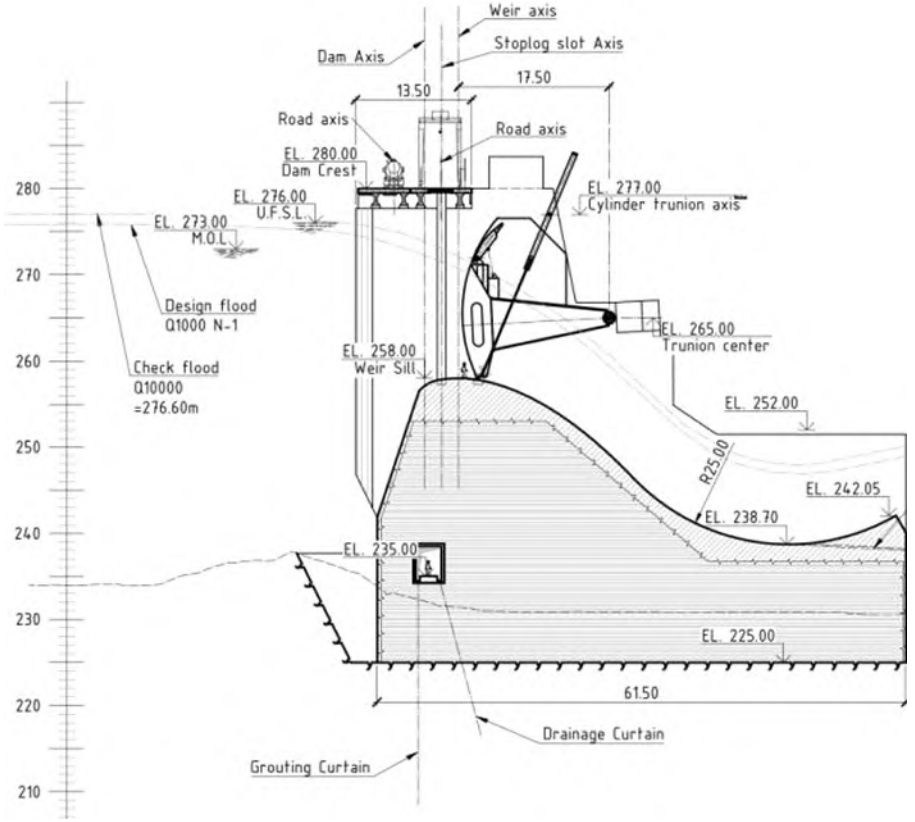
3. Upgrade of S137 road on Blantyre side, rerouting of the S137 on Neno side and a new private road between the main dam and the regulating dam (Blantyre side)

Mpatamanga facilities will be between existing Tedzani and Kapichira hydropower schemes



Mpatamanga Main Dam

- 55 m high concrete dam creating a 20 km² storage reservoir area (x 15 Kapichira)
- 301 MW Powerhouse located 1km downstream of the dam
- Generation of ~1,236 GWh of clean energy per year
- Reservoir operated with hydropeaking: filling up during off-peak hours and lowering during peak hours (± 50 cm vertical)
- One permanent operators' village for the operation phase

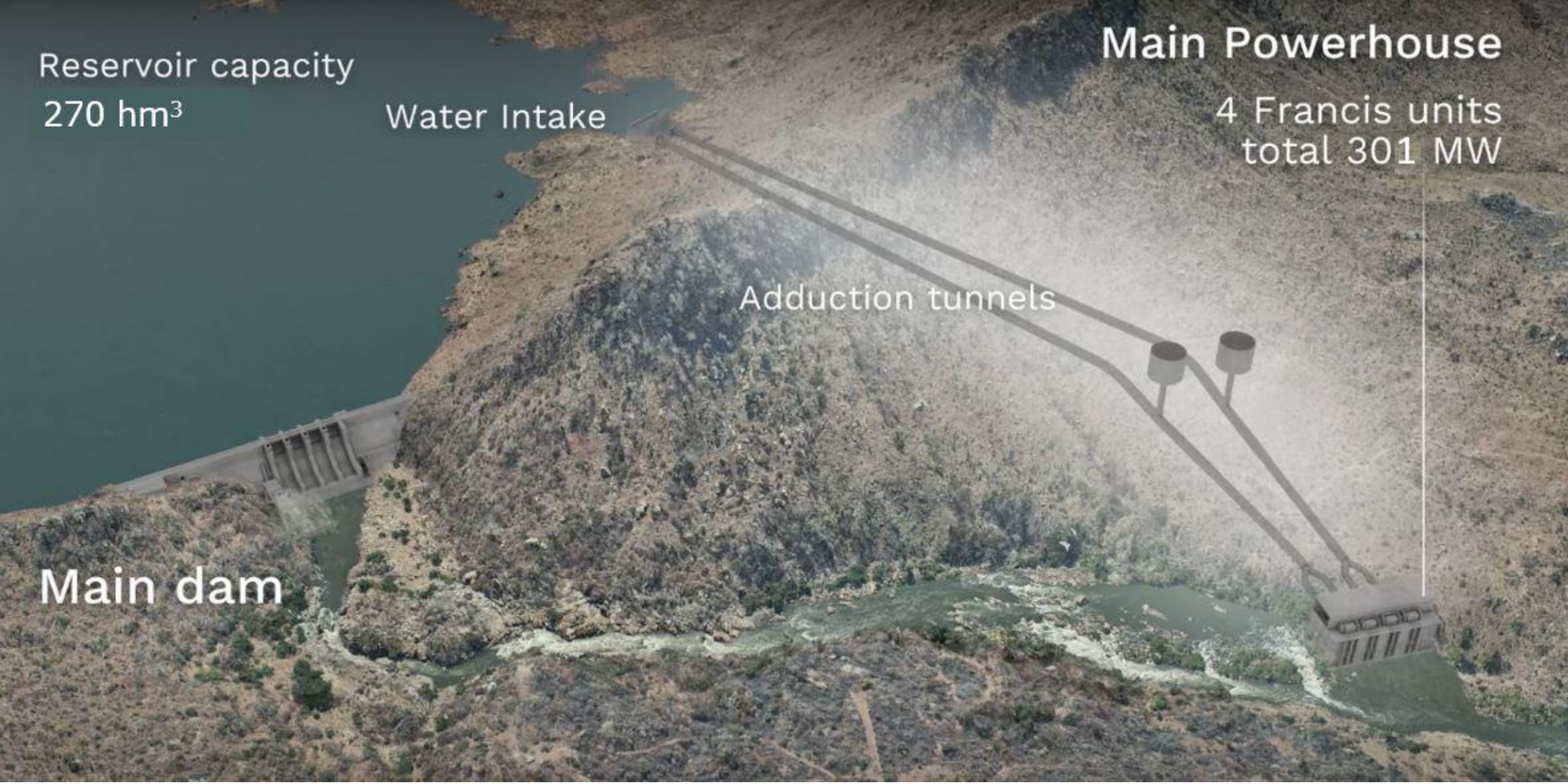



Main dam

Nakai Dam in Laos

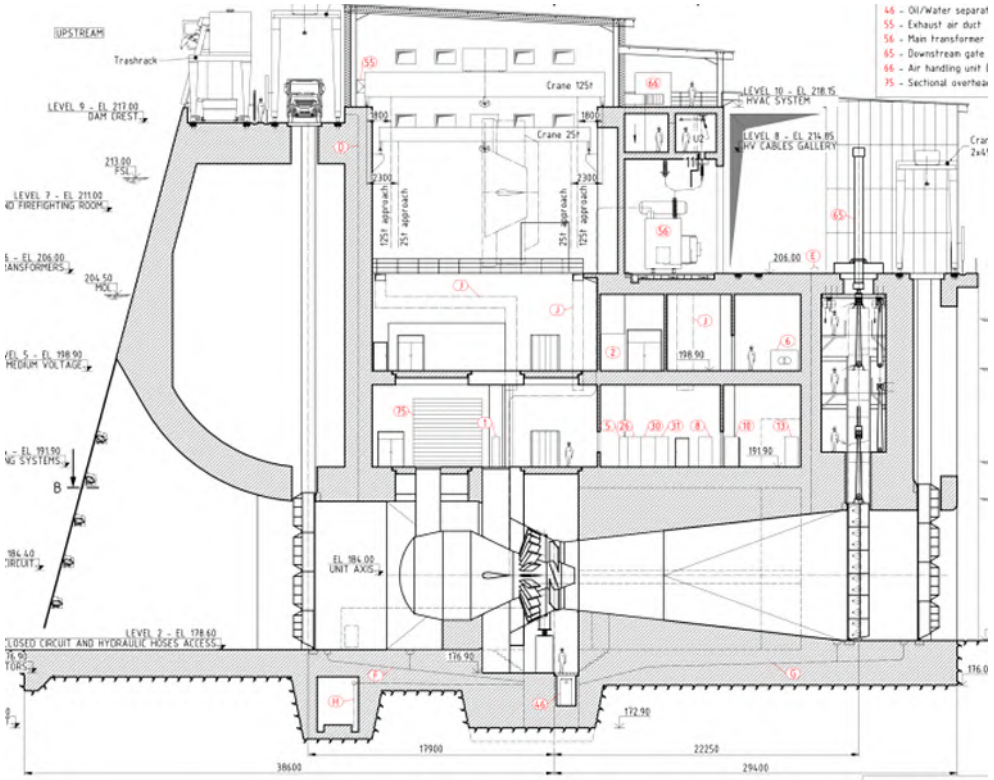
Similar size and design to the proposed Mpatamanga Main Dam

Source: EDF


Reservoir capacity
270 hm3
Water Intake
Main Powerhouse
4 Francis units
total 301 MW
Adduction tunnels
Main dam

Mpatamanga Regulating Dam

- Compensate sudden variations of water flow released by the main powerhouse, and restore the natural river flow downstream of Mpatamanga
- 45 m high dam creating a 1.5 km² reservoir area (~ Kapichira)
- Significant sub-daily variations of reservoir water level (± 8 m vertical)
- 57 MW powerhouse at the foot of the dam, generating 308 GWh of clean energy per year




Regulating dam

Source: https://hobomaps.com/NamOu4damInfo.html

Nam Ou 4 Dam in Laos

Similar size to the proposed Mpatamanga Regulating Dam

Mpatamanga hydropower plant is a peaking scheme

Main dam

Regulating dam

Reservoir capacity

270 hm^3

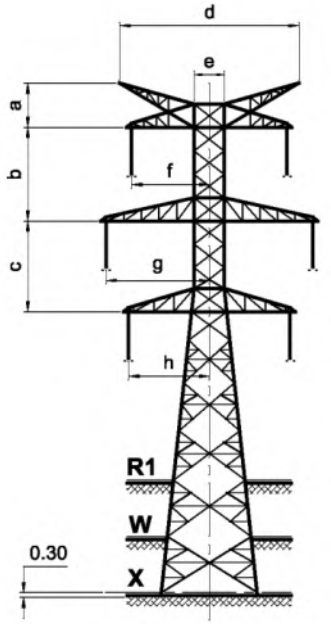
Main Reservoir Inflow = Regulating Reservoir Outflow

except during reservoir filling

Permanent Facilities – Transmission Lines

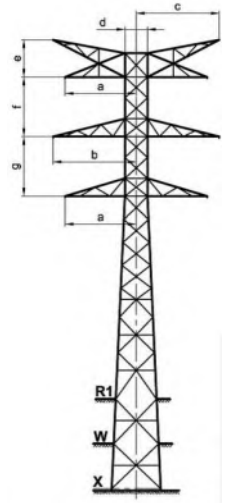
400 kV Transmission Line:

- 63 km long, from main dam to existing Phombeya sub-station
- Each tower is 50m high, typically spaced every 500 meters
- 55 m wide right-of-way

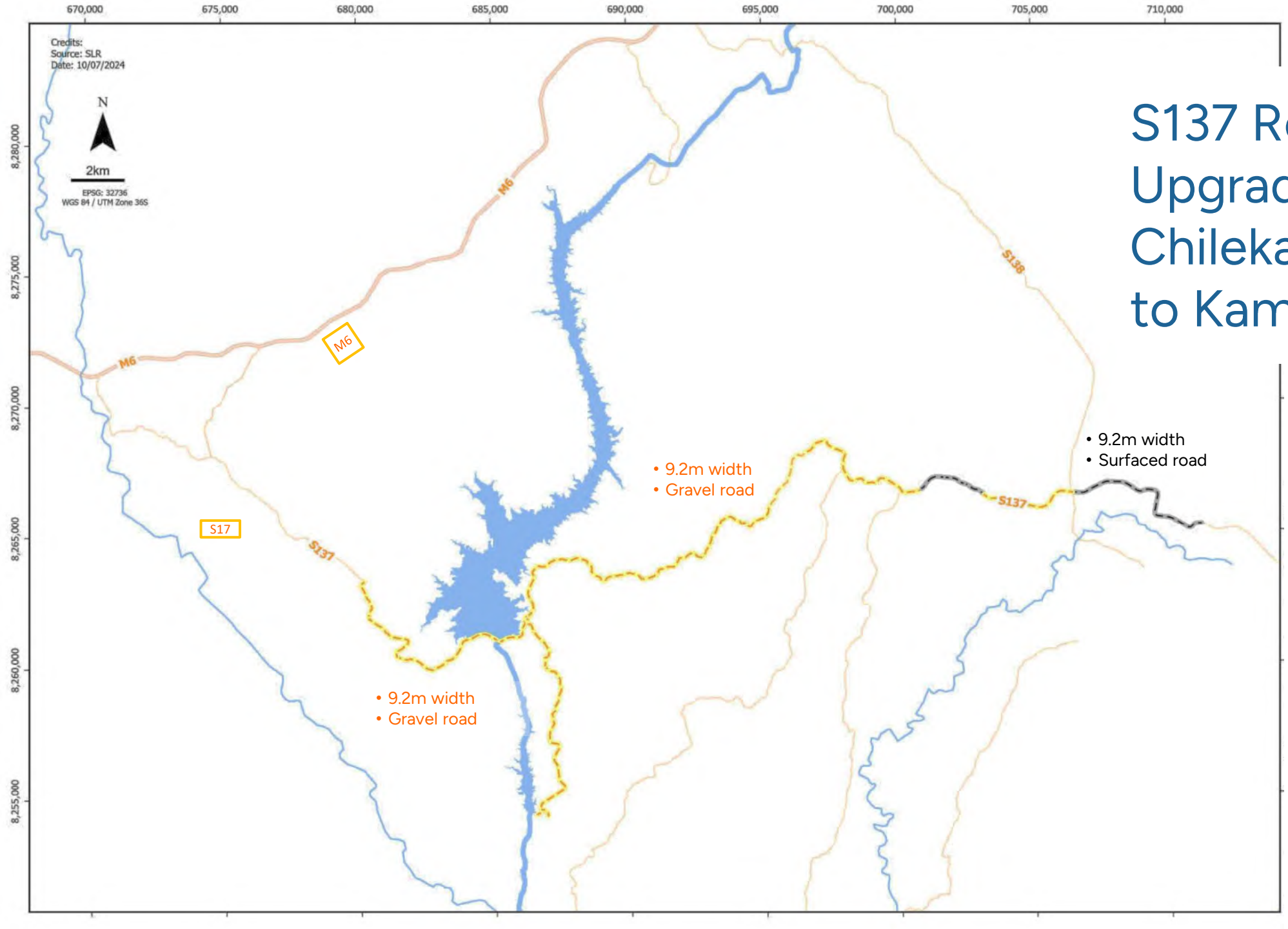


132 kV Transmission line:

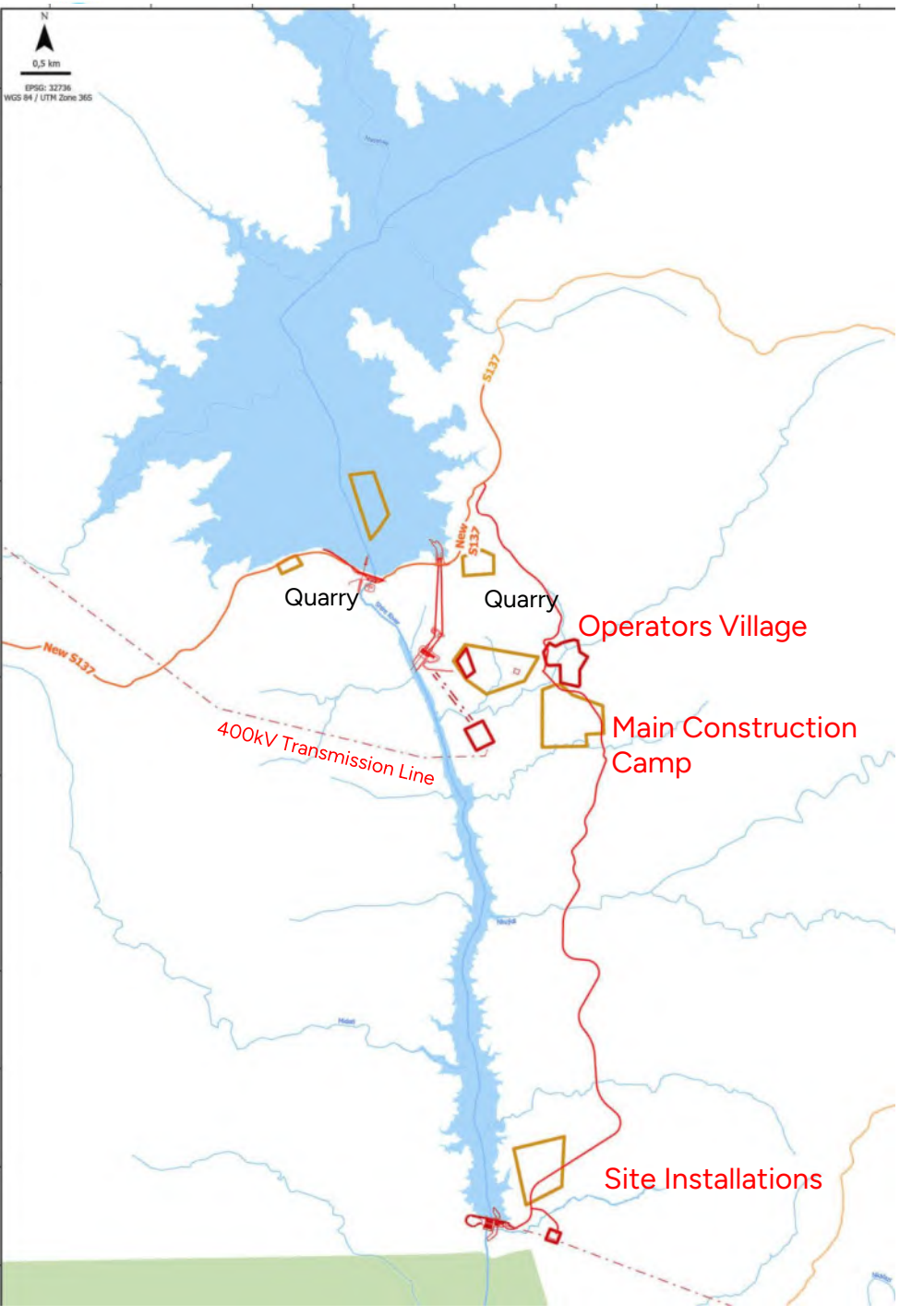
- 11-km long, from the regulation dam to existing Tedzani-Kapichira Transmission Line
- Loop-in loop-out
- Each tower is 30m high, typically spaced every 300 meters
- 36 m wide right-of-way



S137 Road Upgrade from Chileka Airport to Kambalame



Construction Facilities



- Main Dam Site:
  - Site installations (dam, powerhouse, switchyard)
  - Main Construction camp (~2,500 workers)
  - Quarry Areas
- Regulating Dam Site:
  - Site installations only, no camps, no quarry
- Transmission Lines:
  - Temporary construction compounds at intervals along the T-line
  - Access tracks

Manpower Requirements

- Around 2,500 positions at peak period during construction. Local villagers may benefit from a proportion of these opportunities, dependent on skills needs and availability

- Around 80 to 120employees during the operation phase, mostly skilled positions

Credit: Taz Namalueso

Key Dates

- 2024-2025: Preparation
  - Detailed technical, environmental and social studies
  - Selection of construction companies
- 2025 to 2030: Construction
  - S137 road upgrade in 2025
  - Main construction works from 2026 to 2030
- 2030 onwards: Operation
  - Start of power generation at the two powerhouses
  - To be operated by MHPL for 30 years, then transferred to the Government

2024 Environmental & Social Impact Assessment (ESIA) Process

1. Q2-Q3 2023: Baseline field investigations and meetings with key stakeholders
2. Q4 2023: Coordination with engineering teams, to understand changes caused by the Project and to minimise environmental and social impacts
3. Q1-Q2 2024: Prediction of environmental and social impacts, definition of mitigation measures, writing of the draft ESIA report
4. Q3-Q4 2024:
   - Public consultations on ESIA findings (today)
   - ESIA Submission to MEPA (permitting) and to the Lenders (Appraisal)
   - Finalization of ESIA considering feedback from communities, MEPA, NGOs, Lenders

2

Social and Environmental Impacts & Mitigation

Scope of the Environmental & Social Impact Assessment:

- Physical displacement, Loss of Land and Access to Land
- Hydrology and Water Quality
- Reservoir Sediment Trapping and Downstream Erosion
- Project-Induced In-Migration
- Air, Noise, and Light Pollution
- Biodiversity
- Community Health and Safety
- Labour Working Conditions and Supply Chain
- Cultural Heritage
- Gender Based Violence, Human Rights
- Climate change
- Cumulative and transboundary Impact Assessment

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Resettlement

Physical displacement, Loss of Land and Access to Land

- Project needs to permanently acquire approximately 37 km² of land for reservoirs, dams, operators' village, S137 road upgrade and access roads. For Transmission Lines wayleave, only pylon footprints will be acquired permanently, but houses and trees will not be permitted in the wayleave
- Fewer than 200 households may need to be physically displaced along with 15 cattle ranches or farms and some business premises.
- Livelihoods will be impacted because of loss of agricultural land for subsistence, natural resources (reduced access to water and reduced areas for informal charcoal making) and potentially small businesses
- 6 Gravesites will also be impacted and need to be relocated in consultation with affected people,
- Opportunistic land purchases are also a risk

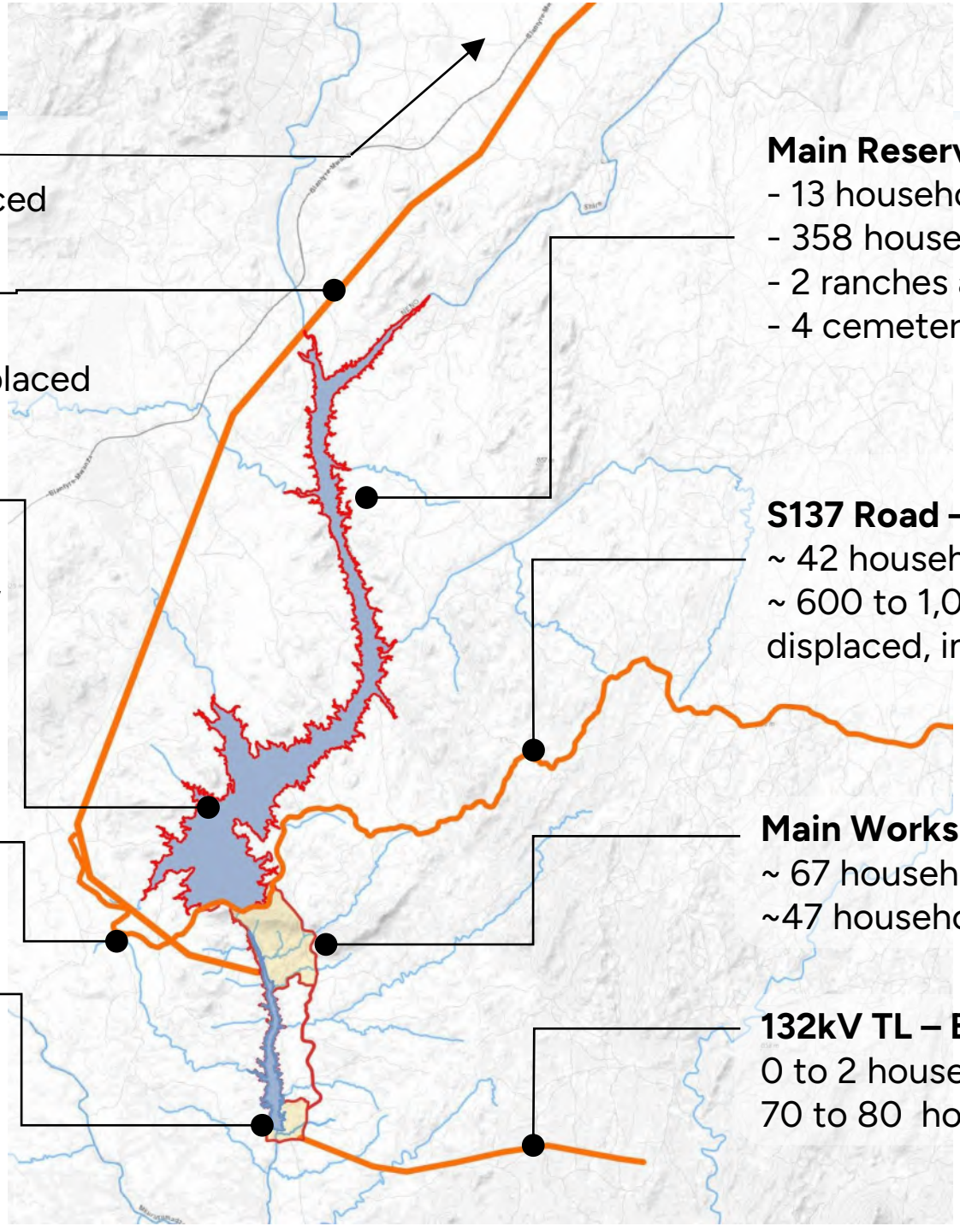
400kV TL – Balaka District
30 to 50 households economically displaced

400kV – Neno District
18 to 32 households physically displaced
370 to 400 households economically displaced

Main Reservoir – Neno District
~ 29 households physically displaced
~ 113 households economically displaced,
11 ranches or farms affected
2 cemeteries and 1 sacred site affected

S137 Road – Neno District
0 to 4 households physically displaced
~ 50 households economically displaced

Main Works – Neno District
1 household physically displaced
7 households economically displaced,
1 ranch affected



Main Reservoir – Blantyre District
- 13 households physically displaced
- 358 households economically displaced
- 2 ranches affected
- 4 cemeteries affected

S137 Road – Blantyre District
~ 42 households physically displaced
~ 600 to 1,000 households economically displaced, including ~70 businesses (shops)

Main Works – Blantyre District
~ 67 households physically displaced
~47 households economically displaced

132kV TL – Blantyre District
0 to 2 households physically displaced
70 to 80 households economically displaced

Resettlement Process

- Phased approach for the land acquisition and compensation:
  1. End 2024 and early 2025: S137 road upgrade works in Blantyre District
  2. 2025: Main Works and S137 in Neno District
  3. 2026: Transmission Lines
  4. 2027: Main Reservoir

- Compensation in cash at replacement cost, according to international standards, with the possibility to choose in-kind compensation:
  - Resettlement sites for Chaswanthaka, Kambalame, and potentially for Mpindo villages
  - Assisted self-relocation in the same village for the other affected households (house built by the Project)

Livelihood Restoration

In addition to compensation:

- Livelihood restoration will be provided by MHPL, to all affected households
- Collective livelihood restoration support will be provided at the village level, and
- Additional support will be provided to affected vulnerable households

River Flow

Flow Alteration

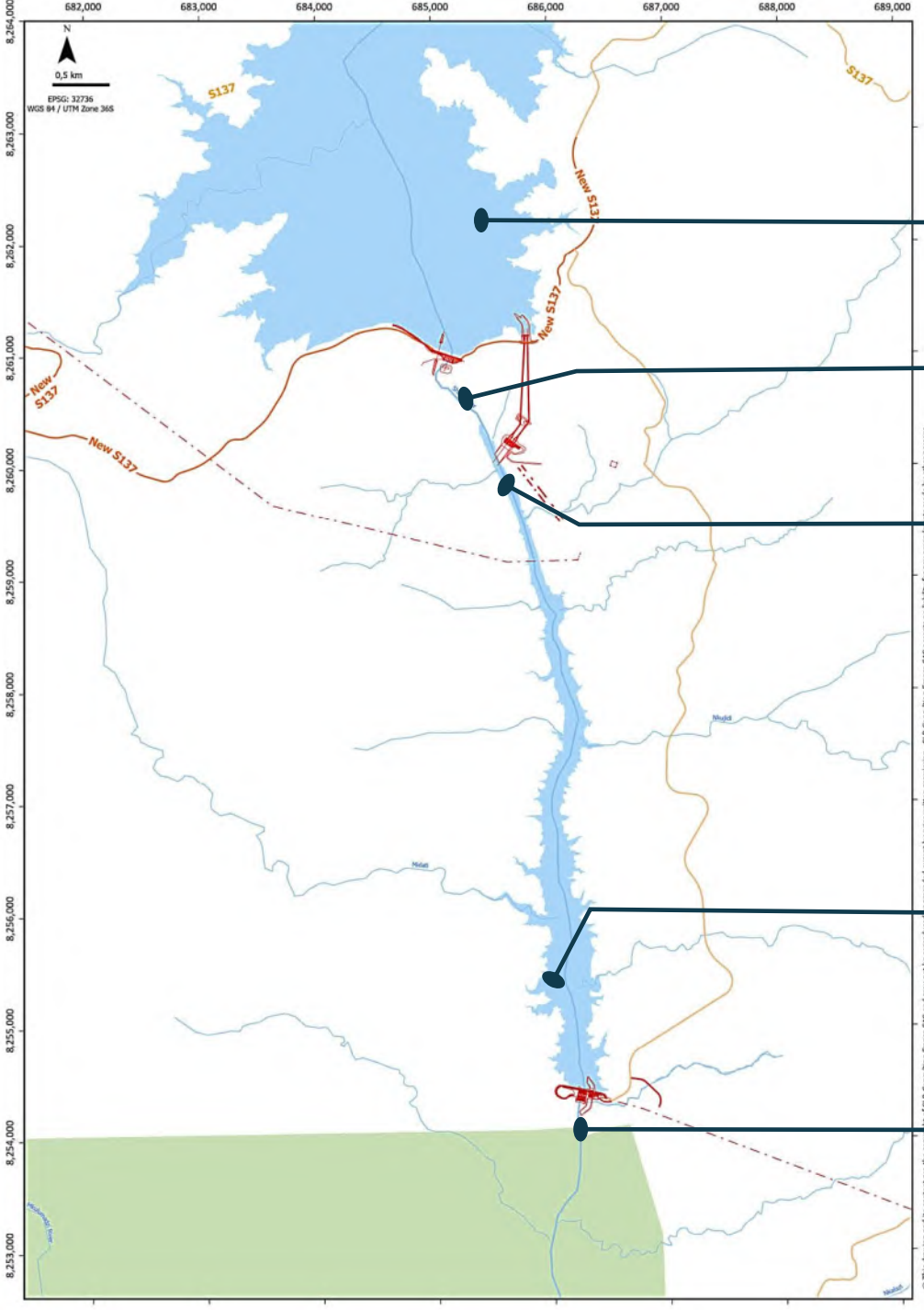
1. During reservoir filling, 90% of the flow in the Shire River will be released downstream of the Regulating Dam

2. During normal operation, reservoir water levels could typically:
    - Be within 50 cm of the full supply level in the main reservoir
    - Vary between 6 to 8 meters in the regulating reservoir

3. During normal operation, the Shire River flow will be:
    - From Main Dam to Main Powerhouse: 2 m^3/s (except during spillage)
    - From Main Powerhouse into regulating reservoir:
        - 2 to 550m^3/s in a matter of minutes when hydropeaking starts
        - Typically no or low flow from the Main Powerhouse during off-peak

Downstream Flow Alteration During Operation

1. Any flow alteration (daily and sub-daily) due to the Mpatamanga HPP operation will only be felt in the reach downstream up to the Kapichira Reservoir
2. Flow downstream of the Regulating Reservoir will be ± 10% of the previous day's inflow into the Main Reservoir
3. Rule n°1 is to minimise downstream flow variation frequency and magnitude
4. Associated downstream water level variations would be maintained within 50cm max (versus 0.72 m and 2.37 m currently)
5. To avoid danger to animal and community safety or ecological health, the maximum rate-of-rise and rate-of-fall river water levels have been defined as 1 cm per minute



± 50cm max

2m3/s
Except during spillage

From 2m3/s to 550m3/s in minutes

Up to ± 6-8m

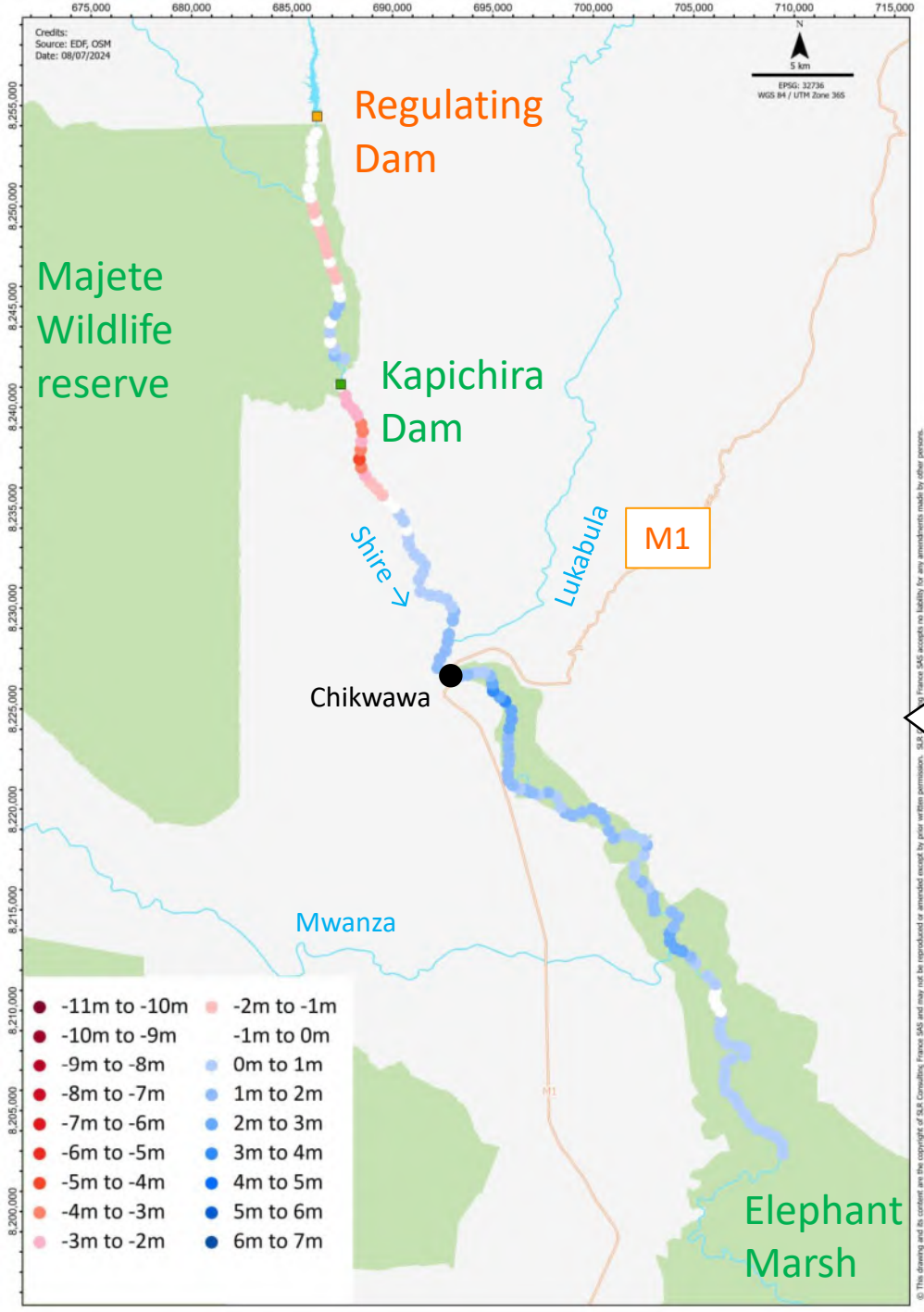
± 50cm max
1 cm/minute

Downstream Erosion

Reservoir Sediment Trapping and Downstream Erosion

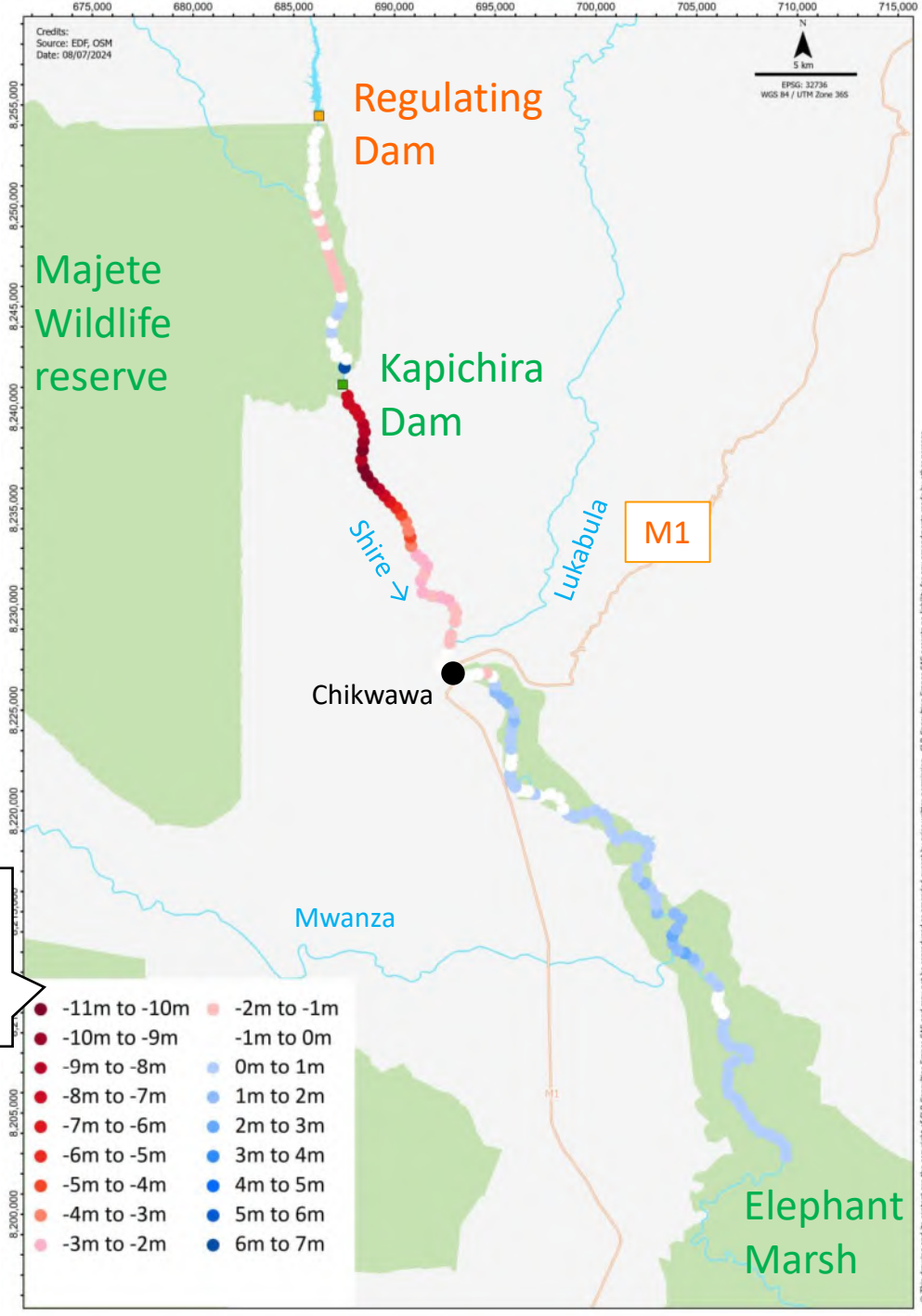
- Most of the sand and suspended solid transported by the Shire River will be trapped in the Mpatamanga main reservoir
- Downstream of Mpatamanga Regulating dam, the Shire River will be exposed to erosion down to confluence with Lukabula River (~Chikwawa Bridge) over 30 years
- This, in turn, could affect groundwater level, farming and fisheries in floodplain, and potentially bridge foundations
- High uncertainties in predicting timing and location of impacts on downstream river geomorphology during operation – Progressive process, over decades, cumulating with other stressors (e.g. climate change)

Possible Riverbed Incision after 30 Years of Operation



Without Project

With Project



Worst case scenario

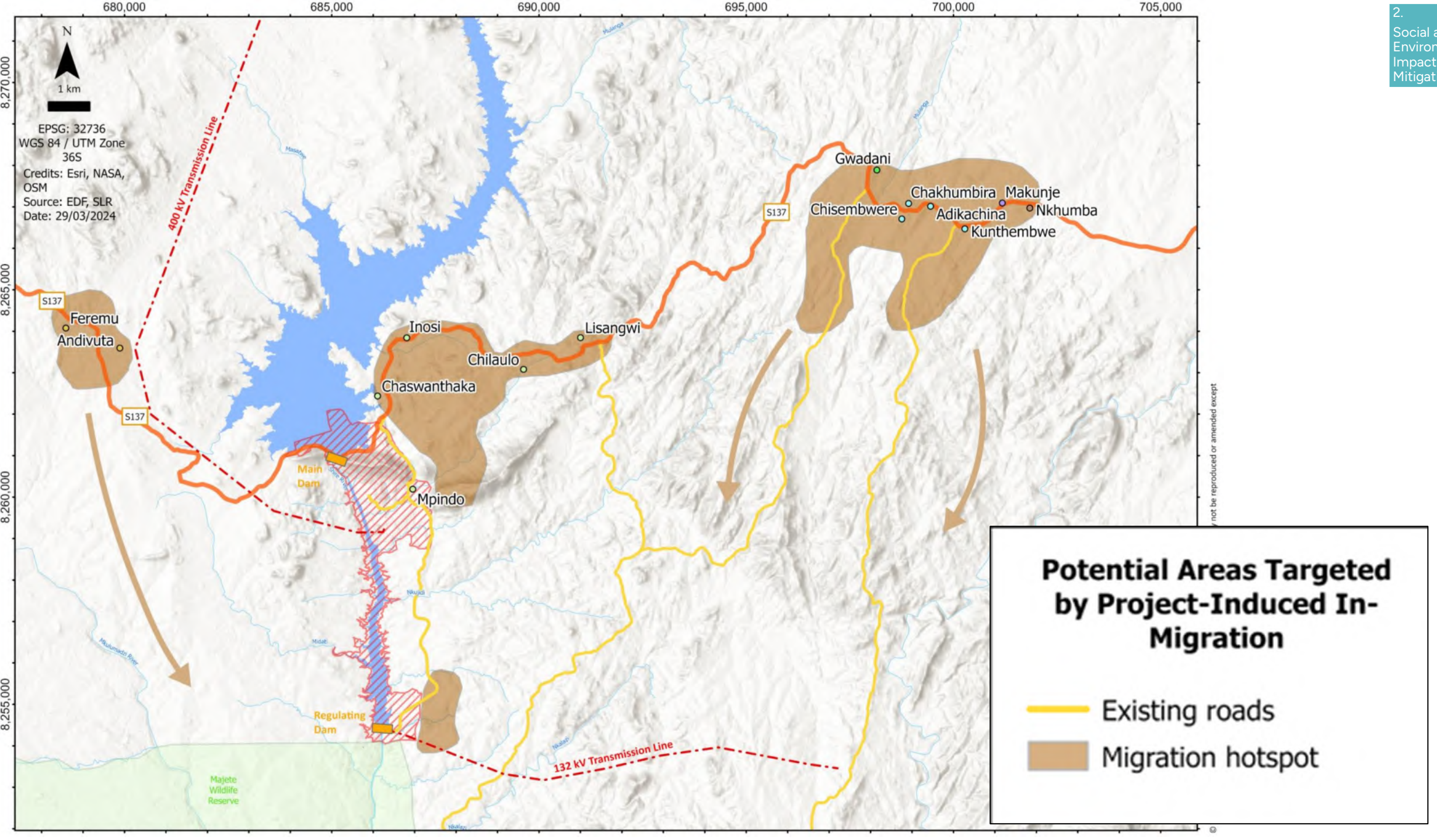
Downstream Erosion Management Strategy

1. Sediment flushing not efficient – Riverbed incision will happen (with uncertainties)
2. Additional floodplain investigations:
   - Geotechnical, groundwater, land use and water use, habitats surveys
   - Modelling and revised downstream floodplain impact assessment
   - Identification of impacted floodplain reaches (timing, magnitude, location)
3. Downstream monitoring and independent review:
   - River morphology, groundwater, soil moisture, river and lake levels
   - Participatory monitoring
   - Grievance redress mechanism
   - Independent Review Panel
4. Management and Response Planning:
   - Downstream Coordination Committees
   - Definition of strategies for floodplain agriculture and fisheries support
   - Implementation, as required, dependent on the outcome of downstream monitoring

Influx

Project-Induced In-Migration

- Construction activities will attract job seekers coming from Blantyre and farther: ~ 4,000 to 7,500 persons could migrate towards the Project area
- Associated potential risks include increased:
  - Tensions between workers and the community
  - Sexual harassment against community members notably women
  - Disease transmission in the community
  - Illegal charcoal making, fishing, slash-and-burn agriculture, animal poaching
  - Pressure on existing social services (health centres and schools)
- The improved access to the Regulating Dam and the 132kV Transmission Line could expose the Majete Reserve to additional pressures (e.g. poaching, charcoal)
- During operation, the main reservoir could attract fishers from other parts of Malawi, creating tensions with local communities


680,000
685,000
690,000
695,000
700,000
705,000
8,270,000
8,265,000
8,260,000
8,255,000
N
1 km
EPSG: 32736
WGS 84 / UTM Zone 36S
Credits: Esri, NASA, OSM
Source: EDF, SLR
Date: 29/03/2024
400 kV Transmission Line
S137
Feremu
Andivuta
Inosi
Chilaulo
Chaswanthaka
Lisangwi
Gwadani
Chakhumbira
Makunje
Chisembwere
Adikachina
Nkhumba
Kunthembwe
Main Dam
Mpindo
Regulating Dam
132 kV Transmission Line
Majete Wildlife Reserve
Potential Areas Targeted by Project-Induced In-Migration
Existing roads
Migration hotspot

Influx – Mitigation Strategy

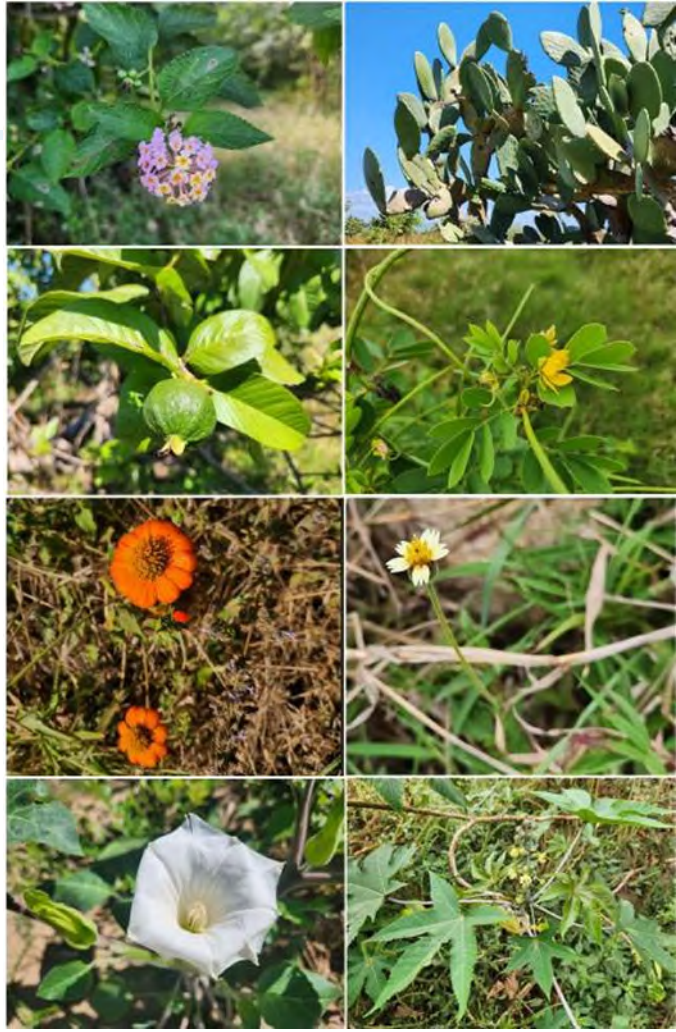
1. Multi-Stakeholder Forum at District, TA, and GVH levels to: (i) Raise awareness; (ii) Share information; (iii) Decide how MHPL could best support initiatives to discourage and control influx; and (iv) Coordinate control measures
2. Ban recruitment at the construction camp, or any of the construction or work sites
3. Construction camp to accommodate all non-local workers – Transport local workers
4. Support Village Level Action Plans for GVH Kaliati and GVH Feremu to anticipate incremental increase in demand of services
5. Assist in installing and maintaining control of access roads with checkpoints (biodiversity and charcoal)
6. Work with local authorities to advance the competitive abilities of communities living around the main reservoir regarding reservoir fisheries during operation

Biodiversity

Aquatic Biodiversity Impacts

- Modification of 29 km degraded natural aquatic habitat & 1 km dewatered reach with minimum flow (low fish diversity & abundance - no threatened species)
- Dam wall barrier to fish migration in 18 km reach (Kapichira-Mpatamanga gorge - low impact). No fish pass: alien risk
- Alien species spread (fish e.g. Tiger fish, Australian redclaw crayfish, aquatic weeds) – risk to native fish in Lake Malawi
- Majete reach (11 km): Some increased riverbank erosion, loss of riparian trees BUT reduced flow fluctuation leading to overall improved aquatic habitats for fish, invertebrates & birds
- Downstream Kapichira: Possible long-term reduction in floodplain lakes in northern Elephant Marsh - low impact on biodiversity

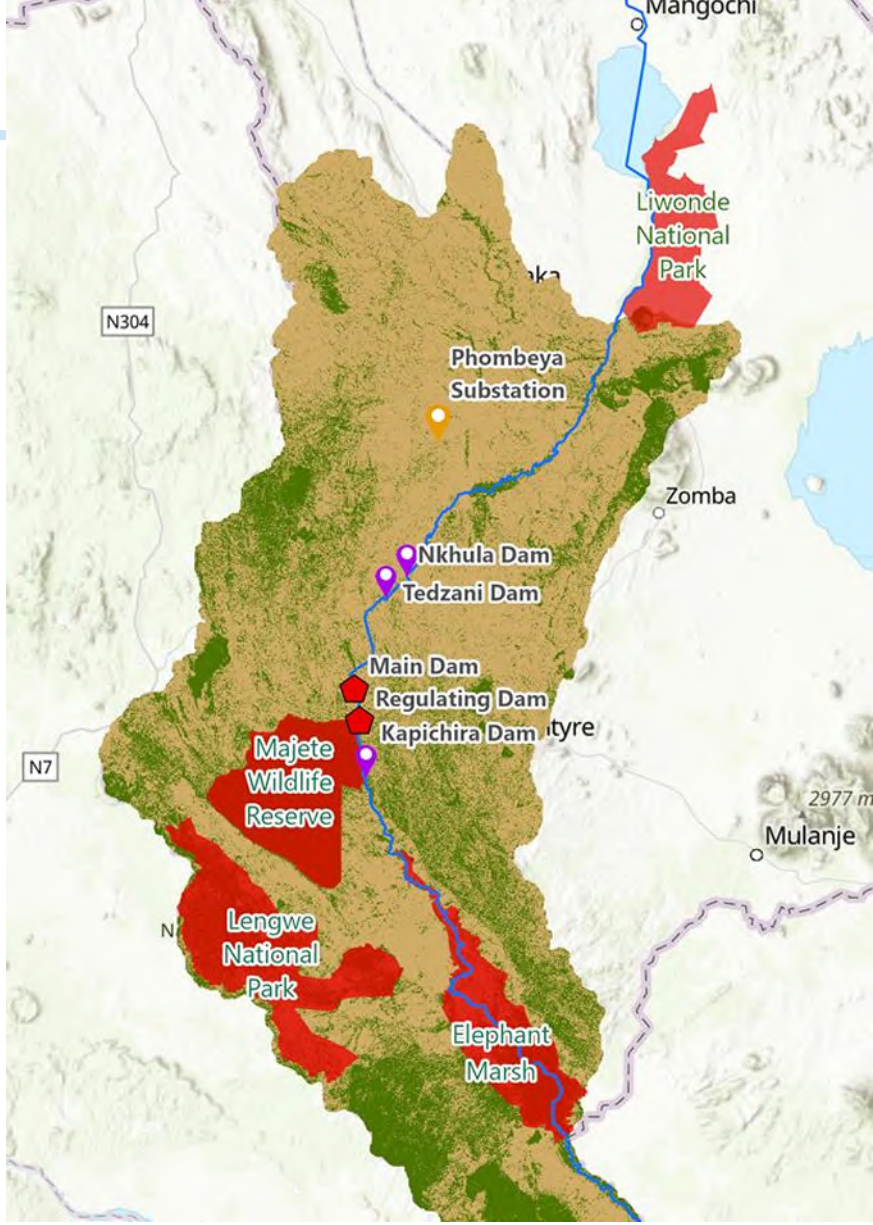
Terrestrial Biodiversity Impacts



- Loss of ~2,600 ha of degraded (modified) habitat & ~1,000 ha of natural woodlands (to be offset).
- Alien plants likely to spread around reservoir & project sites
- Hippo & crocodiles present – reservoirs create new habitat but potential for human-wildlife conflict
- Vulture and other bird collision and electrocution risks with 132kV and 400kV transmission lines
- Potential negative impacts on Majete WR include:
  - High risk of potential increased risk of poaching due to influx (black rhino, elephant)
  - Lower risks from increased construction noise
  - Erosion and displacement of hippo and crocodile sandbanks towards Kapichira

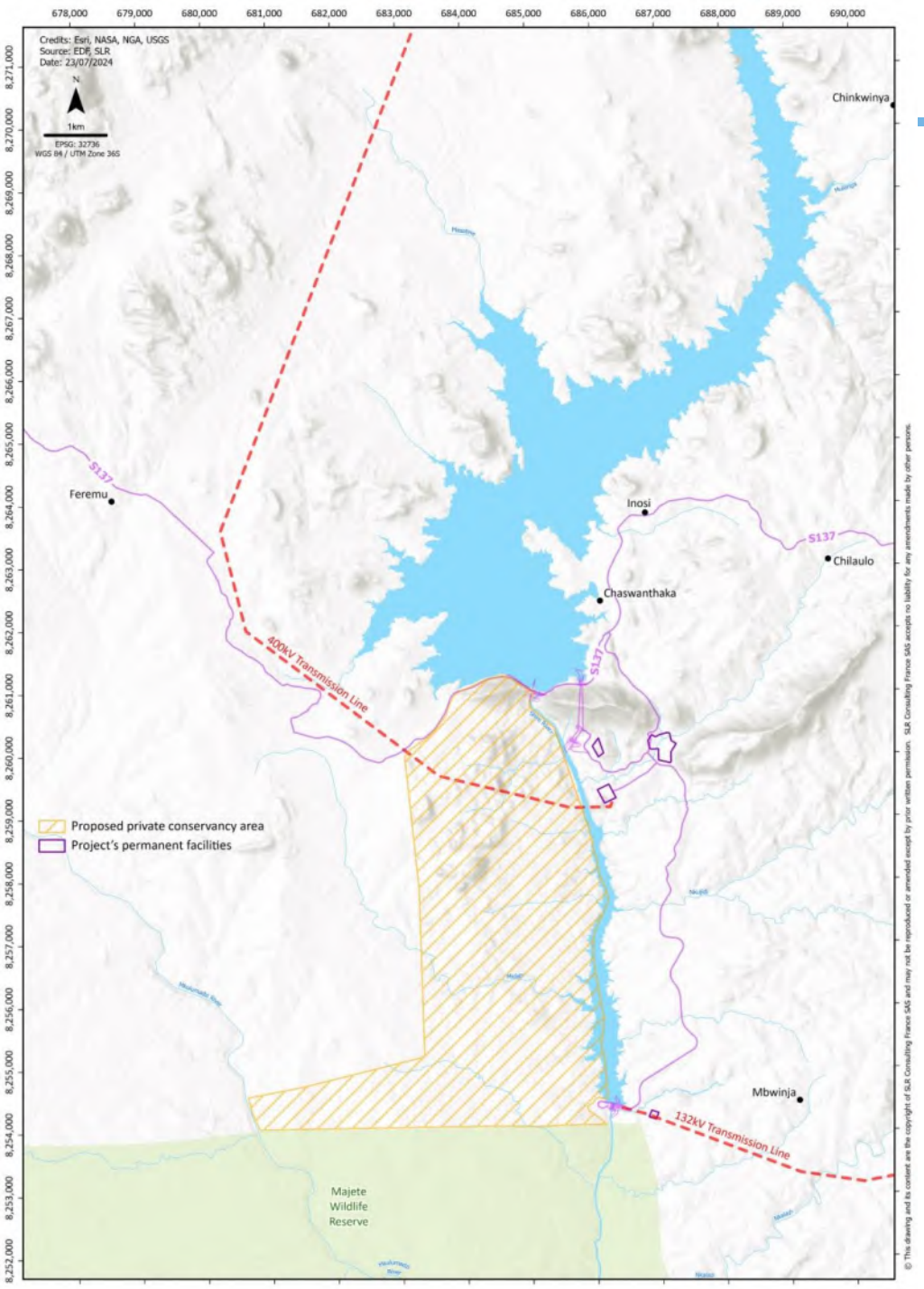
Biodiversity Mitigation Measures

- Demarcate and minimise woodland loss around project sites and full supply level to prevent excess cutting
- Control worker behaviour to prevent poaching/cutting
- Monitor and control aquatic weeds in and around reservoir
- Install bird diverters and anti-electrocution on 132kV and 400kV transmission lines and monitor for bird collision
- Monitor stranded animals (if any) during flooding of reservoirs (especially close to Majete)
- Influx control measures and improved ranger security to protect Majete Reserve



Biodiversity Offsets & Supporting Conservation Actions

- Proposed Terrestrial offset: Create a ~20 km² private conservancy on Neno side of regulating dam to protect and restore woodlands (management by conservation agency/NGO)
- Proposed Aquatic offset: Support community conservation area development in Elephant Marsh (wetland protection)
- Proposed Supporting Conservation Actions:
  - Additional vulture protection measures
  - Awareness & monitoring of pangolin poaching threats
  - Additional rhino protection measures
  - Supporting research and capacity building in southern Malawi



Proposed Private Conservancy on Neno Side

Community Health and Safety

Community Health and Safety Risks

- During construction, the influx of job seekers may alter social cohesion and impact community health. Additional health risks may result from the presence of a large Project workforce, e.g. disease transmission in the community, violence, sexual harassment
- During construction and operation, traffic and road accidents involving local people or workers may increase due to improved S137 road access
- During operation:
  - Presence of the main reservoir may increase water-borne diseases
  - Sudden increases in water levels between Main Dam and Regulating Reservoir will represent a hydraulic safety hazard for people along the shore
  - Increased conflicts between hippos/crocs and farmers along main reservoir banks

Community Health and Safety Mitigation

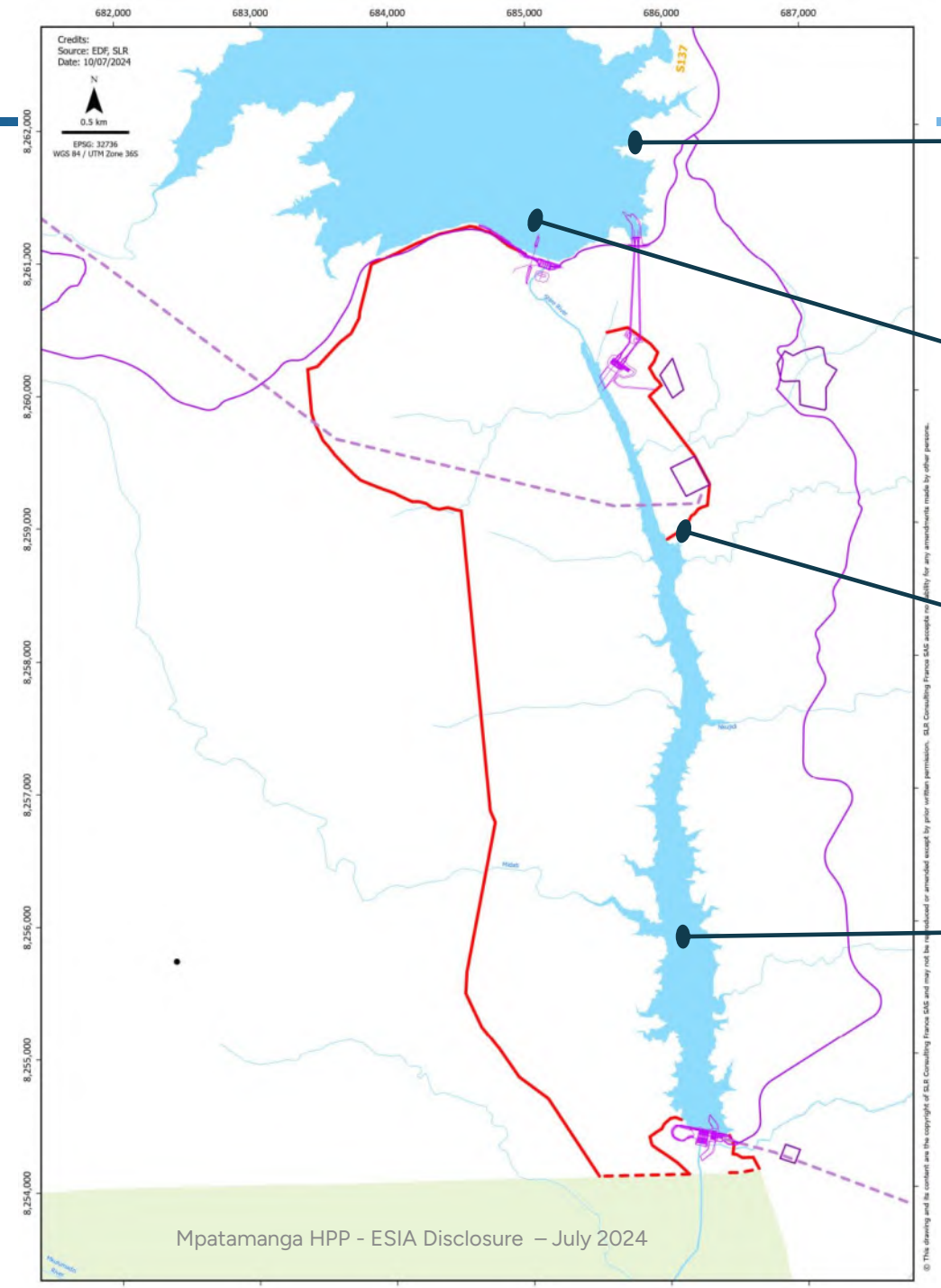
1. Health System Strengthening: Support of (i) District Health Management Teams, (ii) Local health facilities, (iii) Community health workers

2. Security:
   - On site awareness-raising campaigns
   - Opening of a new local police station near the project

3. Safety:
   - Relocation of households too close to construction sites and service road
   - S137 road safety design and awareness-raising campaigns on road safety
   - Safe access to reservoirs for villagers and livestock

Credit: Taz Namalueso

Hydraulic Safety



Safe access for people & cattle

exclusive zone, 500m from dam

Fence and Patrolling

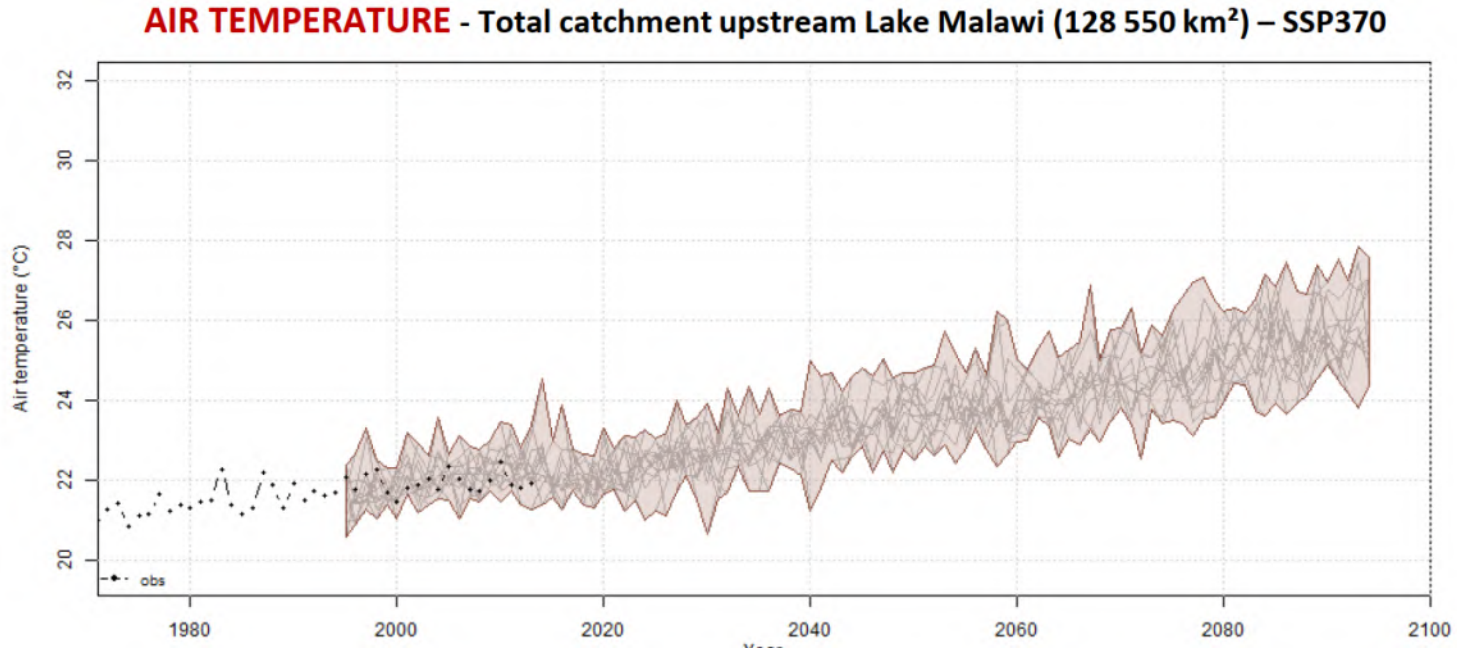
Safe access for people & cattle

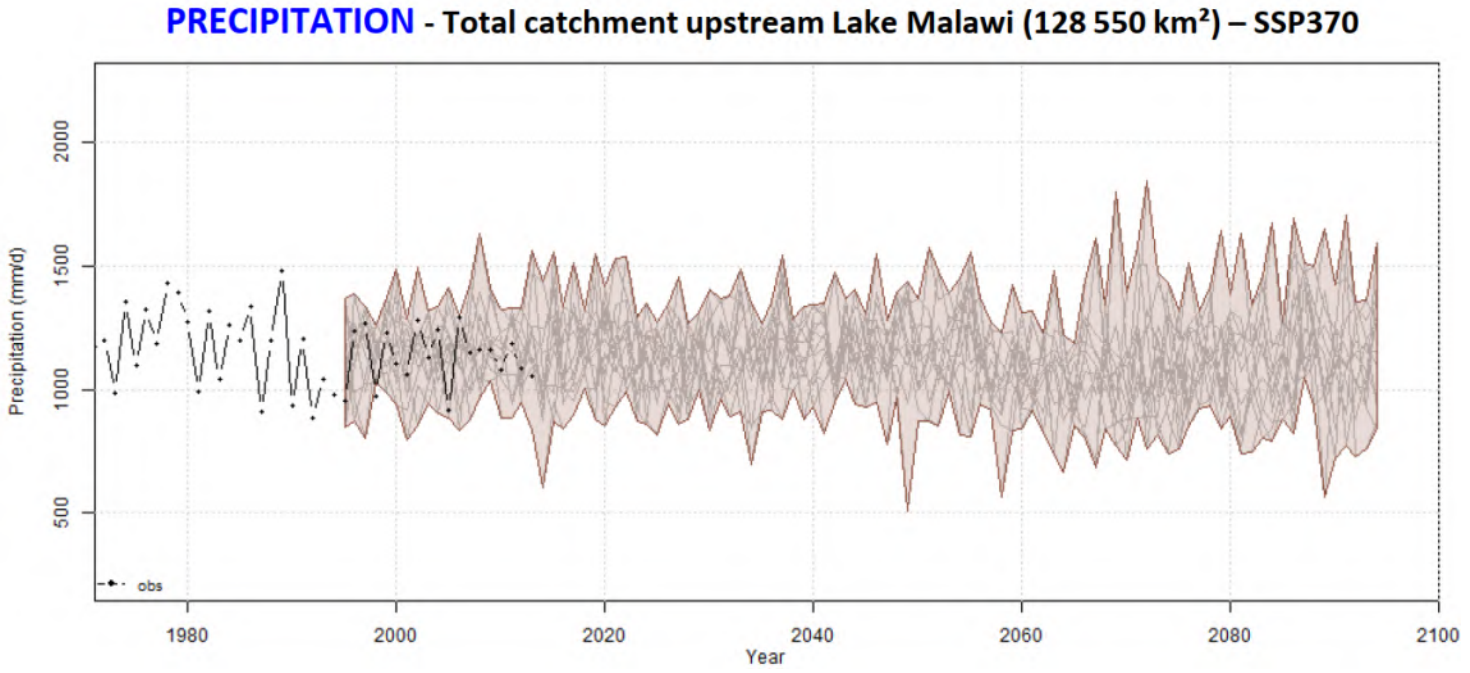
Credit: Taz Namalueso

Climate Change

Climate simulations

- Clear trend of warming
- High uncertainty for future rainfall





Impacts of Climate Change on Project

- 85% of Mpatamanga reservoir inflows come from Lake Malawi
- Lake Malawi outflows depend on rainfall and evaporation (i.e. Temperature)
- Increased temperature will increase evaporation, reducing the Lake outflow if rainfall does not increase
- Risk of reduced inflows to Mpatamanga reservoir
- Uncertainty with future rainfall predictions makes the inflow to the Mpatamanga reservoir uncertain
- Even under reduced flows, Mpatamanga HPP will still be able to peaking production for the next 30 years
- MHPL will include climate change considerations in resettlement planning, and community development initiatives

Local Area Development Plan

Local Area Development Plan

- Benefit sharing scheme
- During construction and operation phase
- Financially support local initiatives which sustainably address educational, economic and social needs of communities
- In the TA Kunthembwe and TA Kuntaja in Blantyre District, TA Mlauli and TA Symon in Neno District, TA Phalula in Balaka District, TA Kasisi and TA Mlilima in Chikwawa District
- Governance, activities, timeframe to be decided with community leaders

Credit: Taz Namalueso

Local Content

Maximizing Local content: jobs and procurement

- MHPL is working on Construction companies (EPC) contracts to specify objectives for local content
- Example:
  - 100% of unskilled jobs for Malawians
  - Access to vocational training
  - Accreditation of informal skills and competencies
  - Inventory of companies in Malawi that could provide supplies and goods to EPC Contractors

Credit: Taz Namalueso

4

Questions & Answers

MHPL
MPATAMANGA HYDRO
POWER LIMITED

THANK YOU