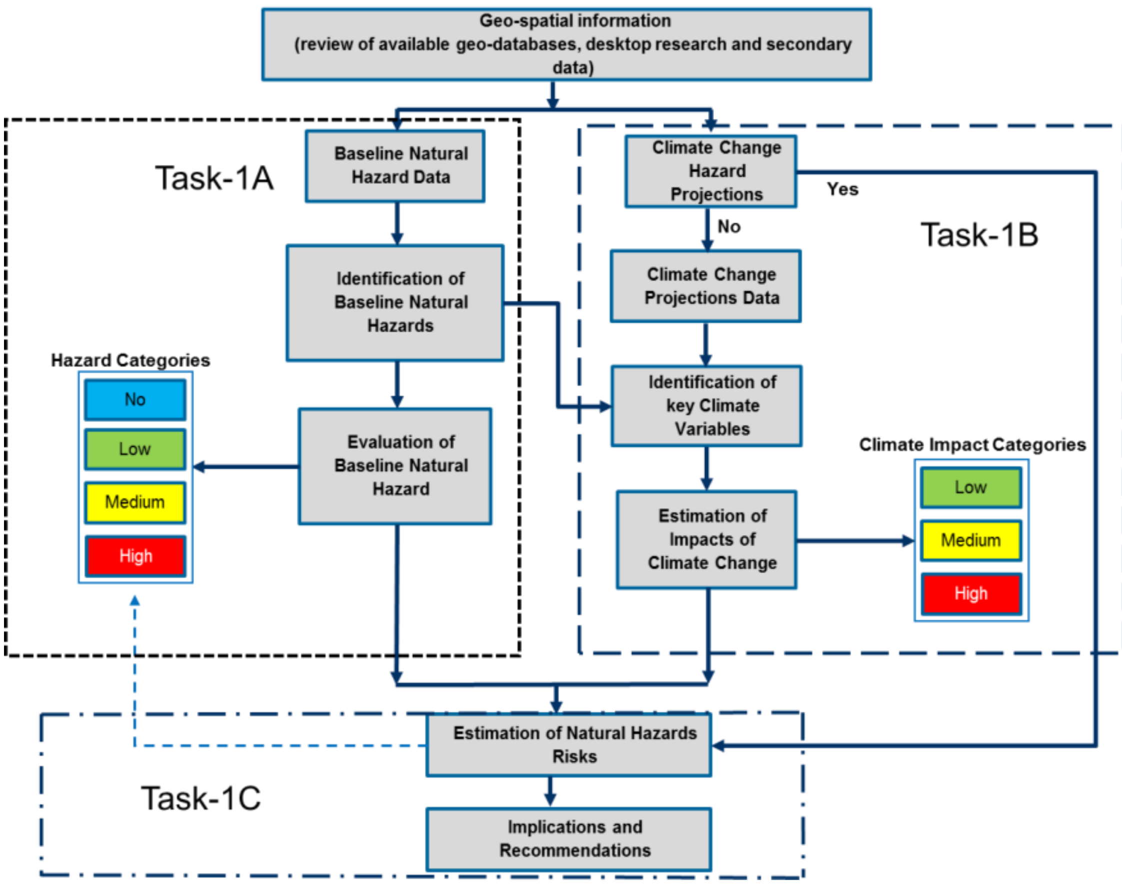
- Task – 3A: The third step involves the evaluation of baseline risk from each natural hazard; the outputs from climate change projections are overlaid qualitatively on the baseline conditions for each hazards to categorize the climate change risk using only the hazard intensity.

Figure 9-66 provides the framework for the current assessment for the extraction of historical and projected data, evaluation of baseline natural hazards and superimposition of climate change projections. The final output is in terms of a semi-quantitative hazard matrix which presents cumulative hazard levels for each study area under baseline and climate change scenario. Based on this outcome, ERM evaluated the high-level implications and the corresponding recommendations for the project components.

Figure 9-66: General Framework for a Natural Hazard and Climate Change Impact Assessment



It should be noted that the present assessment does not aim at a detailed evaluation of asset specific climate related hazards or adequacy of existing design consideration and management plans to adapt the climate change impacts. However, it provides a high level understanding of various natural hazards which are likely to be experienced under baseline and climate change scenario in the areas/ regions in which the Project is located.

Natural Hazard and Climate Change Assessment

This section documents the baseline for natural hazards based on historical data from global, regional, and national databases followed by qualitative evaluation of impacts of climate change on natural hazards.

It should be noted that this is a very high-level review of publicly available information and no detailed site-specific analysis or modelling has been undertaken. Hence, further investigation may be required to quantify the risks in more detail for consideration of adaptation measures.

The likely changes in natural hazards presented here are based on the possible relation between the natural hazards and climatic parameters.

Water Availability

Availability of water is critical to any type of development as water is required throughout the various phases of the project i.e. construction and operational phases. Water availability in itself is not a hazard. However, unavailability of water may impact the project operations as well as health of people working at the project and nearby communities.

Water availability may be impacted by drought i.e. reduced water supply due to below normal rainfall and high evapotranspiration rates, high competition among for common water resource among multiple stakeholders including industry, agriculture and domestic, and seasonal variability

- Baseline Water Availability

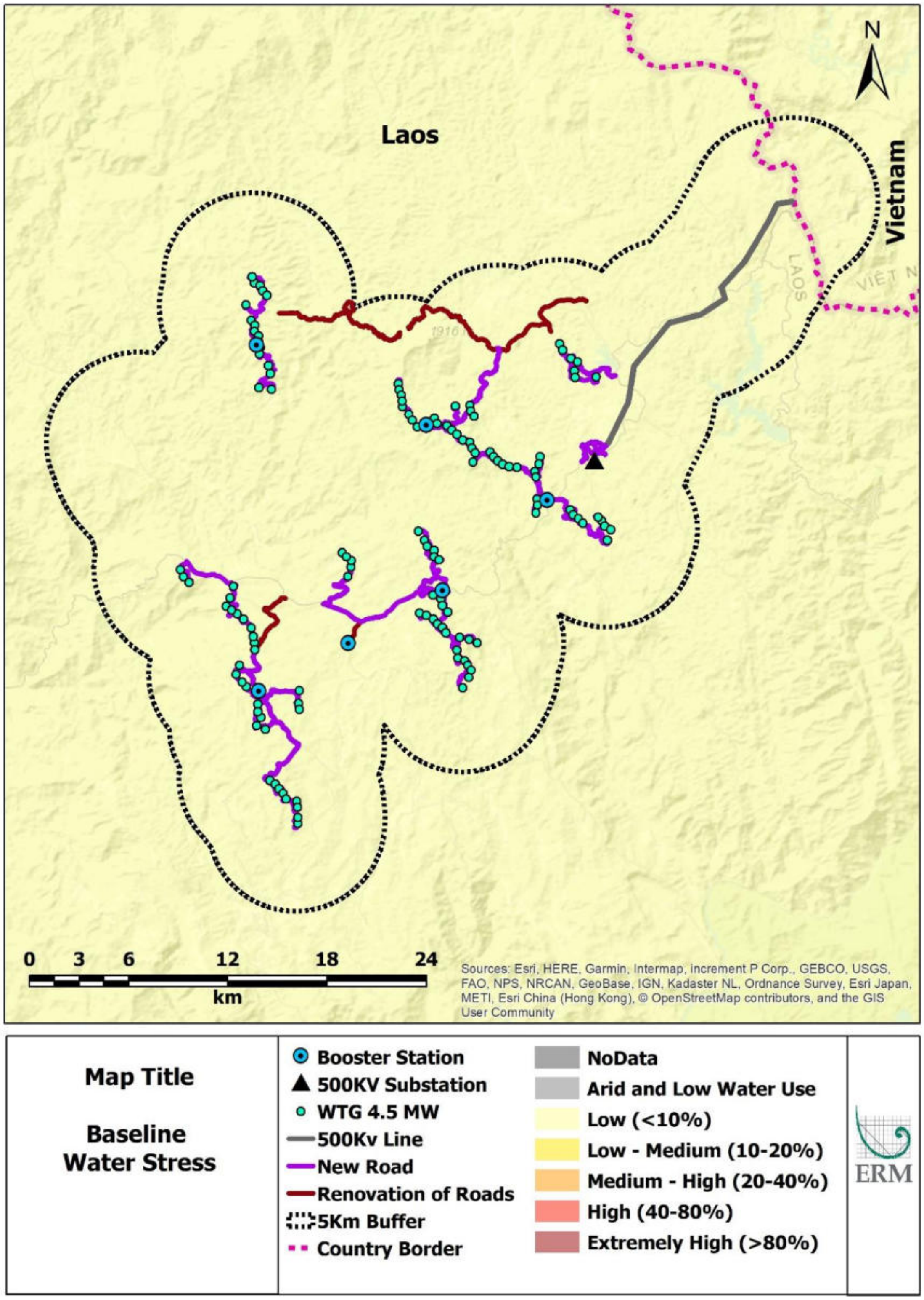
The baseline water stress map as presented in ***Figure 9-67*** indicates ‘Low’ water stress within the study area. Low baseline water stress may be considered to indicate higher availability of water resources or low competition for common water resource.

Water stress is a good indicator to indicate the competition for available water resource and overall availability of water. However, water availability may vary from season especially for countries dependent on seasonal rainfall. Seasonal variability results in higher availability of water during rainy (wet) season and lower availability of water (drought like conditions) during lean period. This may result in acute water scarcity during the lean periods. Therefore, in addition to the water stress parameter, seasonal variability was also assessed as part of present assessment.

The seasonal variability map presented in ***Figure 9-68*** indicates ‘Medium-High’ seasonal variability in the study area. Accordingly, the hazard towards availability of water due to seasonal variability is considered to be ‘***High’*** on a conservative basis.

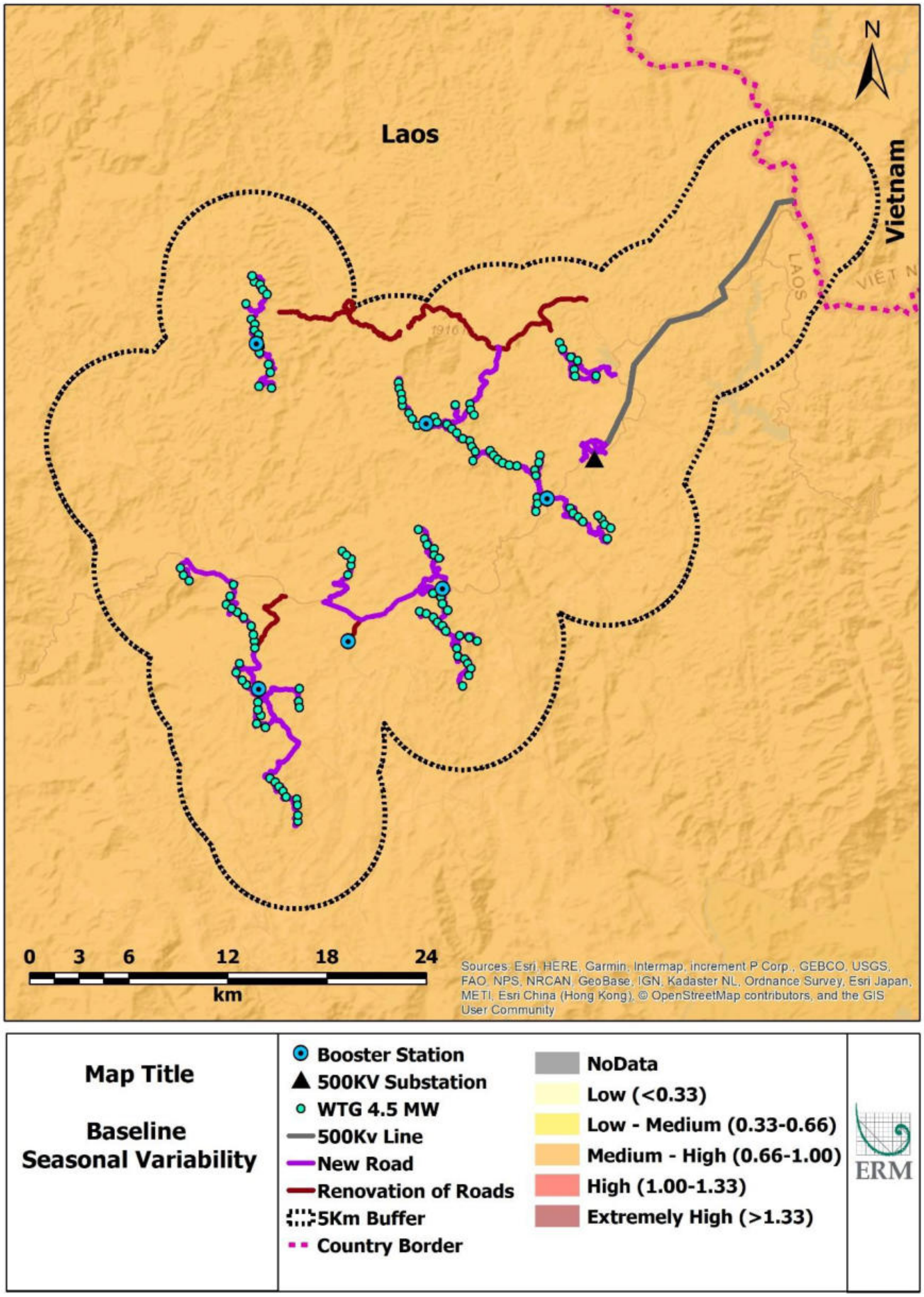
The above evaluation indicated that the area is exposed to ‘Low’ water stress which is likely to be due to low water usage within study area. A review of satellite imagery (Google Earth) indicated that the area under consideration is mostly covered by forest with sparse rural development and agriculture in neighbouring areas. Hence, no intensive water usage is expected in this region. Therefore, considering the Low water usage in the study area, seasonal variability is not likely to have significant impact on overall availability of water. In addition, the wind project is likely to require relatively large quantities of water only during construction phase, and not during its operations. Therefore, overall hazard towards availability of water is considered to be ‘**Low**’ under baseline conditions.

Figure 9-67: Baseline Water Stress



Source: WRI-Aqueduct Water Risk Atlas

Figure 9-68: Baseline Seasonal Variability



Source: WRI-Aqueduct Water Risk Atlas

- Climate Change

Climate change projections for average annual rainfall indicated increasing trend under all climate change scenarios except under RCP 8.5 in 2030. Rainfall under RCP 8.5 in 2030 timeframe indicated a slight decrease (-0.06%). However, projections for evaporation indicated a slightly higher increase as compared to annual rainfall under all climate change scenario. Higher, evaporative losses are likely to be due to increase in average and maximum temperature, and longer warm spells. As a result, net annual rainfall i.e. difference between annual rainfall and evaporation indicated deceasing trend as presented in ***Table 9-93.***

Table 9-93: Climate Change Projections for Annual Rainfall and Evaporation

Parameter	RCP 4.5		RCP 8.5	
	2030	**2050**	**2030**	**2050**
Annual Rainfall	1.6	2.7	-0.06	2.9
Annual Evaporation	1.9	3.2	1.6	3.5
Net Annual Rainfall	-7.0	-9.1	-37.8	-8.7

Climate change projections for water supply under RCP 4.5 and RCP 8.5 scenario during 2030 and 2040` timeframes as presented in ***Figure 9-69*** to ***Figure 9-72*** indicate no significant change. Whereas, as presented in ***Figure 9-73*** to

Figure 9-76. Climate change projections for water demand under all climate change scenarios indicate likely increase by 1.2 x from the baseline. Increased water demand with no significant increase in water supply (renewable water) is likely to result in increased water stress in future.

However, climate change projections for water stress under RCP 4.5 and RCP 8.5 scenarios during 2030 and 2040 timeframes indicate water stress to remain ‘Low’ as presented in ***Figure 9-77*** to ***Figure 9-80***. Therefore, the hazard due to water stress is evaluated to be ‘Low’. The Low water stress under the increased water usage scenario may be attributed to initial Low water usage against the available water under baseline conditions.

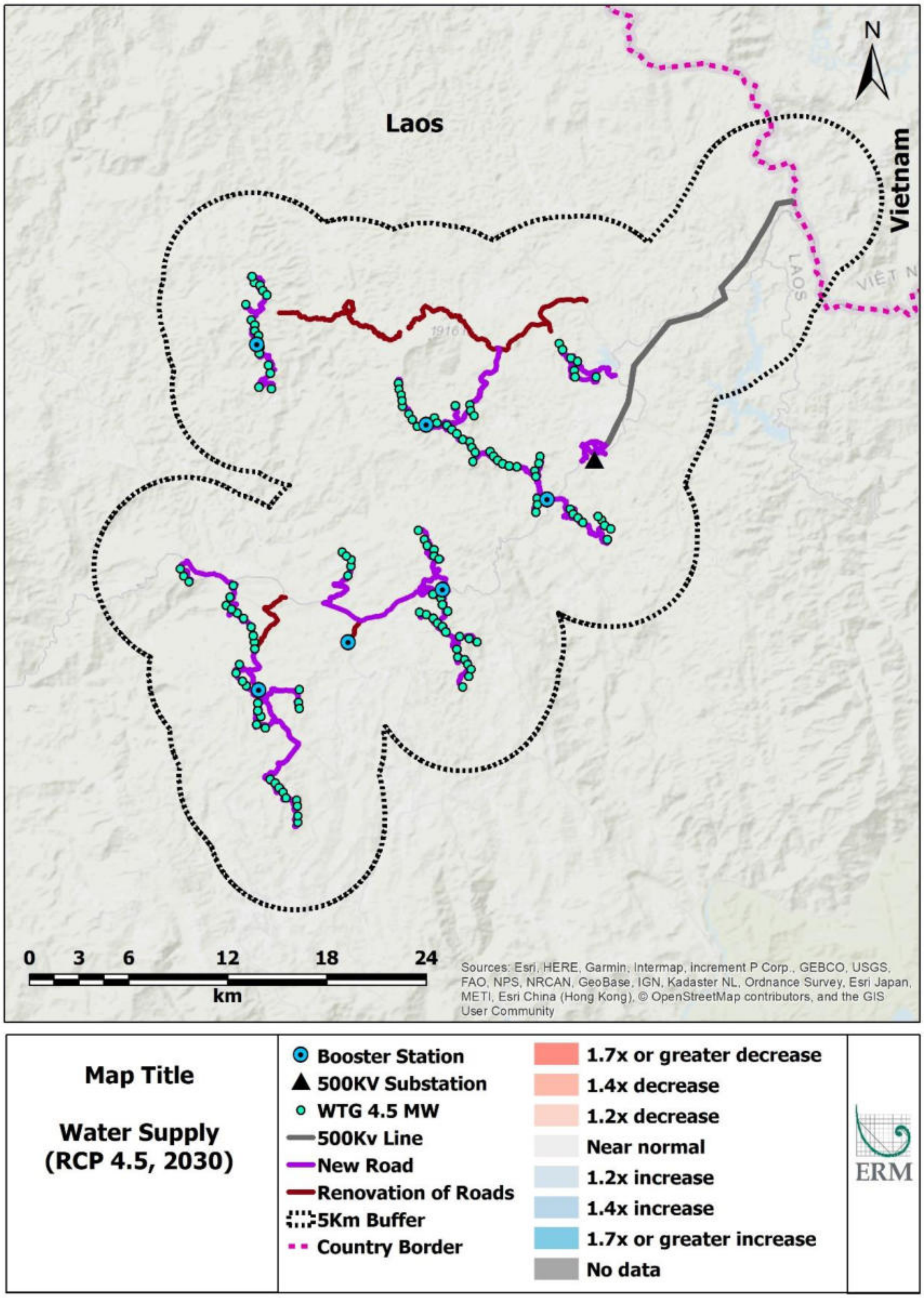
Seasonal variability on the other hand is projected to increase from ‘High’ to ‘Extreme-High’ as presented in ***Figure 9-81*** to ***Figure 9-83*** under RCP 4.5 and RCP 8.5 scenarios through 2040. Accordingly, hazard due to seasonal variability is considered to be ‘***High’***.

However, as discussed earlier as indicated by the land use pattern in the region, and Low water usage as indicated by Low water stress, seasonal variability is not likely to have significant impact on availability of water in general. In addition, the water requirement of the project during operational phases is likely to be significantly lower than during the construction phase. Hence, the hazard due to availability of water is considered to remain ‘Low’ under all climate change scenarios (***Table 9-94***).

Table 9-94: Summary for Hazard Due to Water Availability under Baseline and Climate Change Scenarios

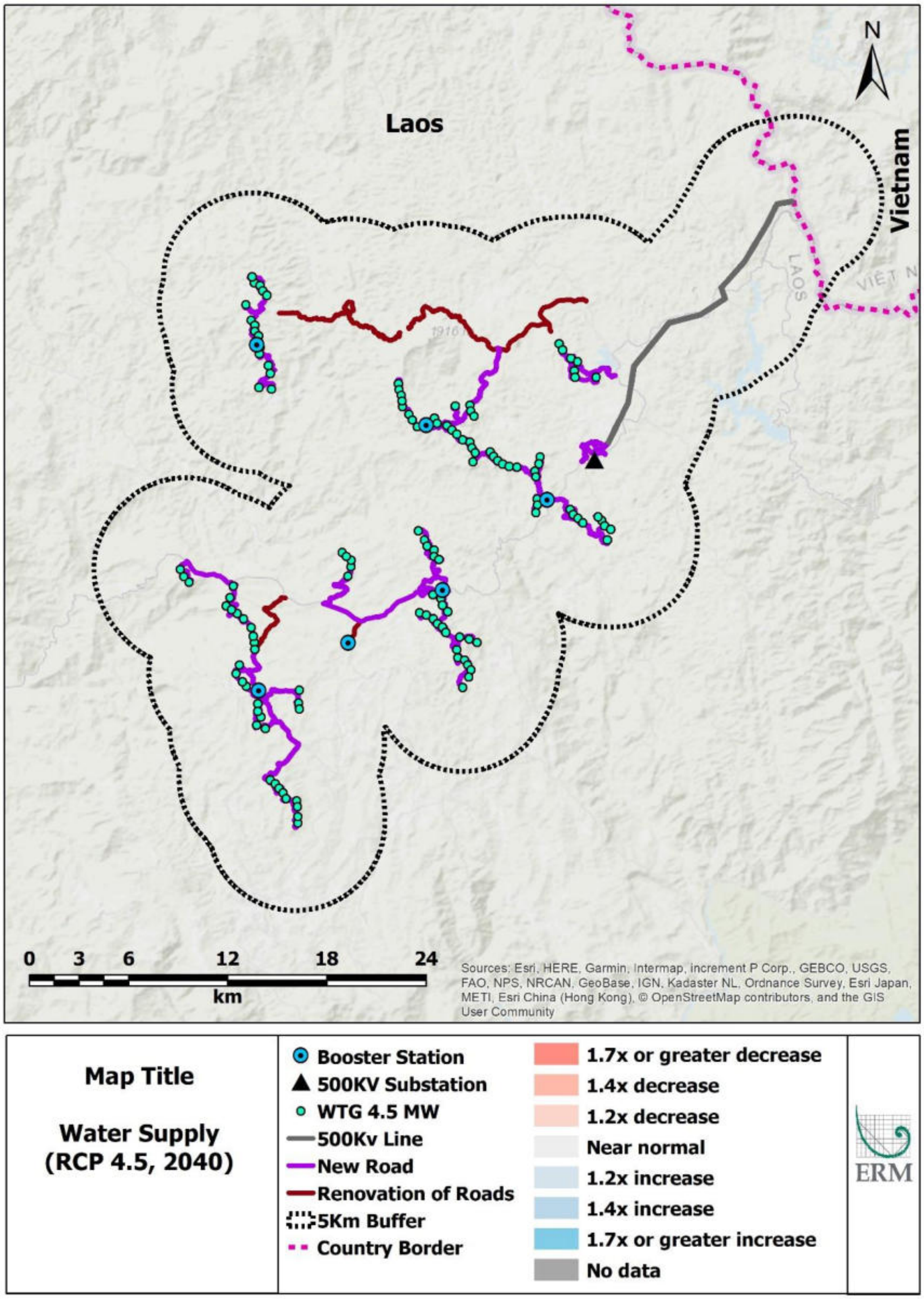
Baseline	RCP 4.5		RCP 8.5	
	2030	2050	2030	2050
Low	Low	Low	Low	Low

Figure 9-69: Water Supply RCP 4.5/2030



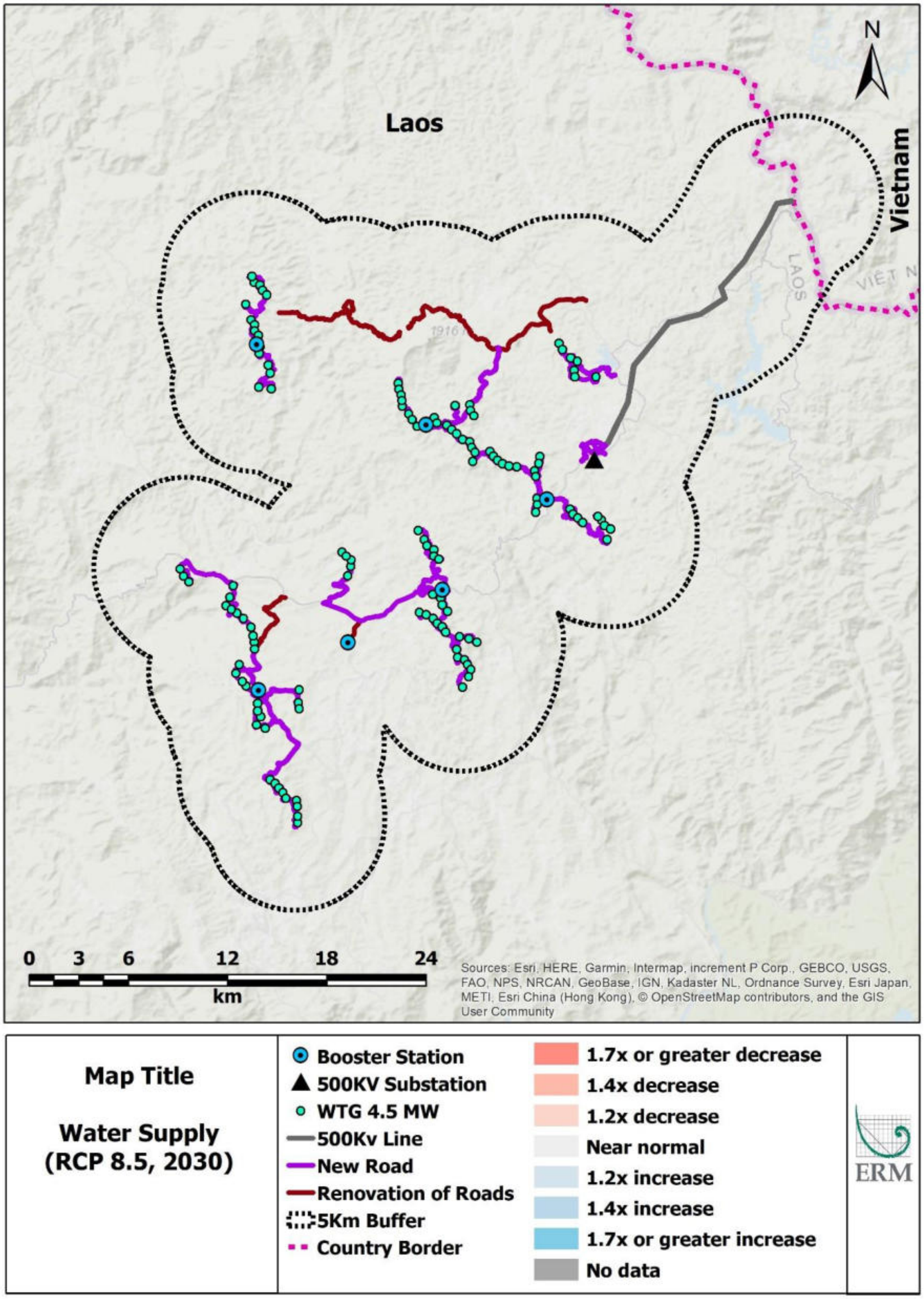
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-70: Water Supply RCP 4.5/2040



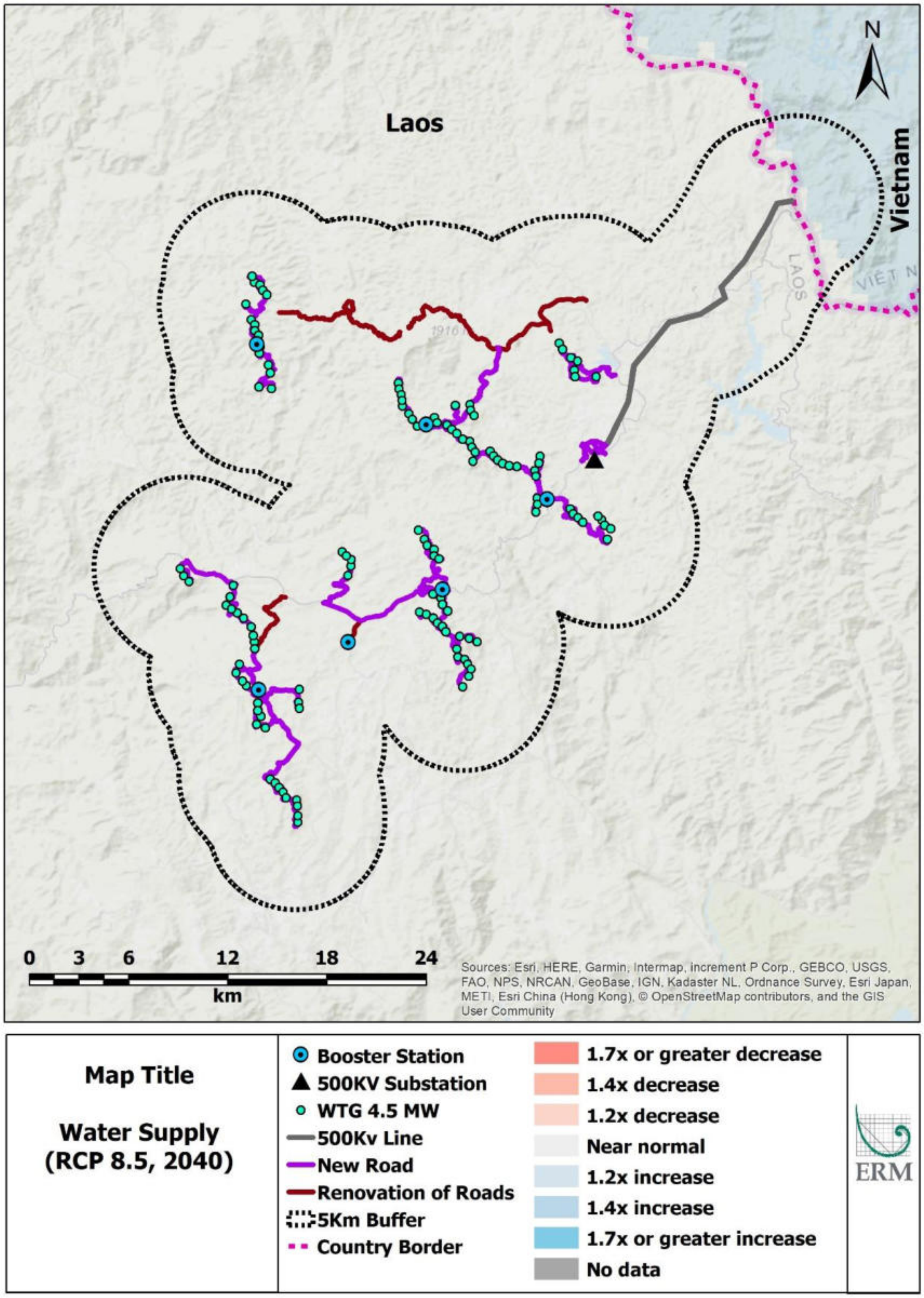
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-71: Water Supply RCP 8.5/2030



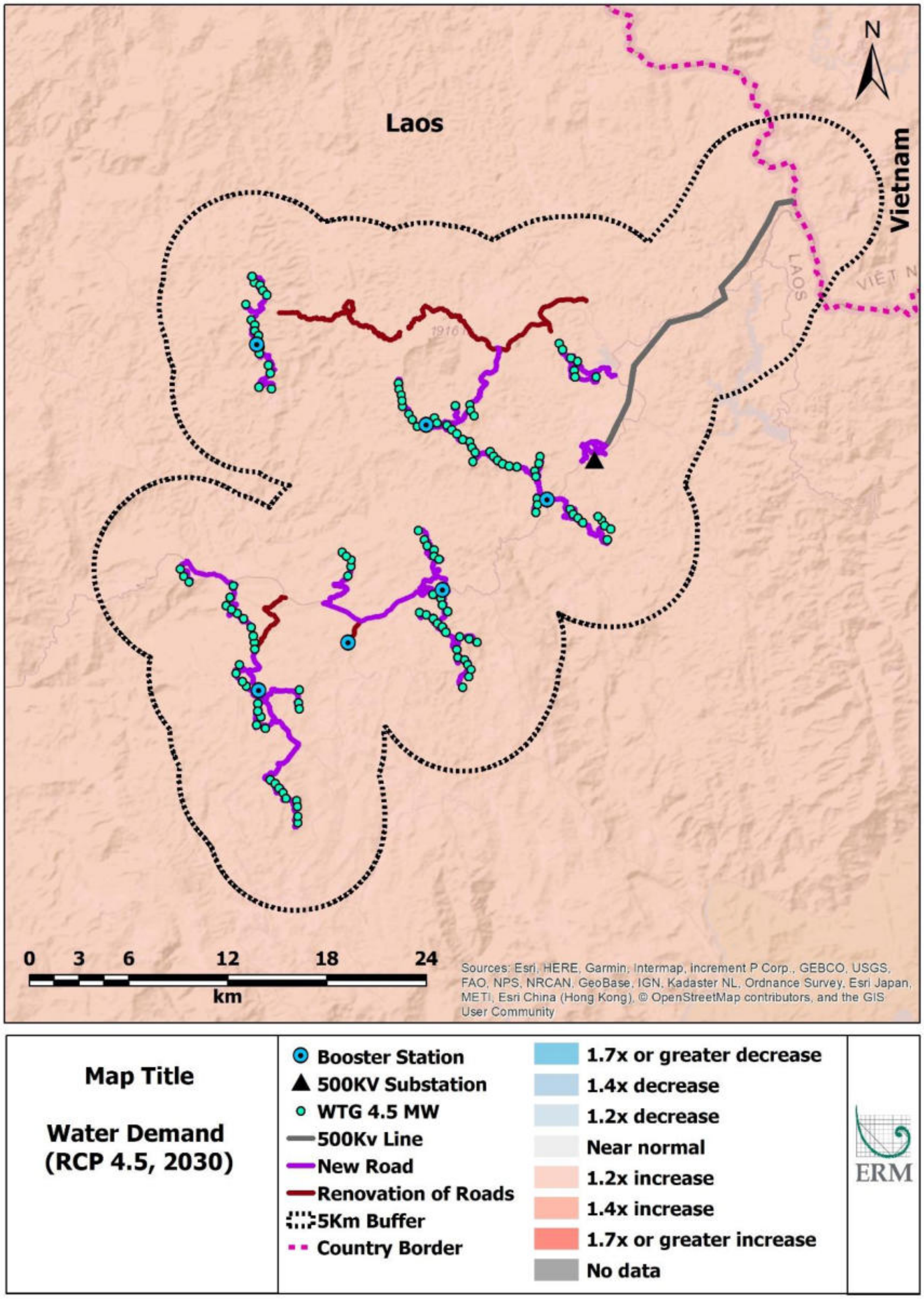
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-72: Water Supply RCP 8.5/2040



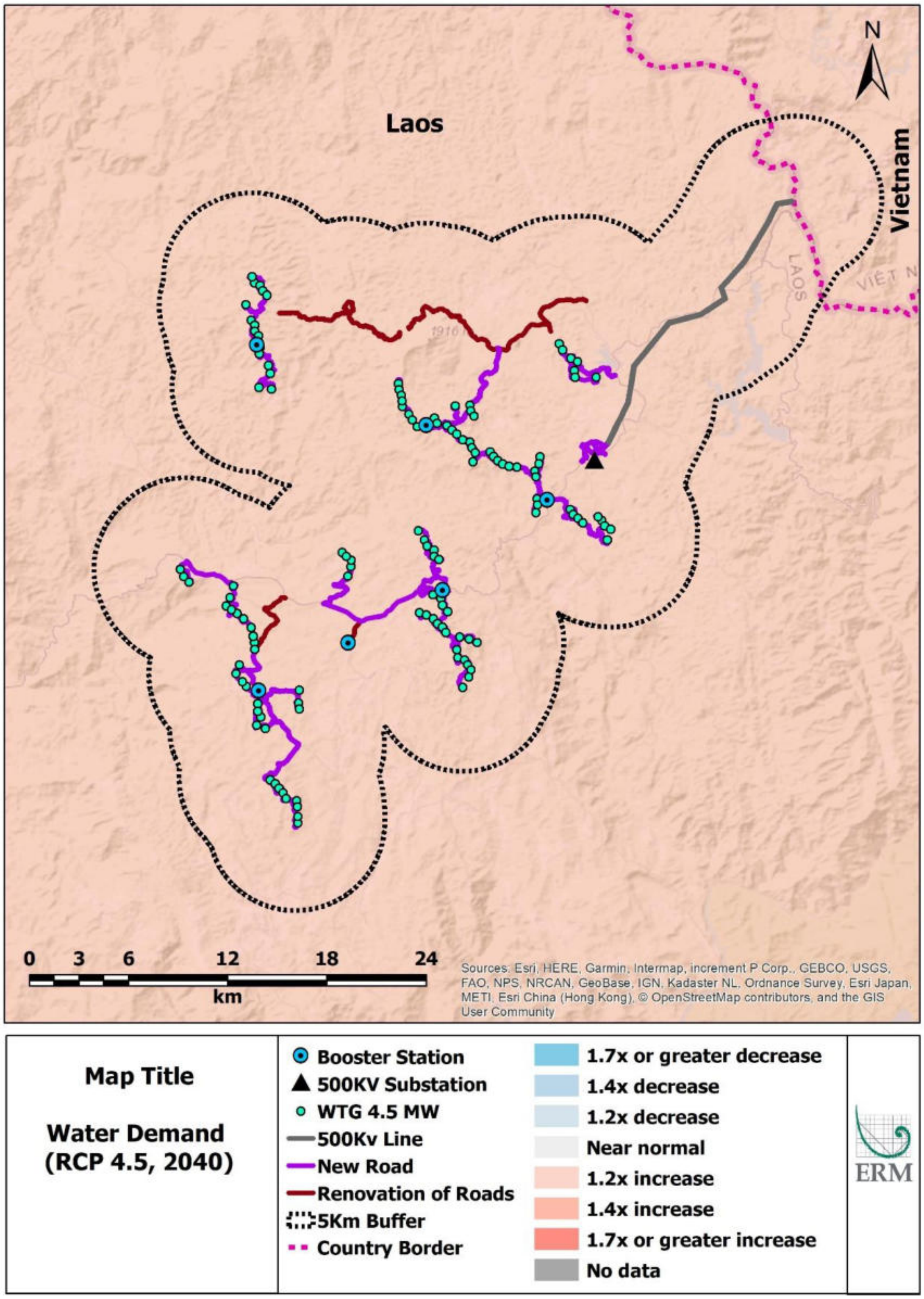
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-73: Water Demand RCP 4.5/2030



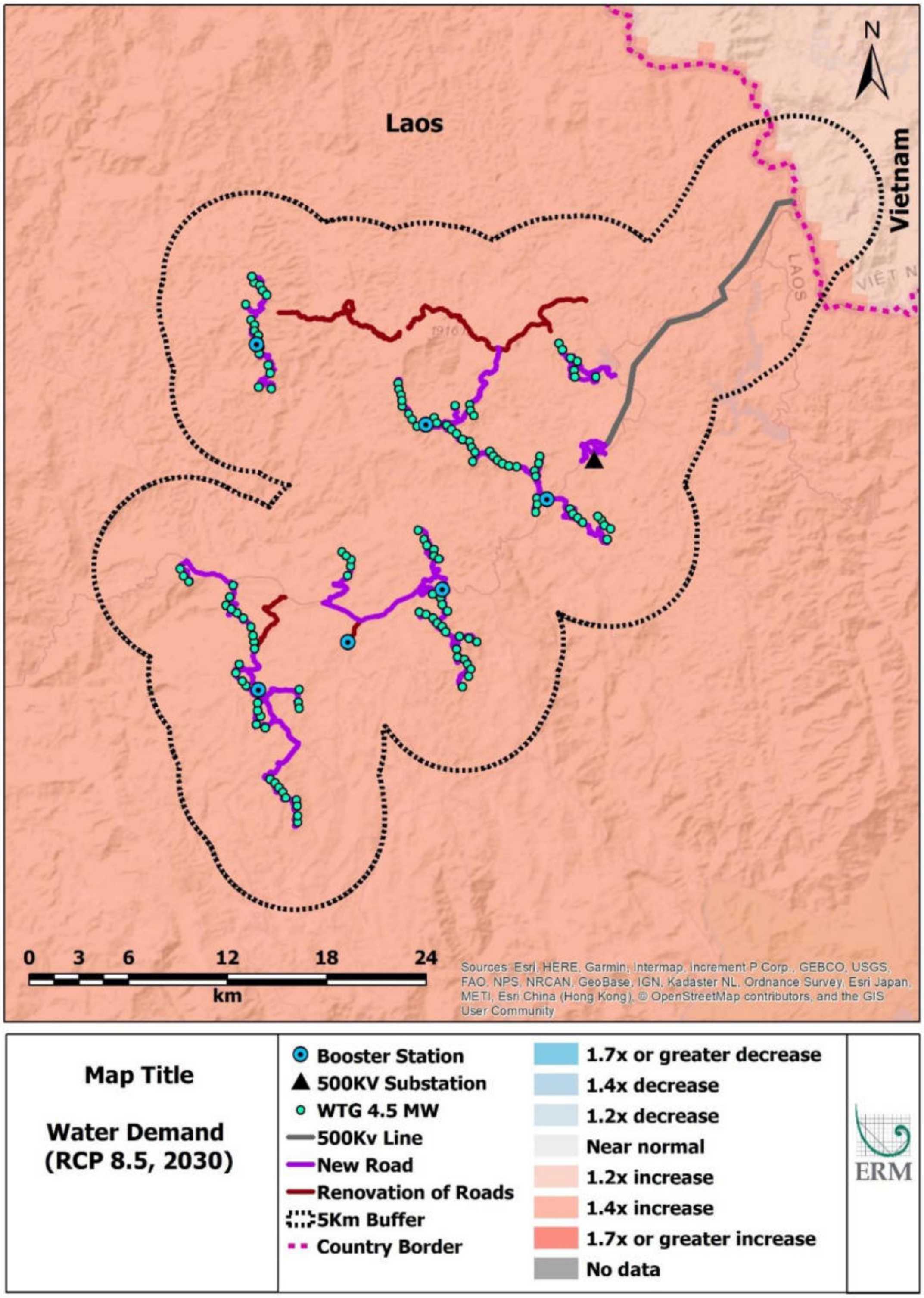
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-74: Water Demand RCP 4.5/2040



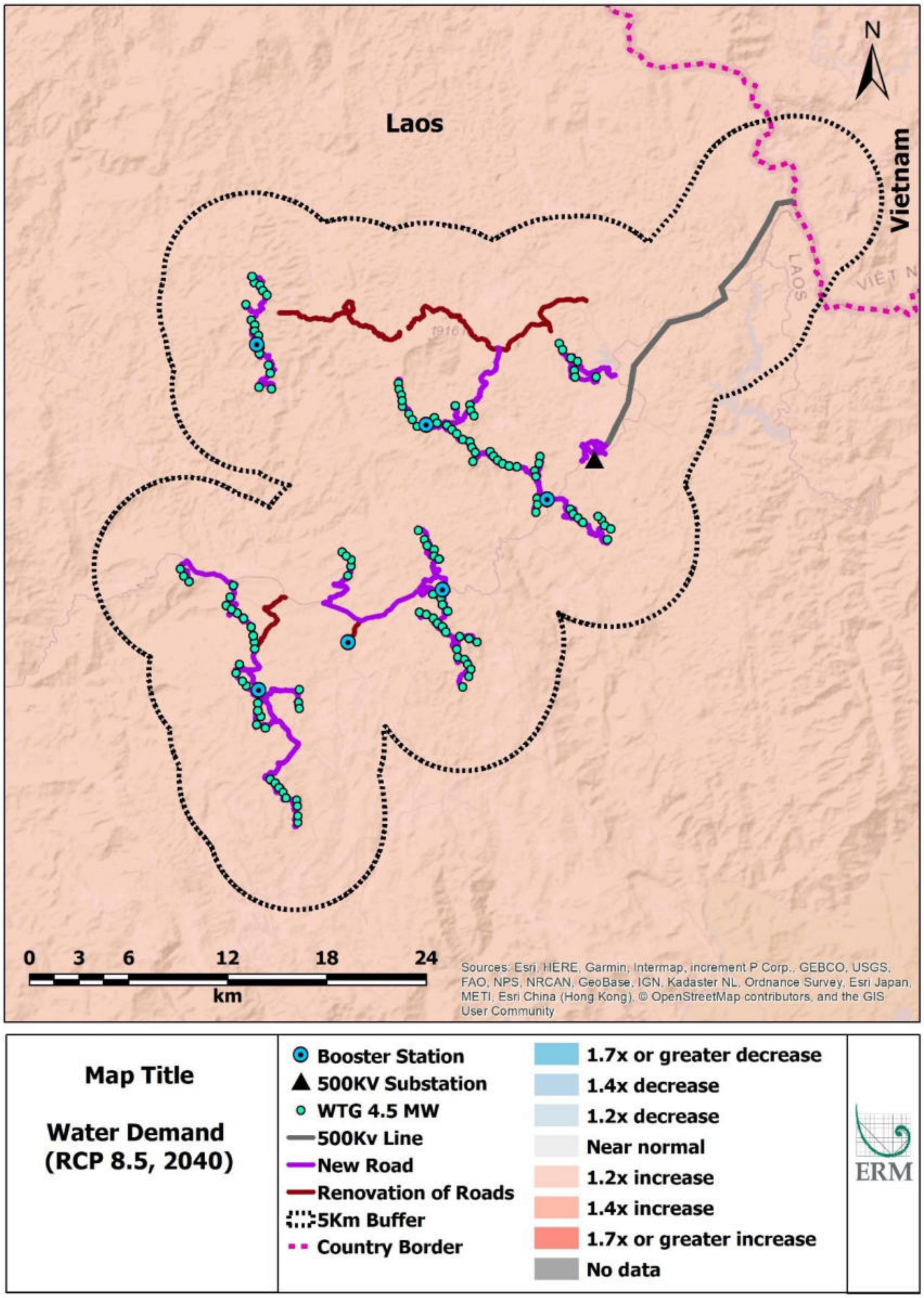
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-75: Water Demand RCP 8.5/2030



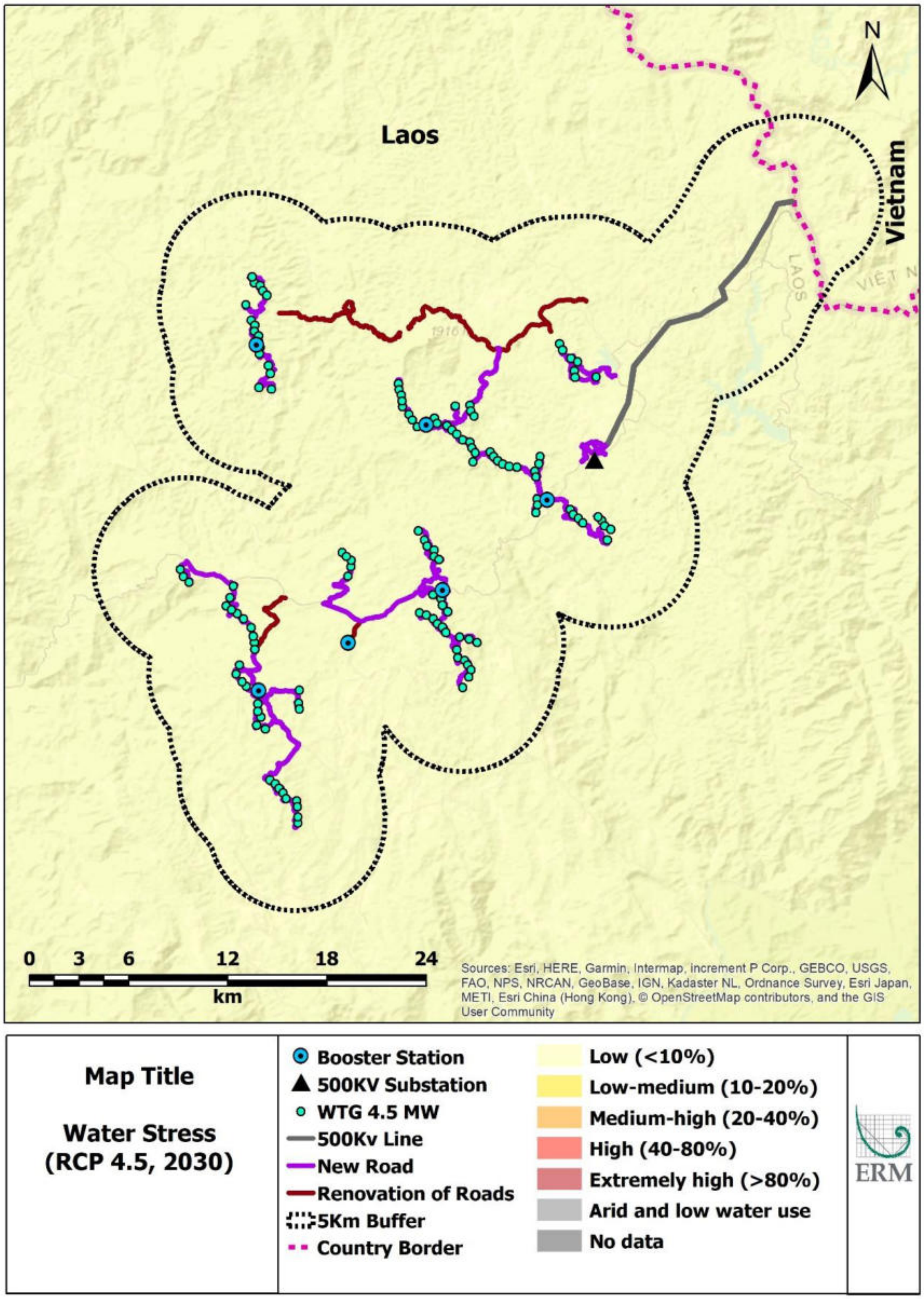
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-76: Water Demand RCP 8.5/2040



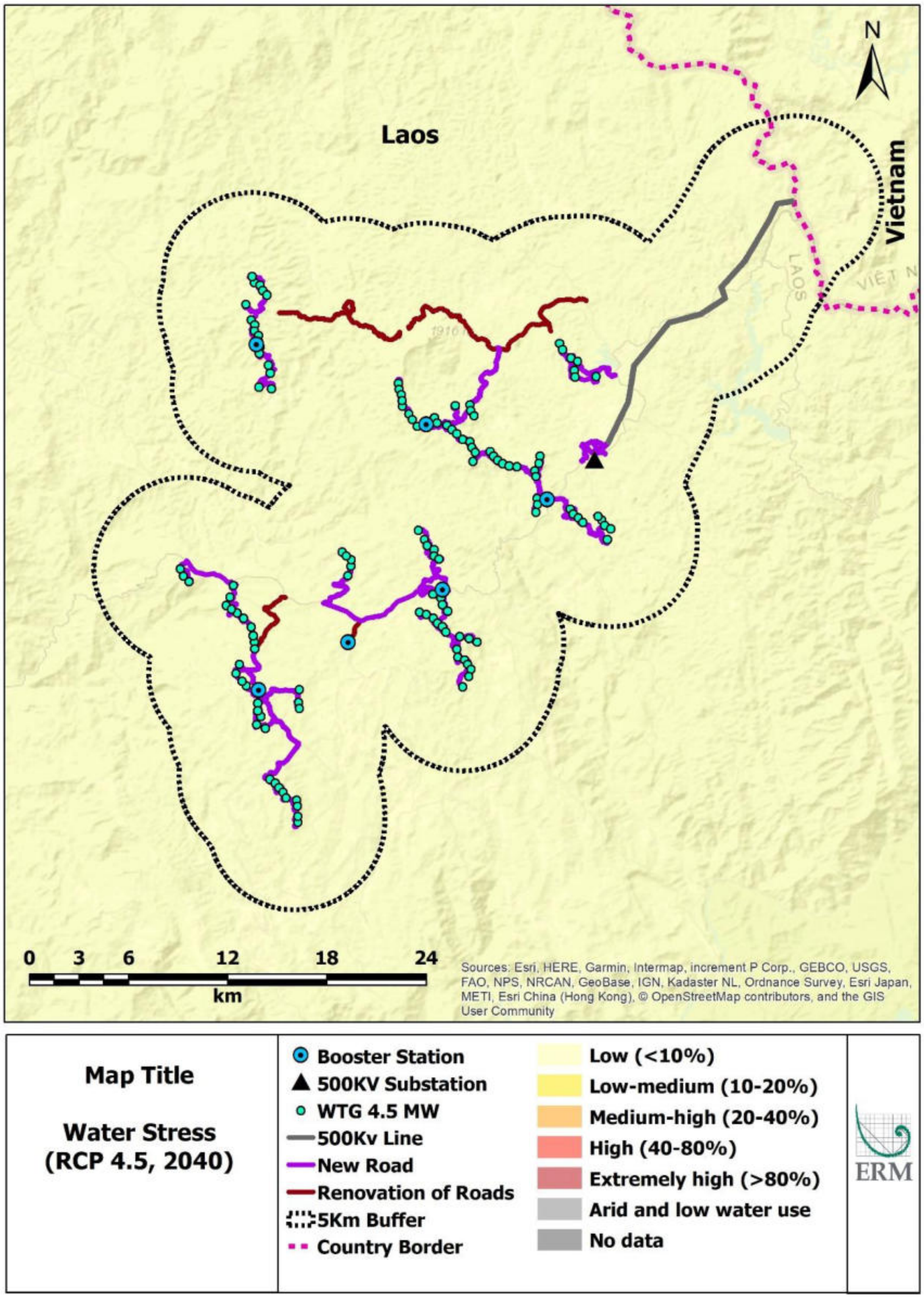
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-77: Water Stress RCP 4.5/2030



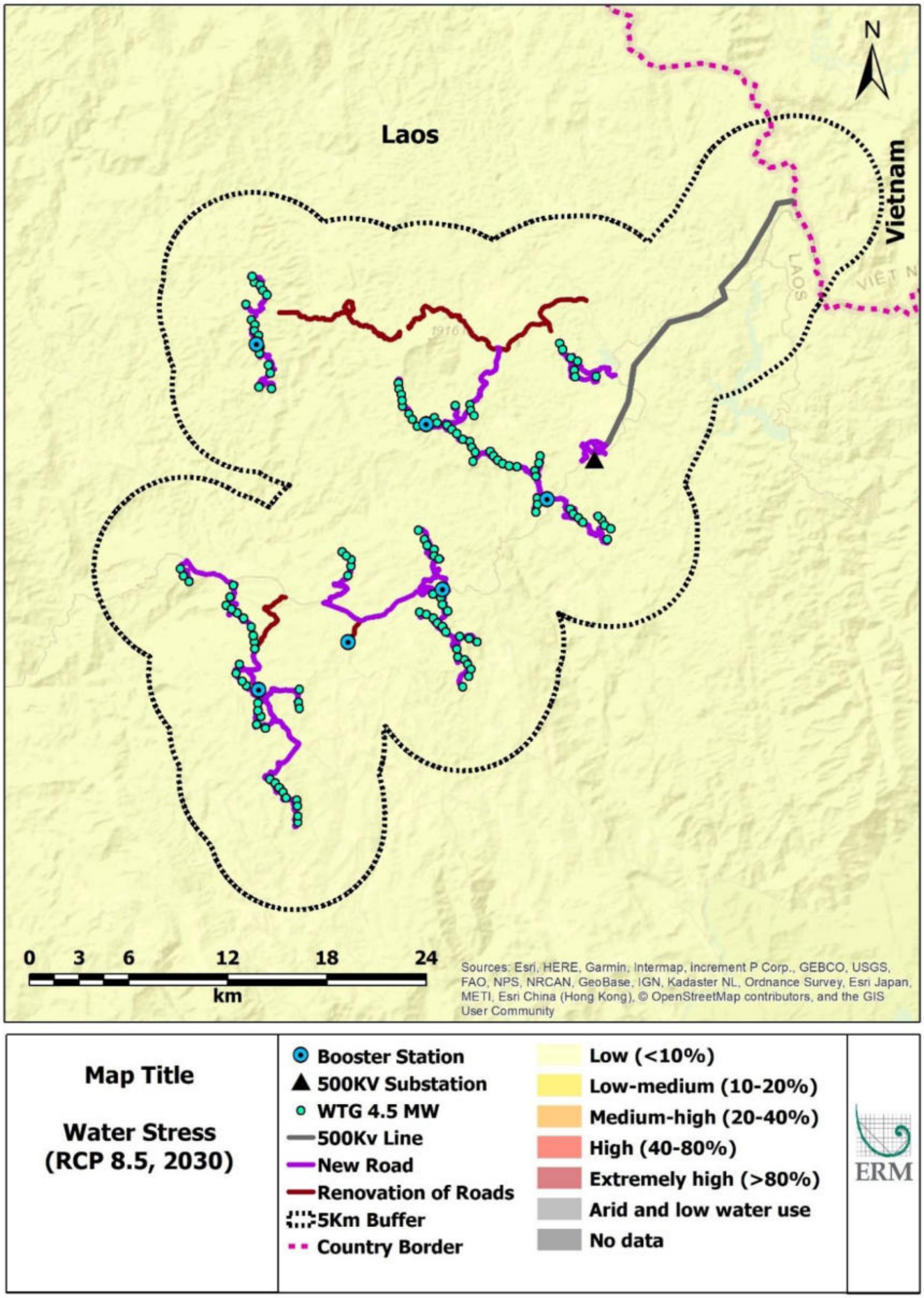
Source: WRI-Aqueduct Water Risk Atlas

Figure 9-78: Water Stress RCP 4.5/2040



Source: WRI-Aqueduct Water Risk Atlas

Figure 9-79: Water Stress RCP 8.5/2030



Source: WRI-Aqueduct Water Risk Atlas