Based on the given assurance case pattern for handling hazards and risks using placeholders like {A :: System}, {B :: Hazard}, {S :: BTD}, {R :: Hazard}, {U :: Consequence}, etc., here is an instantiated assurance case for the BlueROV2 system in a hierarchical tree format:

@Assurance\_case

- G1: Hazards for BlueROV2 addressed in accordance with ALARP principle.

- S1: Argument by risk reduction/elimination of each hazard

- G2: No intolerable risks present in the system.

- C1: Definition of "intolerable"

- S2: Argue that risk posed by any remaining hazards is negligible (undeveloped)

- S3: Argue that no other risks have been identified (undeveloped)

- G3: Risk from electrical short-circuit has been reduced as low as reasonably practicable.

- C2: Assigned severity class is high

- S4: Apply ReSonAte to estimate level of risk from hazard condition electrical short-circuit

- A1: Function isolation switch required by BTD is available (assumption)

- G4: Model BTD accurately describes possible propagation of hazard electrical short-circuit.

- G6: Possible hazard propagation paths correctly captured in BTD (undeveloped)

- G7: Barriers in the BTD correctly describe their respective control action including any required system functions (undeveloped)

- G8: All non-negligible threats have been identified (undeveloped)

- G5: Quantitative risk estimates are accurate and below acceptable threshold.

- G9: State probability distribution used for risk estimation is an accurate representation of expected system states (undeveloped)

- G10: Estimated probability of catastrophic flooding is below allowable threshold for high severity class.

- Sn1: Estimated risk level is 0.002 per dive

@End\_Assurance\_case

Explanation of structure:

- The primary goal (G1) is about addressing all relevant hazards of the BlueROV2 under the ALARP principle.

- Strategy S1 supports the main goal and breaks down into the subsidiary goals (G2 and G3) with G2 focusing on demonstrating that no intolerable risks are present, supported by context C1 and strategies S2 and S3.

- G3 aims at risk reduction for a specific identified hazard (e.g., electrical short-circuit) with detailed risk evaluation strategy S4 which uses hazard-specific BTD modeling and assumption A1.

- Below S4, the model's validity (G4) and accuracy of risk estimates (G5) are further explored with their respective breakdowns into more specific goals and eventual solution Sn1, which is a direct quantitative risk estimate related specifically to severe consequences (e.g., catastrophic flooding) mitigated to below defined thresholds.

- Some goals, strategies, and solutions remain undevoloped or uninstantiated, indicating further work required or placeholders needing instantiation. These elements hold placeholders or assumptions, indicating specific areas of focus for additional evidence collection or analysis.