Here's the hierarchical tree format of the assurance case for the BlueROV2 system:

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- Goal (G1, Hazards for BlueROV2 system addressed in accordance with ALARP principle.)

- Strategy (S1, Argument by risk reduction/elimination of each hazard)

- Goal (G2, No intolerable risks present in the system.)

- Context (C1, Definition of "intolerable")

- Strategy (S2, Argue that risk posed by any remaining hazards is negligible) (Undeveloped)

- Strategy (S3, Argue that no other risks have been identified) (Undeveloped)

- Goal (G3, Risk from hazard collision has been reduced as low as reasonably practicable)

- Context (C2, Assigned severity class is high)

- Strategy (S4, Apply ReSonAte to estimate level of risk from hazard condition collision)

- Assumption (A1, Function obstacle detection required by the BTD is available)

- Goal (G4, Model BTD accurately describes possible propagation of hazard collision) (Uninstantiated)

- Goal (G6, Possible hazard propagation paths correctly captured in BTD) (Undeveloped)

- Goal (G7, Barriers in the BTD correctly describe their respective control action including any required system functions) (Undeveloped)

- Goal (G8, All non-negligible threats have been identified) (Undeveloped)

- Goal (G5, Quantitative risk estimates are accurate and below acceptable threshold)

- Goal (G9, State probability distribution used for risk estimation is an accurate representation of expected system states) (Undeveloped)

- Goal (G10, Estimated probability of collision consequence is below allowable threshold for severity class) (Uninstantiated)

- Solution (Sn1, Estimated risk level is low) (Uninstantiated)

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Here's a brief breakdown of the instantiated components:

- \*\*G1\*\*: Claims that hazards for the BlueROV2 system are addressed as per the ALARP principle (As Low As Reasonably Practicable).

- \*\*S1\*\*: Strategy to argue risk reduction or elimination of each hazard.

- \*\*G2\*\*: Describes no intolerable risks present in the system, contextualized by \*\*C1\*\*, related to the definition of "intolerable".

- \*\*S2\*\* and \*\*S3\*\*: Strategies to argue remaining risks are negligible or no other risks identified (both undeveloped).

- \*\*G3\*\*: Focuses on the risk from the specific hazard of collision, contextualized by \*\*C2\*\*, which defines the assigned severity class as high.

- \*\*S4\*\*: Application of ReSonAte to estimate risk level from the collision hazard, supported by:

- \*\*A1\*\*: Assumption that the function of obstacle detection required by the Bayesian Threat Dependency (BTD) is available.

- \*\*G4\*\*: Claim that the BTD model accurately describes hazard propagation paths (uninstantiated), leading to:

- \*\*G6 - G8\*\*: Goals on capturing hazard paths, barrier correctness, and identifying threats (undeveloped).

- \*\*G5\*\*: Ensures quantitative risk estimates are accurate and below thresholds, leading to:

- \*\*G9\*\*: Distribution state representation accuracy (undeveloped).

- \*\*G10\*\*: Claim that the estimated probability of collision consequence is below allowable threshold (uninstantiated), supported by \*\*Sn1\*\*: which is the estimated risk level claim (uninstantiated).

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