To instantiate the given assurance case pattern specifically for the BlueROV2 system, we will replace the placeholders with system-specific information derived from the domain information provided. Below is a structured hierarchical tree representation of the instantiated assurance case:

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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 obstacle encounter has been reduced as low as reasonably practicable)

Context (C2, Assigned severity class is Major) [Uninstantiated]

Strategy (S4, Apply ReSonAte to estimate level of risk from hazard condition obstacle encounter)

Assumption (A1, Function avoidance logic required by BTD is available) [Uninstantiated]

Goal (G4, Model obstacle encounter BTD accurately describes possible propagation of hazard obstacle encounter) [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 is below allowable threshold for severity class Major) [Uninstantiated]

Solution (Sn1, Estimated risk level 10^-3 per hour) [Uninstantiated]

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\*\*Explanation of GSN Notation Elements in this Structure:\*\*

- \*\*Goal (G):\*\* Claims made on the system; these represent what needs to be assured.

- \*\*Strategy (S):\*\* The method or approach describing how the parent goals are supported by the child goals.

- \*\*Context (C):\*\* Provides additional information important for understanding or framing the goals or strategies.

- \*\*Assumption (A):\*\* Statements taken as true for the purpose of the case but which are not substantiated within this case.

- \*\*Solution (Sn):\*\* Reference to evidence supporting the claim made in a goal.

\*\*Decorators:\*\*

- \*\*[Uninstantiated]:\*\* Elements marked with this require specific system-related details to be filled in.

- \*\*[Undeveloped]:\*\* Indicates that these parts of the assurance case still need further elaboration or development.

This pattern instantiation takes into account specific aspects of the BlueROV2 system (such as hazards, BTD strategies, and specific functions) to demonstrate how it satisfies the safety requirements as per the ALARP principle.