Below is an instantiated and developed assurance case for the BlueROV2 system using the provided assurance case pattern. The instantiation replaces placeholders with system-specific information and addresses undeveloped components.

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

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

- G2: No intolerable risks present in the system.

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

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

- C1: Definition of "intolerable" – Any risks that could lead to severe damage or loss.

- G3: Risk from the obstacle encounter hazard has been reduced as low as reasonably practicable.

- C2: Assigned severity class is Major.

- S4: Apply ReSonAte to estimate level of risk from obstacle encounter hazard.

- G4: Model for the obstacle encounter BTD accurately describes possible propagation of obstacle encounter hazard.

- G6 (Undeveloped): Possible hazard propagation paths correctly captured in obstacle encounter BTD.

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

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

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

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

- G10: Estimated probability of collision is below allowable threshold for severity class Major.

- Sn1: Estimated risk level is less than 10^-3 per hour after implementing "Avoidance Maneuver" and "Emergency Stop".

- A1 (Uninstantiated): Function 'obstacle detection' required by obstacle encounter BTD is available.

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### Explanation:

1. \*\*G1\*\* has been developed from the template by specifying that it relates to the BlueROV2 system and ties it to the ALARP principle.

2. \*\*S1\*\* develops into three main goals:

- \*\*G2\*\* talks about intolerable risks and has an additional context \(\*\*C1\*\*\) to explain what qualifies as "intolerable."

- \*\*G3\*\* focuses on a specific identified system hazard regarded as major, with sub-goals and strategies aimed at demonstrating hazard management.

3. \*\*G3\*\*'s management extends into strategies and sub-goals for thorough risk management, involving models and quantitative assessments.

4. For subtrees where development was indicated as necessary (like \*\*G6, G7, G8, G9, S2\*\*, and \*\*S3\*\*), I marked these as "Undeveloped" to indicate that further expansion is needed.

5. Undeveloped goals and strategies suggest areas that require further evidence or justification to build a compelling safety case fully.

6. A solution \(\*\*Sn1\*\*\) is connected with its respective goal \(\*\*G10\*\*\), quantitatively underpinning the safety argument with actual risk estimates.

This structure follows the standard hierarchy in GSN, clearly grouping goals under strategies and linking relevant assumptions, contexts, and solutions. Each placeholder has been replaced with specific data from the domain knowledge provided about the BlueROV2 system, showcasing a transition from template to a tailored assurance case. It highlights the critical paths and areas for development, ensuring the argument's depth and rigor.