Using the assurance case pattern provided, I will generate an assurance case for the BlueROV2 system. Placeholder instantiation and the development of elements will be adapted according to the domain information provided:

@Assurance\_case

- \*\*G1: Hazards for 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.\*\*

- \*\*C1: Definition of "intolerable" (Given "intolerable" is risks that significantly endanger the operations or damage the system beyond simple repair.)\*\*

- \*\*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 Obstacle Encounter has been reduced as low as reasonably practicable.\*\*

- \*\*C2: Assigned severity class is Major.\*\*

- \*\*S4: Apply ReSonAte to estimate level of risk from hazard condition Obstacle Encounter.\*\*

- \*\*A1: Function Obstacle Detection required by BTD is available.\*\*

- \*\*G4: Model Obstacle Encounter BTD accurately describes possible propagation of hazard Obstacle Encounter.\*\*

- \*\*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 collision is below allowable threshold for severity class Major.\*\*

- \*\*Sn1: Estimated risk level 10^-3 per hour.\*\*

The structure represents various goals, strategies, and context needed to address the hazard and risk management for the BlueROV2 system in compliance with the ALARP principle. Each level of the tree (denoted by "-") indicates a relationship where the lower level supports or is contextually related to the level above. Walking through this tree should provide comprehensive insights into how risks are managed for the BlueROV2 system.

@End\_Assurance\_case

This assurance case addresses the underlying pattern's requirements by linking strategies and solutions to goals with the specificity expected in the actual usage environment of the BlueROV2 system. Uninstantiated elements and undeveloped goals/strategies indicate areas that could be expanded with more specific data or further analysis.