To instantiate the assurance case pattern for the BlueROV2 system, we must replace all placeholders with specific information about the system, as described in the provided domain information. Below is the assurance case created in a hierarchical tree format using the Goal Structuring Notation (GSN) elements and replacing generic placeholders with system-specific information based on the BlueROV2 system:

```

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

S1: Argument by risk reduction/elimination of each hazard

G2: No intolerable risks are present in the BlueROV2 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 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 (Uninstantiated)

- A1: Function Avoidance Maneuver required by Obstacle Encounter BTD is available (Uninstantiated)

G4: Model Obstacle Encounter BTD accurately describes possible propagation of hazard Obstacle encounter (Uninstantiated)

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 (Uninstantiated)

- Sn1: Estimated risk level 10^-3 per hour (Uninstantiated)

```

### Description of Structure:

- \*\*G1\*\* presents the top-level goal directly instantiated with the system's name ("BlueROV2 system") replacing the placeholder `{A :: System}`.

- \*\*S1\*\* supports G1 by providing strategies to eliminate each hazard.

- \*\*G2\*\* supported by S1 argues no intolerable risks in the system.

- \*\*G3\*\* is also supported by S1 and addresses risks associated with the specific hazard 'Obstacle encounter'.

- \*\*S4\*\* in turn supports G3. Due to the instantiation required for hazard conditions and necessary functions, it remains marked as uninstantiated, setting the stage for the instantiation of dependent goals and assumptions.

- \*\*G4, G5\*\* supported by S4 delve into details about model accuracy and risk estimates.

- \*\*G10\*\* specifically relates to quantitative risk estimates and is directly supported by \*\*Sn1\*\* (a solution providing the estimated risk level).

### Uninstantiated and Undeveloped elements:

- Several elements are either marked as 'undeveloped' due to lower levels of development in risk assessment or 'uninstantiated' where specific system information or verification steps are yet to be fully defined.

This structure captures the hierarchical and logical relationship of elements while focusing on risk assessment and mitigation strategies within the BlueROV2's operational environment.