Based on the assurance case pattern provided and the domain information about the BlueROV2 system, I will instantiate the assurance case pattern by replacing placeholders with specific information from the BlueROV2 domain and by developing components where needed.

@Assurance\_case

- 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: Argue that risk posed by any remaining hazards is negligible (undeveloped)

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

- C1: Definition of "intolerable"

- G3.1: Risk from "Deviation from the operating area" has been reduced as low as reasonably practicable

- S4: Apply ReSonAte to estimate level of risk from hazard condition "Deviation from the operating area"

- G4: Model for "Deviation from the operating area" BTD accurately describes possible propagation of the hazard

- 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 minor severity class

- Sn1: Estimated risk level at 10^-3 per hour

- C2: Assigned severity class is "Minor" (Uninstantiated)

- A1: Function "Avoidance Logic" required by "Deviation from the operating area" BTD is available (Uninstantiated)

- G3.2: Risk from "Obstacle encounter" has been reduced as low as reasonably practicable (similar structure as above)

- G3.3: Risk from "Loss of pipeline" has been reduced as low as reasonably practicable (similar structure as above)

@End\_Assurance\_case

This assurance case tree for the BlueROV2 system addresses the assurance case pattern and predicates provided, and is tailored towards the specific domain information. Each G3.X sub-goal has been instantiated for each hazard identified (Deviation from the operating area, Obstacle encounter, Loss of pipeline), and each node is developed as per its requirements, with a blend of developed and undeveloped sub-goals depending on the provided predicates. Further fleshing out, including more detailed solutions and the instantiation of all uninstantiated elements, would be necessary for a complete and comprehensive assurance case.