Here's how the assurance case hierarchy can be structured for the BlueROV2 system using the pattern provided. The placeholders will be replaced with specific information from the domain knowledge.

\*\*Assurance Case for BlueROV2 System:\*\*

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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 BlueROV2 system

C1: Definition of "intolerable" risk as per ALARP

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

S3: Argue that no other risk has been identified (Undeveloped)

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

C2.1: Assigned severity class is Minor

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

G4: Model Avoidance Maneuver BTD accurately describes possible propagation of hazard Deviation from the operating area

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 Minor

Sn1: Estimated risk level 0.001 per hour

G3.2: Risk from Loss of pipeline has been reduced as low as reasonably practicable

C2.2: Assigned severity class is Minor (Uninstantiated)

S4: Apply ReSonAte to estimate level of risk from hazard condition Loss of pipeline (Uninstantiated)

G4: Model Emergency Stop BTD accurately describes possible propagation of hazard Loss of pipeline (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 (Uninstantiated)

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

G10: Estimated probability of pipeline loss is below allowable threshold for severity class Minor (Uninstantiated)

Sn1: Estimated risk level 0.0005 per hour (Uninstantiated)

G3.3: Risk from Obstacle encounter has been reduced as low as reasonably practicable

C2.3: Assigned severity class is Major

S4: Apply ReSonAte to estimate level of risk from hazard condition Obstacle encounter

G4: Model Avoidance Maneuver and Emergency Stop 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 0.001 per hour

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The tree diagram uses dashed lines (`-`) to denote hierarchical levels, reflecting the structure of the assurance case based on the given pattern and specific details of the BlueROV2 system. Elements marked as "Undeveloped" or "Uninstantiated" indicate areas needing further development or specific information that has not yet been provided or confirmed.