Offshore Colocation Forum

Plenary #13

8 April 2025

THE CROWN ESTATE

Agenda

Item	Owner	Duration
1. Matters arising	Adrian Topham	10 mins
2. Terms of Reference	Denise Moylan	10 mins
3. Project updates - Colocate - Anemone	Adrian Topham	 10 mins 10 mins
4. 2025 planning	Denise Moylan & Adrian Topham	40 mins
5. AOB - Actions review	Adrian Topham Ben Frei	10 mins

1. Matters arising

Matters arising

Action	Due date	Owner	Status	Commentary
TCE to explore how it can quantify / categorise decarbonisation contribution of colocation.	N/A	TCE	Paused	
Secretariat to circulate final Project Colocate EIS summary report with Forum members	Jul 2025	TCE	Amended	Update to be provided as part of plenary #13 presentation
OWIC to continue to engage offshore wind developers on their awareness around colocation with the view to hold a webinar alongside TCE		TCE/OWIC	Ongoing	Included as part of 2025 planning
TCE to engage with NECCUS and other trade bodies involved in the Forum to deliver Phase 1 of Project Anemone	TBC	TCE	Ongoing	Update to be provided as part of plenary #13 presentation
Secretariat to develop risk assurance / insurance questionnaire to be circulated with offshore wind and CCS developers ahead of next Plenary	Dec 2024	TCE	Paused	Included as part of 2025 planning
Secretariat to circulate links to Marine Delivery Routemap report and Future of Offshore Wind report with Forum members	30 Oct 2024	TCE	Complete	Included in minutes from plenary #12

2. Terms of Reference update

Offshore Colocation Forum

ToR review

Mandate and topics

- Broad agreement on existing purpose and mandate
- Requests for a greater balance between CCS and OSW
- Requests for research topics to include non-technical topics (insurance, commercial, risk)
- Interest in having more focus on solutions with outputs shared more widely with industry

Structure & logistics

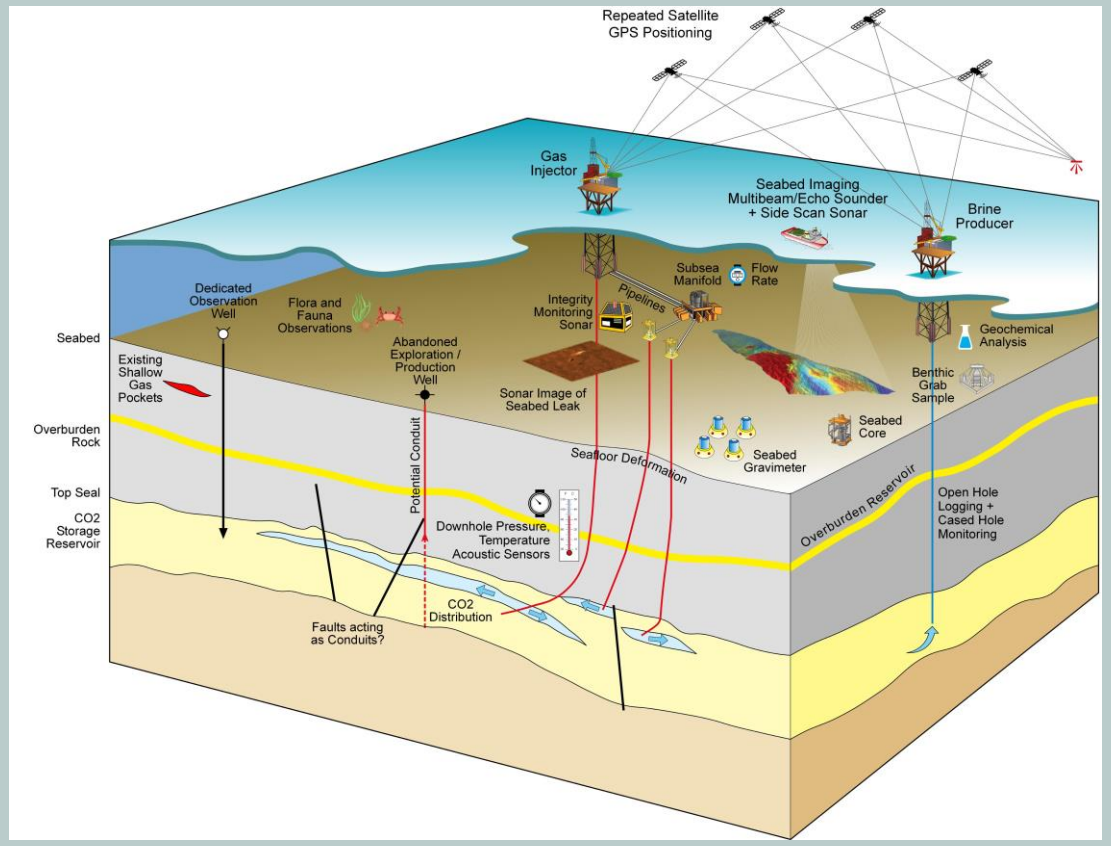
- Quarterly schedule
- Agreement to meet in person once a year, otherwise hybrid
- Proposed working groups to support collaboration, focus on project delivery and promote wider information sharing

Next steps

- Refresh of ToRs
- Confirmation of Forum structure

3. Project updates

Project Colocate



Offshore Colocation Forum

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Aims & objectives

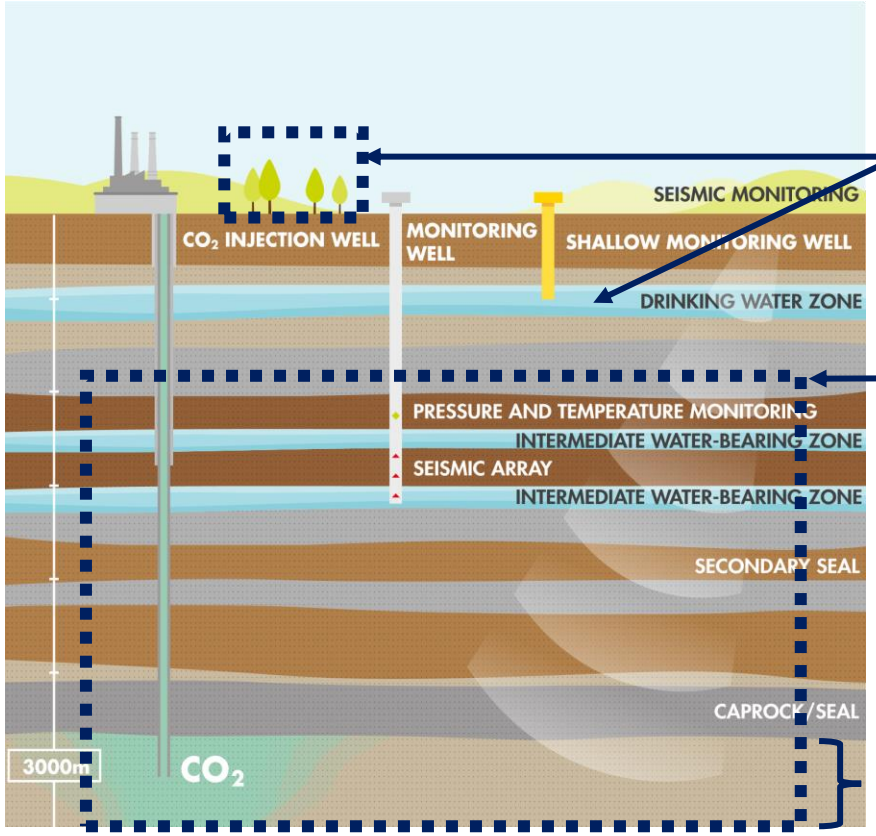
(1) Define Potential areas for OSW and CS	• Identify areas of colocation with offshore seabed and subsurface users, highlighting areas of multiple potential future uses in prospective areas
(2) Design colocation monitoring plans	• Storage risk assessment, including integrity of legacy boreholes and other infrastructure – "What monitoring data is required?"
(3) Explore the viability of colocation projects	• Produce a series of scenarios where multiple sector future use is possible • Evaluate and rank specific proposals

Understanding the store & the complex

Carbon Storage Monitoring – why

Footprint of carbon storage projects changes drastically from appraisal to operation:

- Offshore surveys to monitor the development before and during operation have a temporary but larger footprint
- This is the main source of co-location conflict with offshore wind farms



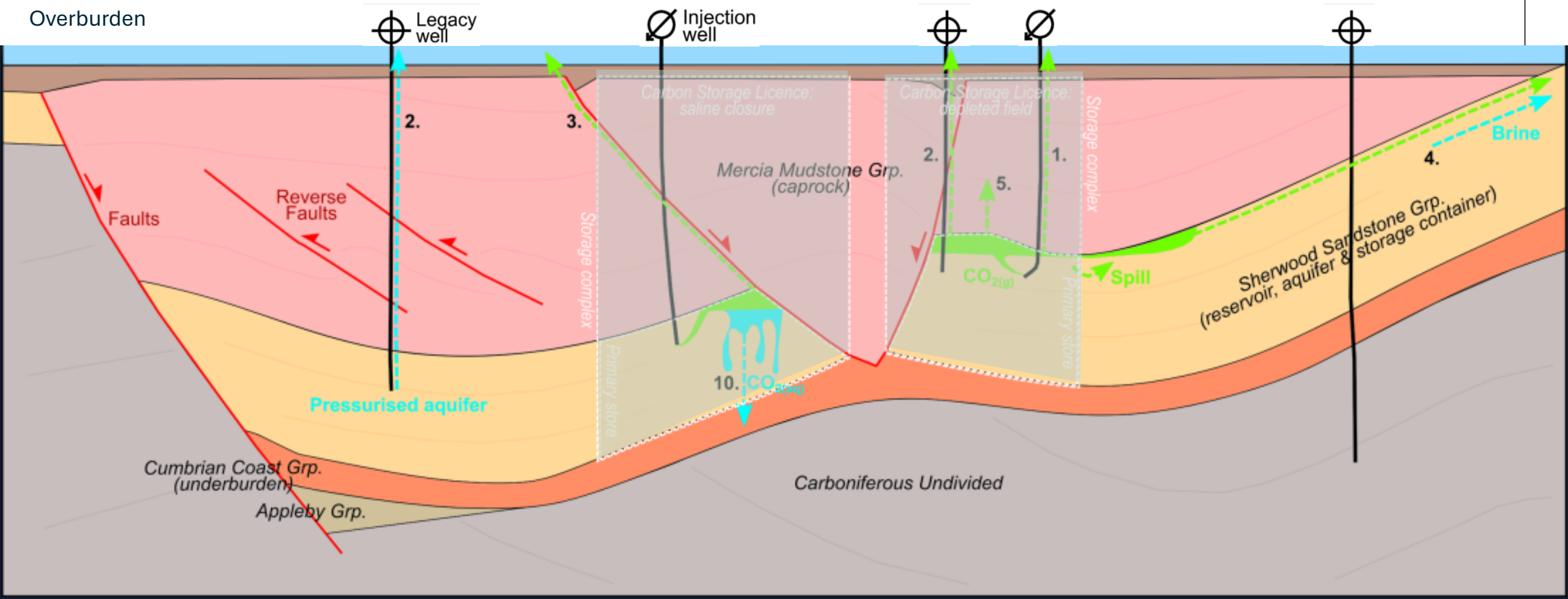
Possible sites of confidence monitoring

Storage complex – containment monitoring

Target rock unit – conformance monitoring

Managing risk with uncertainty

...migration from storage reservoir into storage complex...

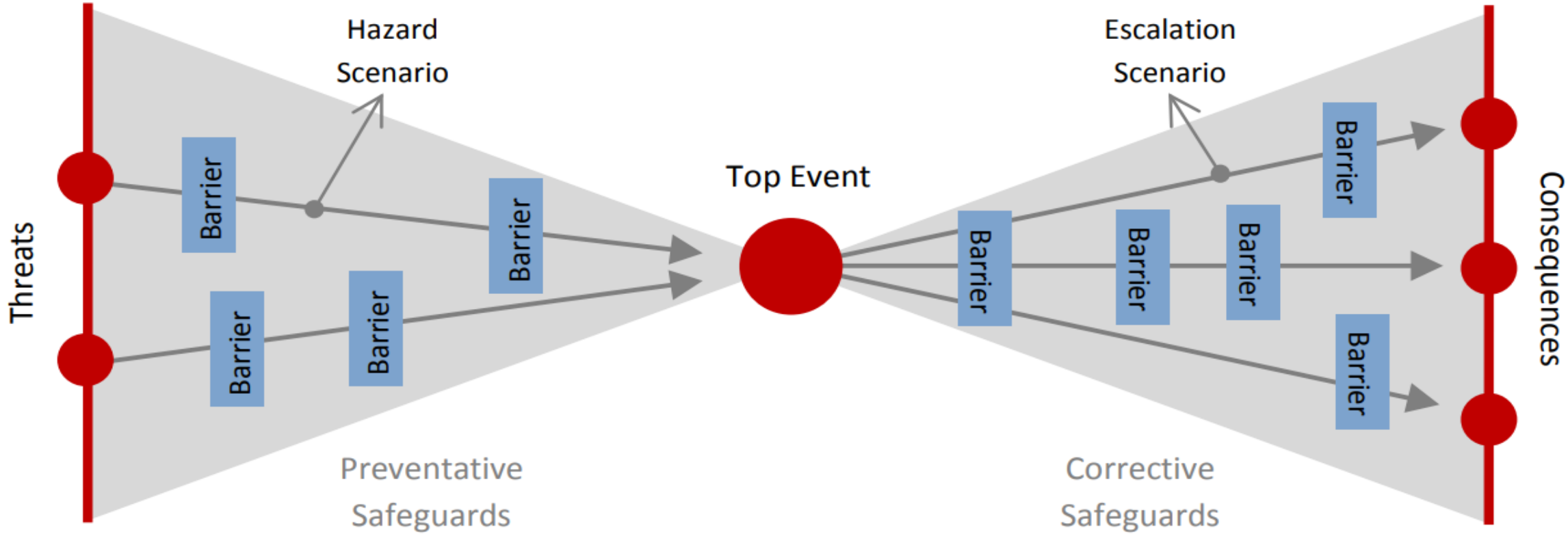


Containment Failure Modes/Potential Fluid Escape Mechanisms (after IPCC, 2005; IEAGHG, 2013; PBD, 2016)

1. via injection wells
2. via legacy wells
3. via a fault
4. unanticipated lateral migration
5. primary caprock failure
10. via the underburden

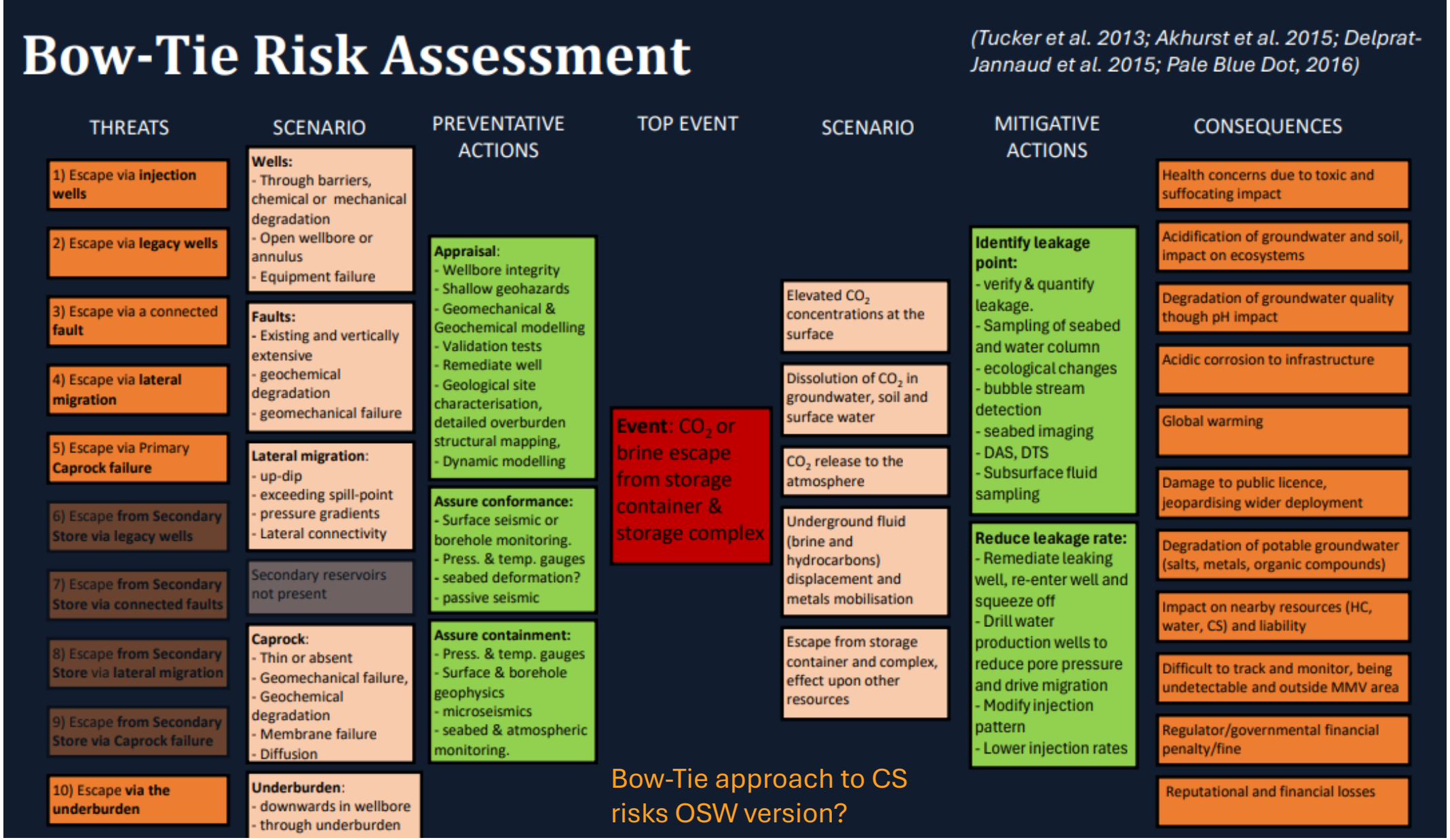
Bow-tie risk assessment

…how are Measurement, Monitoring and Verification Plans created?



Bow-Tie Risk Assessment

(Tucker et al. 2013; Akhurst et al. 2015; Delprat-Jannaud et al. 2015; Pale Blue Dot, 2016)



Bow-Tie approach to CS risks OSW version?

Colocation Scenarios: End-members

Issue ↓ Feasibility →

	Avoid (worst-case)	Compromise	Feasible (best-case)
Temporal	Existing OW (complex pattern, close spacing and risk of collision) CS unprospective (low capacity, high risk, poor injectivity)	Future or existing OW (access pathways for rigs) CS highly prospective (high capacity, low risk, good injectivity	Planned CS - Prospective OW (planning flexibility: access pathways simple pattern, wide spacing)
Spatial	Large or complete overlap of CS prospect (and leakage risks)	Partial overlap (case-by-case), avoiding leakage risks & planned migration route	Both OW & CS have a minor overlap (allowing surveying etc.)
MMV Vessel-access	No viable MMV technologies – or too high risk	Limited vessel-access req., viable if limited MMV alternatives	Wide OW turbine spacing, reducing collision risk, optimising survey coverage & value
Drilling-rig access	Lots of legacy wells within overlapping area, uncertain or poor integrity	Access-pathways to abandoned wells	No legacy wells within overlapping area
Helicopter-access	Limited injection sites, inaccessible	Injection platform outside overlap, horizontal drilling poss.	Flexible injection site, platform located outside or with access
EIS Example	OC4 - Gwynt y Mor	South Morecambe – Morecambe OC6 - Gwynt y Mor? Rhyl Field – Walney Extension 4 →	LBA Licence - Gwynt y Mor; Calder field – Morecambe;

Colocation Scenarios: SWOT

Vessel-access
Drilling-rig access
Helicopter-access

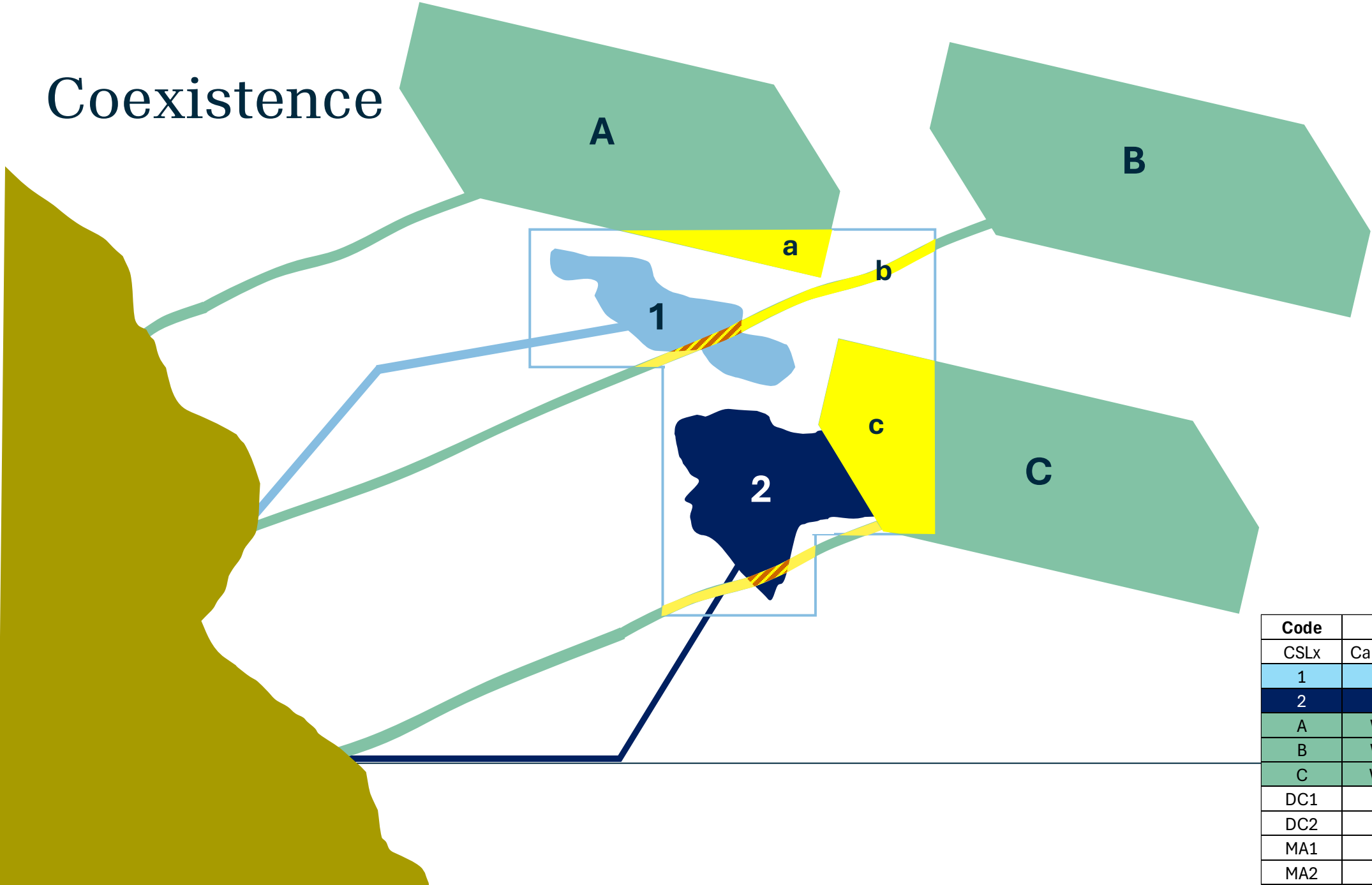
Scenario ↓ Spatial Overlap →

	CS <33% covered	CS >66% covered	Avoid Colocation
Existing OW – Future CS	• **Mixed MMV**: use of towed streamers outside OW farm, OBN at edges, Spotlight within? (limiting HSSE exposure for max. coverage) [CS compromise].	- Greater expense of **Horizontal drilling** for prospective CS? [CS compromise]. - Greater expense & risk of OBN etc. (until **ROV / AUV / MASS cost & development** allowing deployment (& shot) vessel-access) [CS compromise] - Viable MMV alternative (e.g. gravity et al.) need of seismic? (value vs cost & effort). - Need of marine environment/ecosystem studies? (validity).	• OW overlap of plume migration pathway [CS compromise]. • OW overlap of high-risk legacy wells that cannot be assessed/remediated [CS compromise]. • Full overlap – injection sites prevented [CS compromise].
Future OW – Existing / Planned CS	- **Increased WTG spacing:** allows for 2D/HR/2.5D streamers? source vessels (VSP, S-DAS, Spotlight) and improved OBN coverage [OW compromise]. - Use a 3D baseline / characterisation survey as a 2D/Spotlight baseline? (poor repeatability but a signal?) [CS compromise].	- OW away from abandoned wells to allow Well-based MMV & seismic – **through-going access corridors/pathways** [OW compromise]. - **OW accepts legacy well risk** (regulator/both operators/public? - not likely) [OW compromise, e.g. South Morecambe – Morecambe]. - OW away from plume migration pathway [OW compromise].	• **Develop OW where no CS prospects or current poor prospectivity** (SSG is absent? Over Permian & Carboniferous intervals) (High risk: number/density of legacy wells?)(Low storage capacity: Small shallow closures near-shore? -excludes migration-trapping targets). • **Develop Largest and most prospective CS sites** (Low-hanging fruit, high capacity, low risk).

- Prior collaborative planning – accounting for limitations and needs
- Greater acceptance of risk (and uncertainty?)
- Compromise in terms of areas for OW

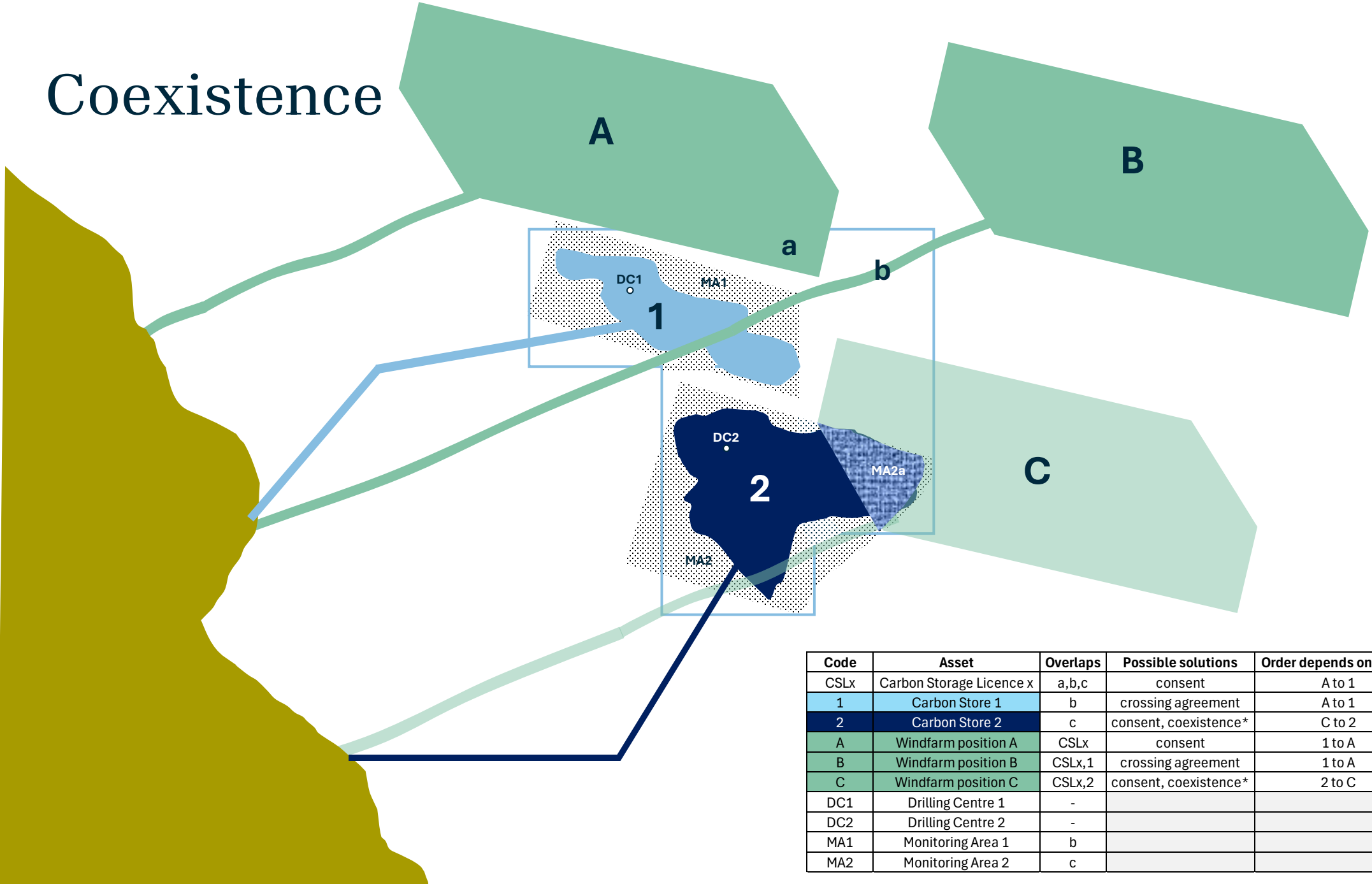
Case-by-case basis / site-specific (Risks, MMV suitability, coloc. problems & solutions)
no simple solution but collaboration (everyone) & compromise (at least one party)

Coexistence



Code	Asset	Overlaps
CSLx	Carbon Storage Licence x	a,b,c
1	Carbon Store 1	b
2	Carbon Store 2	c
A	Windfarm position A	CSLx
B	Windfarm position B	CSLx,1
C	Windfarm position C	CSLx,2
DC1	Drilling Centre 1	-
DC2	Drilling Centre 2	-
MA1	Monitoring Area 1	b
MA2	Monitoring Area 2	c

Coexistence

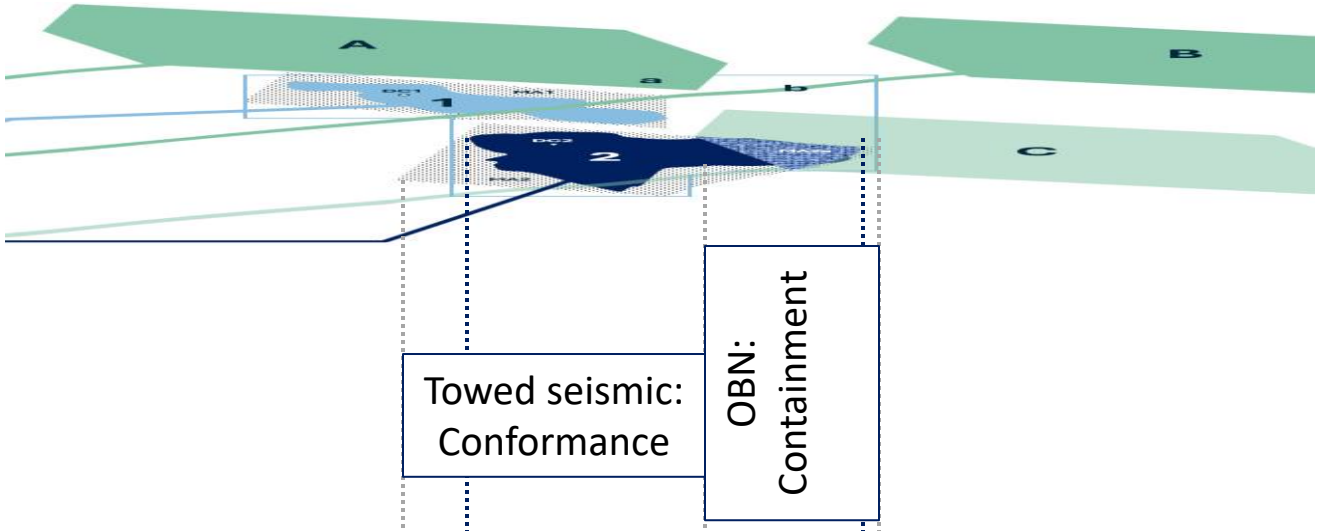


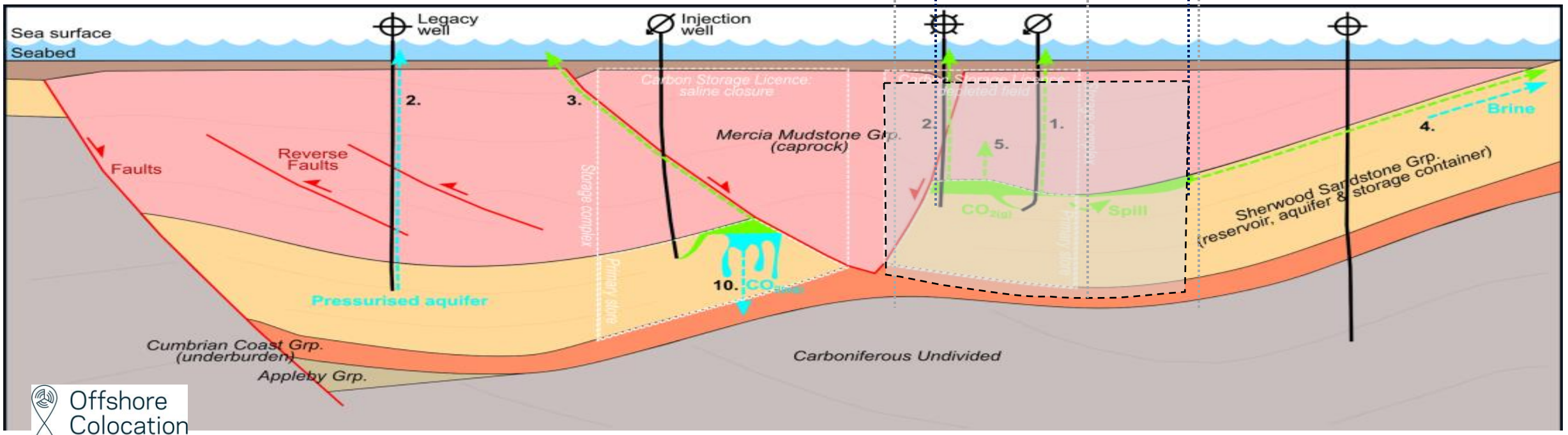
Code	Asset	Overlaps	Possible solutions	Order depends on timing	Notes
CSLx	Carbon Storage Licence x	a,b,c	consent	A to 1	
1	Carbon Store 1	b	crossing agreement	A to 1	
2	Carbon Store 2	c	consent, coexistence*	C to 2	*if MA2 is possible
A	Windfarm position A	CSLx	consent	1 to A	
B	Windfarm position B	CSLx,1	crossing agreement	1 to A	
C	Windfarm position C	CSLx,2	consent, coexistence*	2 to C	*if MA2 is possible
DC1	Drilling Centre 1	-			b must avoid DC1 or vice-versa
DC2	Drilling Centre 2	-			C must avoid DC2 or vice-versa
MA1	Monitoring Area 1	b			must avoid c
MA2	Monitoring Area 2	c			must be compatible with c

Coexistence

Image shows:

- Aims of monitoring for:
  - Conformance
  - Containment
  - Confidence
- Potential for alternative monitoring under windfarm for:
  - Target rock – conformance
  - Storage complex – containment





Potential Outcomes of Project Colocate for Forum

- For OSW, what can we say?
    1. Monitoring avoiding turbines possible
    2. Depends on degree of overlap
    3. Depends on conformance and intervention needs

- For CCS what can we say?
    1. Situation where wind farm already present
    2. CS monitoring must be achievable avoiding turbines
    3. Situation where wind farm is consented (but not built)
    4. OSW may be encouraged to adjust turbine positions

Project Anemone

Source: Freepik

Offshore
Colocation
Forum

Anemone specification

- Investigate the operational challenges and opportunities presented by colocation through engaging with relevant stakeholders, with the aims of:
  - Providing developers with best-practice guidance for simultaneous operations
  - Helping wider marine stakeholders understand the risks and mitigations
  - Influence the policy and regulation needed to support colocation

- Project objectives:
  - Map regulatory and consenting
  - Identify and prioritise opportunities and challenges
  - Identify actions

OEUK proposal

- Members have called for OEUK to develop guidelines on coexistence of offshore energy-vectors
- Conversations held with OEUK who are supportive of collaboration Forum
- Close alignment with 3 objectives of initial project
- Co-hosted arrangement sponsored by the Forum proposed to access a wider audience

4. 2025 Planning

2025 Planning

- Project Anemone
- Risk assurance project
- OWIC webinar
- Project output communications

Risk assurance project

- Forum raised queries regarding non-technical challenges related to colocation
- Forum agreed to explore the topic of colocation risk assurance and insurance
- **Key objectives:**
  - Confirm current developer/operator and insurance market understanding of key issues
  - Define potential for insurance solutions around colocation risks
  - Facilitate understanding between the insurance industry and developers
- **3 phases:**
  - **1:** Developer/Operator survey to gather views on key risks to collocated and sector specific projects and share findings with Insurers
  - **2:** Arrange workshop for Insurers to address the key points and questions raised by survey
  - **3:** Share feedback from workshop with developers/operators and agree any further stages

AOB