

BIM4WATER



Please Join

4D LOIN Application Matrix with Health and Safety Guidance

Legend of application categories:

Generic
Constructability
Site plan & Logistics
Environmental constraints
Commissioning

Project Delivery Lifecycle Based on Project Type			Input Description	3D Model Description	4D LOIN recommendation	Programme Description	Category	Deliverables	4D use cases and benefits	Health and Safety Guidance
Project Phase	Delivery Milestones	Project Management Frameworks	Input Requirements (Who to engage with, data, outputs)	Minimum 3D Model LOIN	4D LOIN recommendation	Programme LOIN	Category	4D Outputs	4D use cases and benefits	Health and safety guidance should always link back to the project H&S File, Risk Register (maintained by the appointing party), and the CDM Coordinator.
Concept	DM0	Stage 1	Appointing Party, Project Brief, Schematics, Survey Data, Project Needs and Constraints, Key Milestones	LOIN Level 1: Concept Design / Historic Data	Programme items to high level resource element tree. Model items, space planning and library items if available (may be generic)	1	Generic	4D High level visualisation	Animation files and images for space proving and time line of progress visually. Used for work winning, early stakeholder engagement and early collaborative planning.	Risk register at concept stage Add guidance as requirement in EIR/ BEP Phasing strategy DNA naming convention/ strategy to tie back inside 3D models Simplify access to the risk register as single source of information Existing infrastructure which has already identified issues
Optioneering/ Feasibility	DM1	Stage 2	Appointing Party, Project Brief, Schematics, Survey Data, Project Needs and Constraints, Key Milestones, Optioneering, Decommission requirements	LOIN Level 1: Concept Design / Historic Data	Model items as above. Inclusion of site boundary and associated work packages as boundaries to check project clash and any land ownership boundaries. Programme at this stage may reflect different optioneering methods as the project schedule develops for this stage. Decommissioning requirements if required.	1	Generic	4D High-level visualisation to optioneer Understand risks & opportunities of each option	Programme and Animations to give visual appreciation of primary activities and allow dynamic change of the key milestones. Use the 4D animation to access multiple work methodologies and define the most efficient solution. Possibility to review different methods of working such as of site build vs on site. Programme validation within project constraints.	3D CAD library + Asset data (smart attributes) linked to database and flag up issues from BOD. Alerts for products, or flagging up non-compliance with faulty materials. Linking up with databases which keep these records up to date. Identifying old assets that need replacing. Identify lessons learnt on repeat jobs. Optioneer solutions to ascertain Health and Safety risks. Ability to produce a scoring matrix.
Initial Design	DM2	Stage 3	As Stage 2 + Agree Design Approach Models (DFMA, Insitu etc.) , Procurement Strategy, Stakeholder Needs & Constraints, Survey Data (missing info), Contractor/Consultant	LOIN Level 2: Developed Design	Detail model items split to zone or work package and capable to split to assembly and object if applicable. Identify high risk activities or critical site constraints such as site access and egress and maintenance constraints. Environmental and seasonal working constraints.	3	Constructability	Buildability/ constructability reviews	Use of cloud options to allow for review of live information. Native 4D files may be shared to support the animation submissions. Initial Construction sequence review and validation.	Carry out simulations for Health and Safety critical activities.
							Site plan & Logistics	Risk Assessment	Early risk mitigation and identification of maintenance constraints and limitation to site access or logistics as well as material delivery and storage during the project timeline.	Carry out simulations for Health and Safety critical activities.
							Environmental Constraints	Environmental Risk	Validating environment impact using the 4D model.	Carry out simulations for Health and Safety critical activities.
							Generic	Level 1 4D output, interfaces, environment constraints	Health and safety risks identified for critical activities. 4D Review for optioneering/ value engineering.	Value engineering analysis comparison to Health and Safety performance of design solution. Updating the residual risks and warning triangles that have been identified previously. Constant review of your design solutions, as new risks could be introduced. Ability to export the information into an excel format, or easy to digest format, risk registers, dashboards, Power BI.
Detailed Design /Preconstruction	DM3	Stage 4	As above + Detailed Design (Incl. Supplier info), delivery and commissioning strategy, detailed programme (supplier, temp works proposals etc.) , Tier 1&2 Contractor, Procurement schedule, Realising strategy for delivering safer, above ground work etc.	LOIN Level 3: Technical Design	Possible inclusion of site logistic and construction plant interfaces. Possible inclusion of environmental risks within model High level Commissioning plan and visual representation of commissioning activity. As above and including any significant temporary works or relevant shut downs or handover.	5	Constructability	Buildability/ constructability reviews	Animation native files and report on Design and construction programme clash. Critical path analysis and collaborative planning workshops across multi discipline work packages.	Construction rehearsals Dashboards implemented at this stage - quality of information becomes better. Walkthroughs highlighting hazards in 3D environment.
							Site plan & Logistics	Risk Assessment, HAZOP/HAZID	Identifying high risk activities on potential exclusion zones. Construction plant and site logistic issues.	High risk activities identified.
							Environmental Constraints	Environmental Risks	Validating environment impact using the 4D model.	High risk activities identified.
							Commissioning	Commissioning Sequence	Outline commissioning sequence following on from construction schedule.	Outline commissioning sequence.
							Generic	Level 2 4D output, H&S risks, methodologies, build sequence, supplier interfaces, logistics, high level commissioning plan	Use cases as per the previous stage with additional model and programme detail.	Catalogue health and safety information automatically from the model. Hazard simulation based on lighting exposure.

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Construction/ Assembly/ Pre-commission	DM4	Stage 5	As above + Detailed Design (incl. supplier info), detailed programme (supplier, temp works etc.), Tier 1&2 Contractor, Procurement schedule, Delivery and commissioning strategy	LOIN Level 4: Construction	Including as above 4D requirements. With the addition of As-built model records and programme to include completed dates. Complete commissioning plans and H&S methodology for all high risk activities. Programme and model clash free. Programme updates and progress updates/lookaheads within 4D software. Visual representation with in 4D model showing completed when applicable.	5	Constructability	Methodology, Build sequence	As above use cases. Ongoing Clash report on construction programme clashes reflecting programme update during the construction phase. Program review workshops to improve construction timeline.	Construction rehearsals Dashboards implemented at this stage - quality of information becomes better. Walkthroughs highlighting hazards in 3D environment.
							Site plan & Logistics	HAZOP / HAZID Supplier interfaces, Logistics, Rehearsals, RAMS, Tool box talks / briefings	4D used for Method statement and risk assessment briefings for high risk activities. Highlight any programme constraints between reliant follow on or previous activities and working areas.	High risk activities identified.
							Environmental Constraints	Environmental Risks	Validating environment impact using the 4D model.	High risk activities identified.
							Commissioning	Detailed commissioning plan	Outline commissioning sequence following on from construction schedule.	Outline commissioning sequence.
							Generic	Level 3 4D output, H&S risks, Lookaheads etc.	Consider vertical and horizontal working areas. Project lookaheads and team briefings.	Catalogue health and safety information from the model. Hazard simulation based additional factors e.g. lighting exposure, DSEAR classification.
Commission	DM5	Stage 6	Detailed commissioning plan, Operational Input, plant performance and integrating new assets	LOIN Level 4: Construction	As above 4D requirements. Items of significant risk or disruption to disciplines during maintenance and in use phases. Potential requirement to 4D model decommissioning it aid end of life stage.	6	Generic	Level 3 4D output detailed commissioning programme, RAMS etc.	Clash report. Highlight any programme constraints between reliant follow on or previous activities. Consider vertical and horizontal working areas at that point in time. Identify, constructed and actual commissioned items ready for handover. Decommissioning animation for use to aid O&M.	Catalogue health and safety information from model for use in O&M strategy.
Handover	DM6	Stage 7	As built	LOIN Level 5: As-Built	Maintenance regimes and items requiring special access or shut downs and decommissioning.	6	Generic	Capture lessons learnt, as built against actual (internal) - Client to specify if Other	Report of items that are handed over, identify assets still being commissioned. Decommission handover model for O&M use.	Catalogue health and safety information from model for use in O&M strategy.
Use (Operation and Maintenance)	DM7	Stage 8	In Use	LOIN Level 6: Operations and Maintenance	As above.	-	Generic	O&M Manual data	Identify maintenance programmes and colour code items. Attached separated maintenance regime's. 4D animation to support O&M manuals. Consider design life of items with considerable considerations when being demolished. Indicate the maintenance intervals or service schedule for the asset.	Catalogue health and safety information from model Risk register with operational data, e.g. where objects with hazardous materials are to be phased out due to legislation changes during project lifecycle, or assets are at risk of exceeding recommended lifespan.
Demolition/ Decommissioning		Stage 9	End of life	LOIN Level 1: Concept Design / Historical Data	Use decommissioning 4D animation to identify and clearly explain decommissioning activities. update the legacy 4D decommissioning model to reflect new/ replacement items / O&M procedure	-	Generic	4D High-level visualisation to optioneer Understand risks & opportunities of each option	Explain decommissioning activities to workforce, update the legacy 4D decommissioning model to reflect new/ replacement items / O&M procedure.	Risk register compilation Phasing strategy DRA naming convention / strategy to tie back inside 3D models Simplify access to the risk register as single source of information Existing infrastructure which has already identified issues Catalogue health and safety information automatically from model.