BIM EXECUTION PLAN

Post-Appointment BEP

ISO 19650-2:2018 Compliant

Project: Greenfield Office Complex Phase 2

Project Number: GF-2024-017

Generated: 15/02/2026 11:06:19

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1. Project Information and Confirmed Objectives

Project Name

Greenfield Office Complex Phase 2

Project Number

GF-2024-017

Project Type

Commercial Building

Appointing Party

ABC Development Corporation

Confirmed Project Timeline

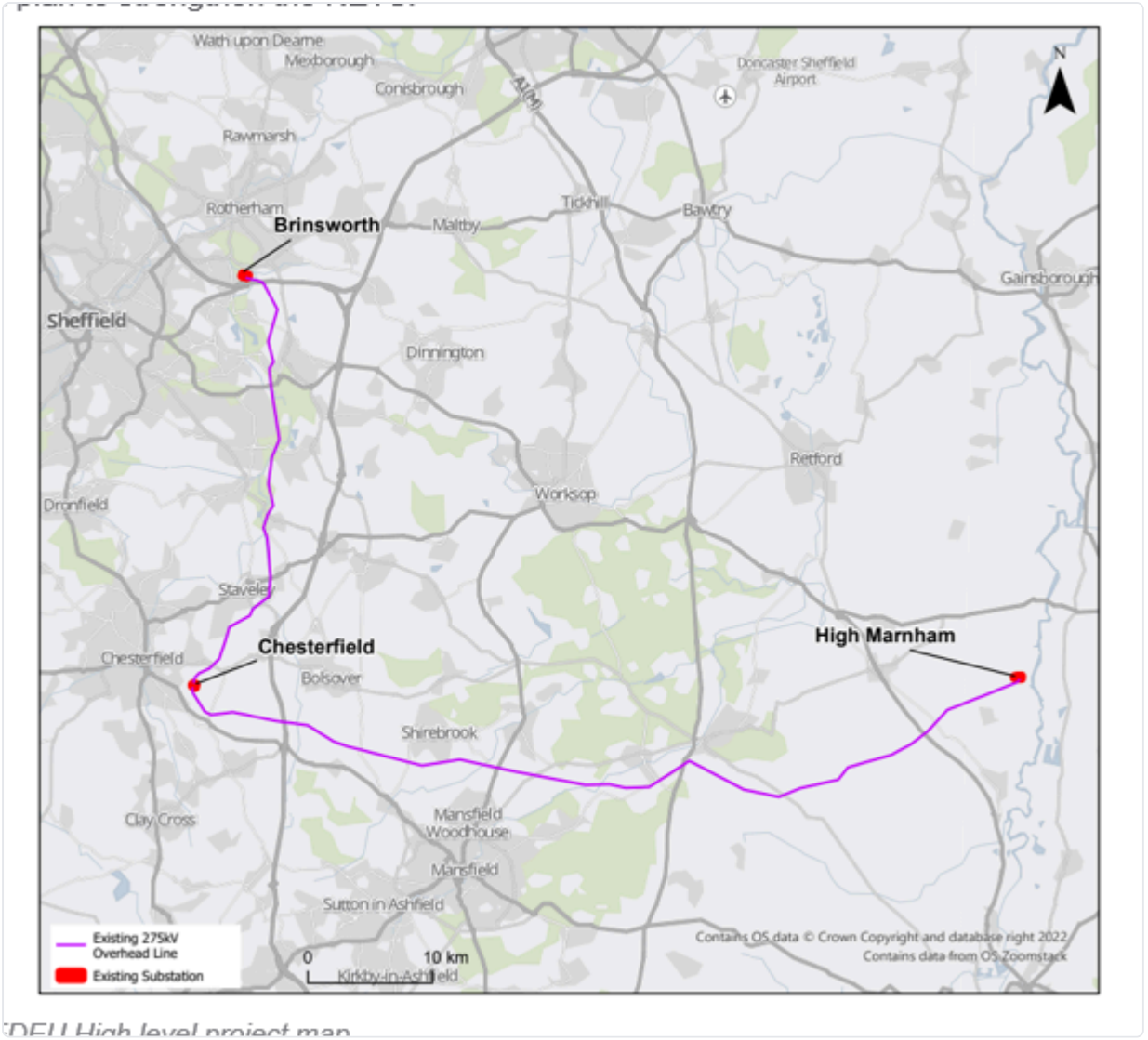
24 months (Jan 2025 - Dec 2026)

Confirmed Project Budget

£12.5 million

1.2 Project Description

A modern 8-story office complex featuring sustainable design principles, flexible workspace layouts, and integrated smart building technologies. The building will accommodate 800+ employees across multiple tenants with shared amenities including conference facilities, cafeteria, and underground parking for 200 vehicles.



DFU High level project map

1.3 Confirmed Delivery Approach

Our delivery approach implements collaborative design coordination through advanced BIM workflows, stakeholder integration at key milestones, and continuous value engineering. We will execute a phased delivery strategy with integrated sustainability analysis and proactive risk management throughout all project stages to ensure on-time, on-budget completion.

2. Executive Summary

2.1 Project Context and Overview

This BEP outlines our comprehensive approach to delivering the Greenfield Office Complex using advanced BIM methodologies. Our strategy emphasizes collaborative design coordination, data-driven decision making, and seamless information handover to support long-term facility management. The project will serve as a flagship example of sustainable commercial development in the region.

2.2 BIM Strategy Summary

Our BIM strategy centers on early clash detection, integrated 4D/5D modeling for construction sequencing and cost control, and comprehensive digital twin creation for facilities management. We will utilize federated models across all disciplines with real-time collaboration through cloud-based platforms, ensuring design quality and construction efficiency while reducing project risks.

2.3 Key Commitments and Deliverables

We commit to full ISO 19650-2:2018 compliance throughout all project phases. Key deliverables include:

2.4 Key Project Contacts

ROLE	NAME	COMPANY	EMAIL	PHONE NUMBER
Project Director	John Smith	Smith & Associates Architects Ltd.	j.smith@smithassociates.com	+44 20 1234 5678
BIM Manager	Sarah Johnson	Smith & Associates Architects Ltd.	s.johnson@smithassociates.com	+44 20 1234 5679
Client Representative	David Brown	ABC Development Corporation	d.brown@abcdev.com	+44 20 9876 5432

ROLE	NAME	COMPANY	EMAIL	PHONE NUMBER
Information Manager	Sarah Johnson	Smith & Associates Architects Ltd.	s.johnson@smithassociates.com	+44 20 1234 5679
Lead Architect	Emma Davis	Smith & Associates Architects Ltd.	e.davis@smithassociates.com	+44 20 1234 5680
Structural Lead	Robert Chen	Engineering Excellence Ltd.	r.chen@engexcel.com	+44 20 2345 6789
MEP Lead	Lisa Rodriguez	Advanced Systems Group	l.rodriguez@asg.com	+44 20 3456 7890

2.5 Value Proposition

Our BIM approach will deliver 15% reduction in construction costs through early clash detection, 25% faster design coordination, and comprehensive lifecycle cost analysis enabling informed material selections. The digital twin will provide 30% operational cost savings through predictive maintenance and space optimization, while the structured data handover ensures seamless facilities management integration.

3. Confirmed Team and Responsibilities

3.1 Delivery Team's Organisational Structure and Composition

3.3 Task Teams

TASK TEAM	DISCIPLINE	LEADER	LEADER CONTACT	COMPANY
Architecture	Architecture	Emma Davis	e.davis@smithassociates.com	Smith & Associates Architects Ltd.
Structural Engineering	Structural	Robert Chen	r.chen@engexcel.com	Engineering Excellence Ltd.
MEP Engineering	MEP	Lisa Rodriguez	l.rodriguez@asg.com	Advanced Systems Group
Quantity Surveying	Cost Management	David Kumar	d.kumar@cmp.com	Cost Management Partners
Facade Engineering	Facades	David Wilson	d.wilson@cwe.com	Curtain Wall Experts Ltd.

3.5 Confirmed Track Record - Delivered Similar Projects

PROJECT NAME	VALUE	COMPLETION DATE	PROJECT TYPE	OUR ROLE	KEY BIM ACHIEVEMENTS
Tech Innovation Hub	£25M	March 2023	Commercial Office	Lead Design Consultant	Zero clashes at construc-tion, 30% RFI reduction, BREEAM Excellent achieved

PROJECT NAME	VALUE	COMPLETION DATE	PROJECT TYPE	OUR ROLE	KEY BIM ACHIEVEMENTS
Riverside Commercial Centre	£18M	August 2022	Mixed Use	BIM Coordinator	4D sequencing reduced programme by 8 weeks, digital twin handover
Metropolitan Tower Refurbishment	£12M	December 2021	Renovation/Retrofit	Design Lead	Scan-to-BIM for existing conditions, clash-free MEP coordination
University Research Building	£35M	June 2021	Education	Lead Appointed Party	Full COBie handover, integrated FM systems, 5D cost tracking
Corporate Headquarters Phase 1	£42M	November 2020	Commercial Building	BIM Manager	First ISO 19650-certified project, established company BIM standards

3.6 Mobilization Plan and Risk Mitigation

PHASED MOBILIZATION TIMELINE

Week 1 - Onboarding and Training:
- Team orientation and project kickoff meeting with all stakeholders
- ISO 19650-2:2018 training for all personnel (2-day intensive workshop)
- Information security briefings and CDE access provisioning with role-based permissions
- Review of EIR requirements and delivery obligations with each task team

Week 2 - IT Infrastructure Setup:
- Workstation configuration and deployment (Revit 2024, Navisworks, AutoCAD)
- Software licensing verification and activation for all team members
- Cloud storage allocation and VPN setup for secure remote collaboration
- CDE platform configuration (BIM 360) with folder structure, naming conventions, and permissions
- Shared template files and object libraries deployment

Week 3 - Capability Verification:
- Pilot model production (one discipline per task team to test workflows)
- Federation testing and clash detection protocol validation
- IFC export testing to verify data integrity and interoperability compliance
- CDE submission procedures walkthrough and quality checks
- Review against EIR requirements with client feedback integration

RISK MITIGATION STRATEGY

Resource capacity risks (skill shortfalls, IT connectivity issues, software compatibility) are documented in the project risk register per ISO 19650-2 clause 5.3.6.

Contingency Plans:
- Access to specialist BIM consultants for advanced workflows
- Backup internet connectivity (4G/5G mobile hotspots)
- Alternative software licenses (floating licenses for surge capacity)
- Escalation protocols via MIDP notifications to client for critical issues

CAPABILITY VERIFICATION

All resources will be tested for collaborative production capability before full information delivery commences. This includes verification of software interoperability, CDE access permissions, and information security compliance.

3.7 Information Management Responsibilities

Sarah Johnson, Information Manager, oversees all information production, validation, and exchange protocols in full compliance with ISO 19650-2:2018. Key responsibilities include establishing CDE governance structures, coordinating Task Information Delivery Plans (TIDPs) across all disciplines, ensuring model federation quality and consistency, implementing information security protocols including access controls and audit procedures, conducting

weekly quality audits of information deliverables, facilitating cross-disciplinary coordination meetings, managing version control and approval workflows, monitoring compliance with established naming conventions and standards, coordinating client information exchanges and milestone reviews, and providing regular progress reports to project leadership on information delivery performance.

4. BIM Goals and Objectives

4.1 BIM Goals

The BIM goals for this project are to enhance design coordination through clash detection reducing RFIs by 40%, improve construction sequencing through 4D modeling resulting in 20% schedule compression, enable accurate cost forecasting through 5D integration achieving ±2% budget variance, and deliver comprehensive digital asset information for lifecycle management supporting 25% reduction in operational costs over the first 5 years.

4.2 Primary Objectives

Primary objectives include: eliminating design conflicts before construction through rigorous clash detection protocols, optimising building performance through integrated analysis and simulation, enabling efficient construction through accurate quantity extraction and sequencing models, supporting sustainability targets through embedded carbon analysis and energy modeling, and facilitating seamless handover with structured asset data for predictive maintenance and space management.

4.3 BIM Uses

- ✓ Design Authoring
- ✓ 3D Coordination
- ✓ Clash Detection
- ✓ Quantity Take-off
- ✓ 4D Planning

4.4 BIM Applications for Project Value

BIM will maximize project value through: 4D scheduling for time optimization reducing construction duration by 15%, energy modeling for sustainability compliance achieving BREEAM

Excellent rating, life-cycle costing analysis enabling informed material selections with 20-year cost projections, design alternative evaluations through parametric modeling supporting value engineering decisions, pre-fabrication coordination reducing on-site assembly time by 30%, stakeholder visualization for enhanced buy-in and reduced change orders, and comprehensive digital asset creation supporting £2M+ operational cost savings over building lifecycle.

4.5 Success Metrics and Value Measurement

VALUE AREA	TARGET METRIC	MEASUREMENT METHOD	BASELINE/BENCHMARK
Schedule Optimization	15% reduction in construction duration	4D model analysis vs baseline schedule	24-month traditional schedule
Cost Reduction	£500k savings through clash elimination	Clash detection reports and change order tracking	Industry average 3% RFI costs
Sustainability Performance	BREEAM Excellent rating achievement	Energy modeling validation	Building Regulations Part L compliance
Operational Efficiency	25% reduction in FM costs	Digital twin performance monitoring	Industry benchmark £150/m^2/year
Quality Improvement	40% reduction in RFIs	Design coordination metrics	Previous project average 120 RFIs

4.6 Alignment with Client Strategic Objectives

BIM strategy directly supports client objectives including: 15% reduction in total project delivery time through optimized sequencing, achievement of net-zero carbon targets through integrated energy modeling, enhanced asset performance through digital twin implementation, improved tenant satisfaction via optimized space planning and MEP design, future-proofing for smart building integration, and comprehensive data foundation for predictive maintenance reducing operational costs by 25% annually.

4.7 Objectives/Goals for the Collaborative Production of Information

Collaborative production goals focus on establishing unified data standards across all disciplines, implementing real-time model coordination through federated workflows, ensuring

consistent information delivery at all project milestones, maintaining version control integrity throughout design development, facilitating transparent communication through shared visualisation platforms, and creating comprehensive audit trails for decision-making accountability whilst adhering to ISO 19650 information management principles.

5. Level of Information Need (LOIN)

5.1 Information Purposes

- ✓ Design Development and Coordination
- ✓ Construction Planning and Sequencing
- ✓ Quantity Surveying and Cost Management
- ✓ Facility Management and Operations
- ✓ Clash Detection and Resolution
- ✓ Regulatory Compliance and Building Control
- ✓ Energy Analysis and Sustainability Assessment
- ✓ Structural Analysis and Performance Verification
- ✓ MEP Systems Coordination and Integration
- ✓ Health and Safety Planning (CDM Compliance)
- ✓ Stakeholder Communication and Visualization
- ✓ As-Built Documentation and Asset Handover
- ✓ Maintenance Planning and Lifecycle Management
- ✓ Space Planning and Occupancy Analysis
- ✓ Procurement and Supply Chain Management

5.2 Geometrical Information Requirements

LOD 350 for construction documentation phase, with dimensional accuracy of ±10mm for structural elements and ±5mm for MEP coordination points.

5.3 Alphanumerical Information Requirements

All building elements must include material specifications, performance data, manufacturer information, maintenance requirements, and warranty details.

5.4 Documentation Requirements

Construction drawings, specifications, schedules, O&M manuals, warranty documents, and asset registers in digital format.

5.5 Information Formats

- ✓ IFC 4
- ✓ PDF
- ✓ BCF 2.1
- ✓ DWG
- ✓ COBie

5.6 Project Information Requirements (PIR)

Project Information Requirements specify deliverable information to support asset management objectives: integrated 3D models with embedded property data for space management systems, energy consumption monitoring through IoT sensor integration, preventive maintenance scheduling with equipment lifecycle data, tenant fit-out guidelines with services capacity information, building performance analytics for continuous optimisation, digital twin connectivity for predictive maintenance, compliance monitoring systems for regulatory reporting, and structured data formats supporting client's existing CAFM systems and sustainability reporting requirements.

6. Information Delivery Planning

6.1 Key Information Delivery Milestones

[object Object],[object Object],[object Object],[object Object],[object Object]

6.2 Task Information Delivery Plans (TIDPs)

Each task team must produce TIDPs detailing their information deliverables, responsibilities, quality requirements, and delivery schedules in alignment with project milestones.

6.3 TIDP Description and Notes

TIDPs define discipline-specific delivery requirements aligned with project milestones. Each TIDP includes: information container definitions, production responsibilities, delivery schedules, quality checking procedures, and approval workflows. TIDPs are maintained by Task Team Leaders and reviewed monthly by the Information Manager to ensure alignment with the MIDP and project programme.

6.4 Master Information Delivery Plan (MIDP)

The MIDP coordinates all discipline-specific TIDPs into a unified delivery schedule aligned with RIBA stages and construction milestones. Information exchanges occur at stage gates with formal approval processes.

6.5 Information Deliverables Responsibility Matrix

[object Object]

6.6 Information Management Activities (Annex A)

[object Object]

6.7 Mobilisation Plan

Project mobilisation occurs over 4 weeks: Week 1 includes CDE setup, template development, and team onboarding; Week 2 involves standards training, tool deployment, and workflow testing; Week 3 encompasses pilot model creation, federation testing, and quality checking procedures; Week 4 includes final system validation, team competency verification, and formal project launch. All team members complete ISO 19650 certification and project-specific training before accessing the CDE and commencing information production activities.

6.8 Delivery Team Capability & Capacity Summary

The delivery team provides comprehensive BIM capabilities across all disciplines: 15 certified BIM professionals with ISO 19650 competency, advanced modeling expertise in Revit, Tekla, and specialist analysis software, 5+ years experience delivering federated models for commercial projects £10M+, proven track record in clash detection reducing construction issues by 60%, established workflows for 4D/5D integration, and dedicated quality assurance resources ensuring deliverable compliance. Team capacity supports peak deployment of 35 specialists during technical design phases.

6.9 Delivery Team's Information Risk Register

RISK DESCRIPTION	IMPACT	PROBABILITY	MITIGATION
Model coordination conflicts due to discipline isolation	High - Construction delays and rework	Medium	Weekly federated model reviews, automated clash detection, early coordination protocols
Data loss or corruption in CDE platform	High - Project delays and data recreation costs	Low	Daily automated backups, geo-redundant storage, version control, disaster recovery procedures
Software interoperability failures between disciplines	Medium - Information exchange delays	Medium	Standardized IFC workflows, software compatibility testing, alternative exchange formats
Inconsistent information delivery by task teams	Medium - Project coordination issues	Medium	Clear TIDP requirements, regular progress monitoring, milestone quality gates
Team member turnover affecting BIM competency	Medium - Knowledge loss and training delays	Low	Cross-training programs, documented procedures, knowledge management systems
Client changes affecting information requirements	Medium - Scope creep and delivery delays	High	Change control procedures, impact assessments, flexible workflow systems

6.10 Exchange of Information Between Task Teams

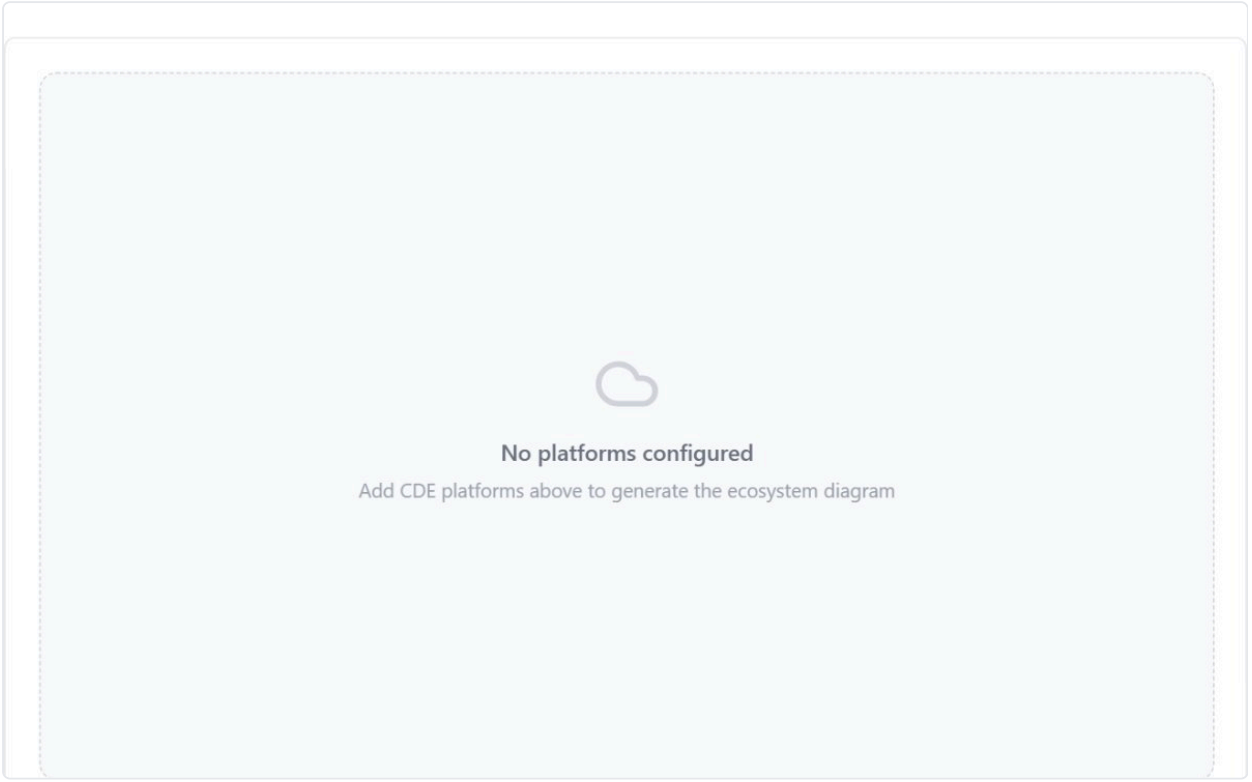
Information exchange protocols establish: weekly model federation with automated clash detection reports, fortnightly design coordination meetings with federated model reviews, monthly design freeze periods for cross-disciplinary validation, standardised BCF workflows for issue resolution, real-time model access through shared CDE workspace, automated notification systems for model updates and issue assignments, and formal sign-off procedures for milestone deliverables ensuring all disciplines approve federated models before progression to next design stage.

6.11 Referencing of 3D Information Models

Model referencing procedures ensure consistent spatial coordination: shared coordinate system established from Ordnance Survey grid references, standardised origin points and level datums across all disciplines, automated reference model linking through shared CDE folders, version control protocols preventing out-of-date reference usage, clash detection workflows identifying reference model conflicts, weekly reference model updates with team notifications, and quality gates preventing model publication without current reference verification ensuring geometric consistency throughout the federated environment.

7. Common Data Environment (CDE)

7.1 Multi-Platform CDE Strategy



7.2 CDE Platform Matrix

PLATFORM/SERVICE	USAGE/PURPOSE	INFORMATION TYPES	WORKFLOW STATES	ACCESS CONTROL
Microsoft SharePoint Online	WIP collaboration and document management	MS Office documents, specifications, reports, meeting minutes, correspondence	WIP, Review, Approved	Team member authentication, version control, document check-out/in

PLATFORM/SERVICE	USAGE/PURPOSE	INFORMATION TYPES	WORKFLOW STATES	ACCESS CONTROL
Autodesk Construction Cloud	BIM model sharing and design coordination	Native BIM models (RVT, DWG), IFC files, federated models, clash reports	WIP, Shared, Published	Role-based access, model viewing permissions, download restrictions
Bentley ProjectWise	Engineering deliverables and technical drawings	CAD drawings, engineering calculations, technical specifications, design reports	Draft, Review, Approved, Issued	Discipline-based folders, approval workflows, audit trails
Esri ArcGIS Online	Geospatial data management and GIS analysis	Survey data, site analysis, environmental data, location intelligence	Draft, Published, Archived	GIS team access, public viewing portals, data export controls
Aconex (Oracle)	Client communication and formal submissions	Official correspondence, RFIs, submittals, progress reports, certificates	Draft, Submitted, Under Review, Approved	Client portal access, formal approval workflows, notification systems

7.3 Unified Workflow States

STATE NAME	DESCRIPTION	ACCESS LEVEL	NEXT STATE
Work in Progress (WIP)	Active development by task teams	Author only	Shared
Shared	Available for coordination and review	Team members	Published
Published	Approved for use by the project team	All stakeholders	Archived

STATE NAME	DESCRIPTION	ACCESS LEVEL	NEXT STATE
Archived	Historical versions for reference	Read-only access	N/A

7.4 Integrated Access Control

Role-based access control with Project Administrator, Design Team, Review Team, and Client View permissions. Multi-factor authentication required for all users. Project folders restricted by discipline with read/write permissions assigned per project phase. Guest access limited to 30-day periods with approval workflows.

7.5 Multi-Platform Security Framework

End-to-end encryption for data in transit and at rest using AES-256 standards. SSL/TLS certificates for secure connections. Regular security audits and penetration testing. ISO 27001 certified cloud infrastructure. Automated malware scanning for all uploads. Data residency compliance with UK GDPR requirements.

7.6 Comprehensive Backup Strategy

Automated daily backups with 30-day retention policy. Weekly full system backups with 12-month retention. Geo-redundant storage across multiple UK data centres. 99.9% uptime SLA with disaster recovery protocols. Regular backup integrity testing and documented restoration procedures. Monthly backup verification reports.

8. Technology and Software Requirements

8.1 BIM Software Applications

- ✓ Autodesk Revit
- ✓ Navisworks
- ✓ Solibri Model Checker
- ✓ BIM 360

8.2 File Formats

- ✓ IFC 4
- ✓ DWG
- ✓ PDF
- ✓ BCF 2.1
- ✓ NWD

8.3 Hardware Requirements

Minimum: Intel i7 or equivalent, 32GB RAM, dedicated graphics card (RTX 3060 or higher), 1TB SSD storage, dual monitors recommended.

8.4 Network Requirements

High-speed internet connection (minimum 100 Mbps), VPN access for remote working, secure cloud connectivity to CDE platform.

8.5 Interoperability Requirements

Seamless data exchange between Revit disciplines, coordination in Navisworks, model checking in Solibri, and cloud collaboration through BIM 360.

8.6 Software, Hardware and IT Infrastructure

CATEGORY	ITEM/COMPONENT	SPECIFICATION	PURPOSE
BIM Authoring	Autodesk Revit Architecture 2024	Licensed seats: 12, Cloud entitlement	Architectural design and documentation
BIM Authoring	Autodesk Revit Structure 2024	Licensed seats: 8, Cloud entitlement	Structural design and analysis integration
BIM Authoring	Autodesk Revit MEP 2024	Licensed seats: 10, Cloud entitlement	MEP systems design and coordination
Model Coordination	Navisworks Manage 2024	Licensed seats: 6, Freedom entitlement	Model federation and clash detection

CATEGORY	ITEM/COMPONENT	SPECIFICATION	PURPOSE
Quality Assurance	Solibri Model Checker v9.12	Licensed seats: 4, Annual subscription	Model validation and rule checking
Cloud Platform	Autodesk Construction Cloud	Premium plan, 500GB storage	Collaborative design and data sharing
Hardware Workstations	Dell Precision 5000 Series	Intel i7-13700K, 32GB RAM, RTX 4070, 1TB NVMe SSD	BIM modeling and coordination workstations
Network Infrastructure	Fiber Internet Connection	1Gbps symmetric, 99.9% uptime SLA	High-speed cloud collaboration and file sync
Data Storage	Network Attached Storage (NAS)	Synology DS1821+, 64TB capacity, RAID 6	Local backup and file server functionality
Security	Multi-Factor Authentication	Microsoft Authenticator, SMS backup	Enhanced security for all cloud platforms

9. Information Production Methods and Procedures

9.1 Standards and Guidelines

STANDARD/GUIDELINE	VERSION	APPLICATION AREA	COMPLIANCE LEVEL
UK BIM Alliance Standards	v2.1	General BIM practices	Mandatory
Uniclass 2015	2015	Classification system	Mandatory
AIA LOD Specification	2019	Level of development	Mandatory

STANDARD/GUIDELINE	VERSION	APPLICATION AREA	COMPLIANCE LEVEL
Company Modeling Guide	v3.2	Internal procedures	Required

9.2 Naming Conventions and Document Control

9.2.1 Overview

File naming follows **ISO 19650-2** convention to ensure consistency, traceability, and efficient information management across all project deliverables.

9.2.2 Naming Convention Fields

#	FIELD NAME	EXAMPLE VALUE	DESCRIPTION
1	`[Project Code]`	`GF24`	Unique project identifier assigned by the appointing party (e.g., GF24 for Greenfield 2024)
2	`[Originator]`	`SAA`	Organization/discipline creating the information (e.g., SAA=Smith Associates Architects, STR=Structural, MEP=MEP)
3	`[Volume/System]`	`XX`	Building zone, system, or spatial reference (XX=Whole building, 01=Core/Stair, 02=Office wings)
4	`[Level/Location]`	`GF`	Floor level or location code (e.g., GF=Ground Floor, 01-08=Floors, RF=Roof, B1=Basement)
5	`[Type]`	`M3`	Information type (e.g., M3=Model, DR=Drawing, SP=Specification, RP=Report, SC=Schedule)
6	`[Role]`	`ARC`	Discipline or role responsible for the content (ARC=Architecture, STR=Structural, MEP=MEP, FAC=Facades)

#	FIELD NAME	EXAMPLE VALUE	DESCRIPTION
7	`[Number]`	`0001`	Sequential 4-digit number for the deliverable
8	`[Revision]`	`P01`	Revision status (e.g., S1-S4=Design stages, P01+=Construction issue, C01+=As-built)

9.2.3 Naming Pattern & Example

Pattern

```
[Project Code]-[Originator]-[Volume/System]-[Level/Location]-[Type]-[Role]-[Number]-[Revision]
```

Example

```
GF24-SAA-XX-GF-M3-ARC-0001-P01.rvt
```

9.2.4 Deliverable Attributes

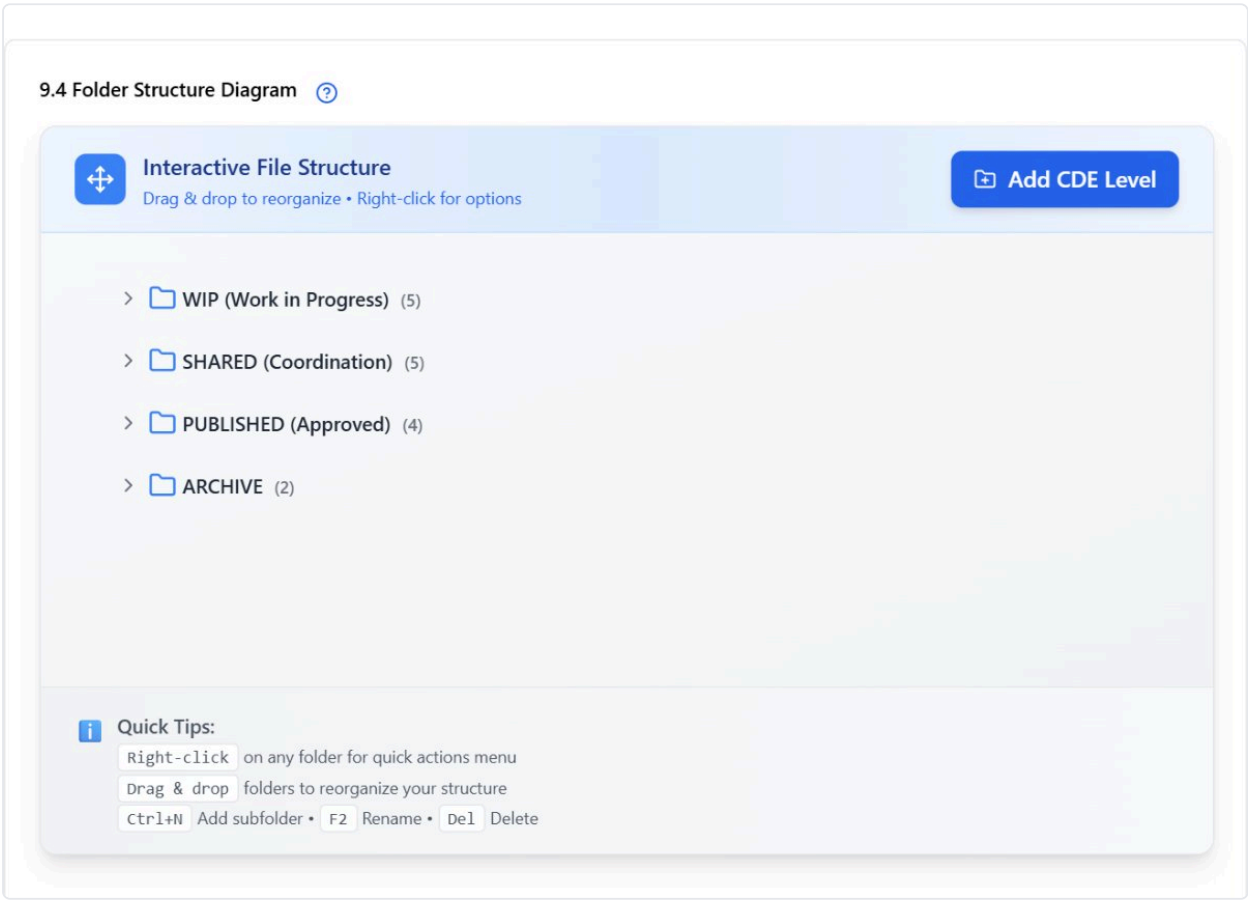
ATTRIBUTE NAME	EXAMPLE VALUE	DESCRIPTION
File Format	`.rvt, .dwg, .pdf, .ifc`	Acceptable file formats for each deliverable type
Classification System	`Uniclass 2015`	Classification framework for organizing information
Level of Information Need	`LOD 300 / LOI 300`	Required level of detail/information for the deliverable
Security Classification	`Confidential`	Information security level (e.g., Public, Internal, Confidential, Restricted)
Suitability Code	`S2 - Suitable for Information`	Document status/suitability per ISO 19650 (S0-S9, A1-A7, B1-B7, CR, etc.)

ATTRIBUTE NAME	EXAMPLE VALUE	DESCRIPTION
Revision Code	`P01`	Revision code indicating version and status: P=First Production (P01-P99), C=Construction (C01-C99), A=As-Built (A01-A99), S=Spatial Coordination (S1-S4), D=Developed Design (D1-D9)

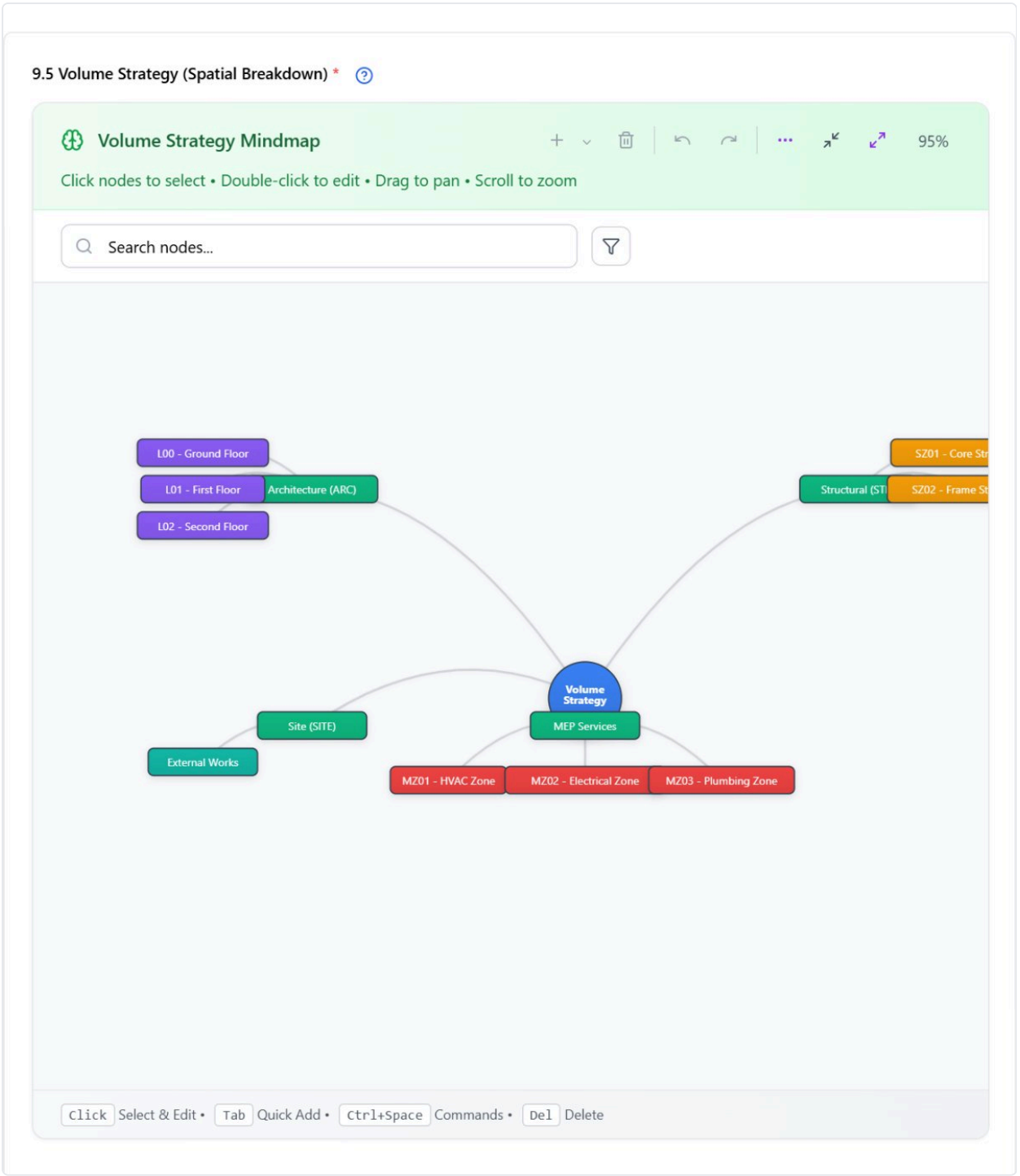
9.3 Folder Structure Description

Organized by discipline and project phase with clear folder hierarchies, version control through file naming, and linked file management protocols.

9.4 Folder Structure Diagram



9.5 Volume Strategy (Spatial Breakdown)

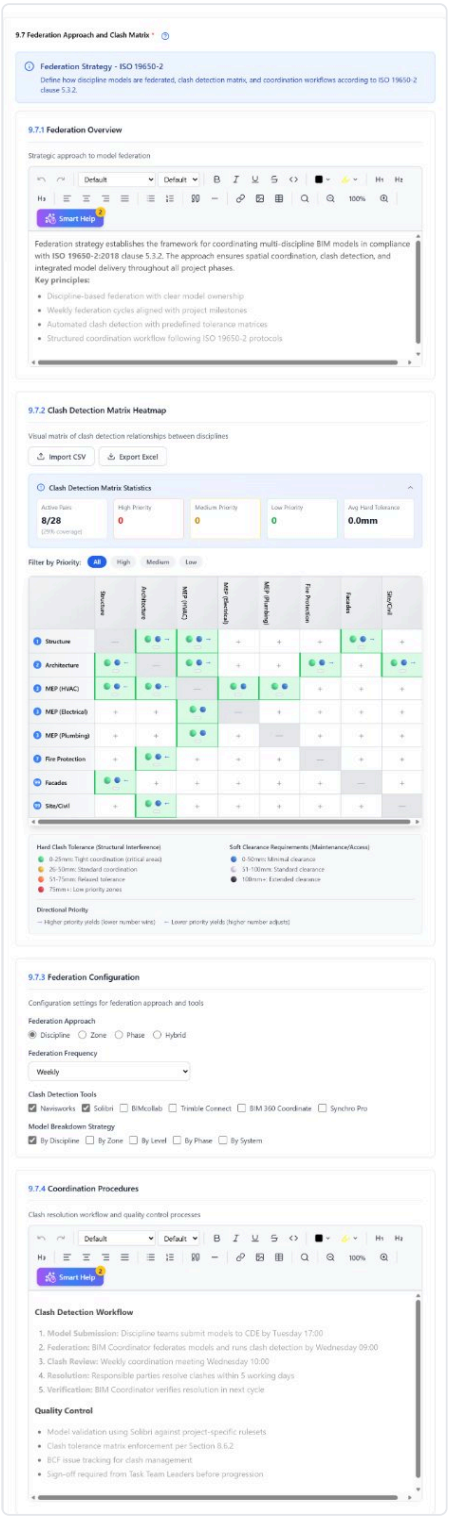


9.6 Discipline and System Breakdown

Information breakdown follows ISO 19650 principles with clear segregation by discipline, building zone, and information type. Architecture models are subdivided by floor levels (L00-L08), structural models by structural zones (SZ01-SZ04), and MEP models by service zones

(MZ01-MZ03). Each volume maintains consistent coordinate systems and spatial relationships. Cross-zone coordination models ensure seamless integration whilst enabling parallel development and efficient collaboration workflows across all disciplines.

9.7 Federation Approach and Clash Matrix



9.8 Federation Workflow Process

Model federation occurs weekly through automated processes in Navisworks Manage, with daily clash detection runs for active design areas. Each discipline publishes IFC models to designated CDE folders following standardized naming conventions. The federation workflow includes automated quality checking, spatial coordination verification, and clash detection reporting. Federated models undergo review and approval before release to the wider project team, ensuring consistency and reliability of coordination information.

9.9 Classification Systems Selection

CLASSIFICATION SYSTEM	APPLICATION AREA	CODE FORMAT	RESPONSIBILITY
Uniclass 2015	Building Elements	Ss_25_30_05	All Disciplines
Uniclass 2015	MEP Equipment	Pr_35_31_26	MEP Engineers
Uniclass 2015	Architectural Elements	Ac_45_10_12	Architects
SfB/Uniclass	Space Classification	(21) Office Areas	Space Planning Team
COBie	Asset Data	Type.Component.Asset	Information Manager

9.10 Implementation Standards

ELEMENT CATEGORY	CLASSIFICATION SYSTEM	CODE FORMAT	EXAMPLE CODE	DESCRIPTION
Structural Elements	Uniclass 2015	Ss_25_30_05	Ss_25_30_05	Structural concrete elements
MEP Equipment	Uniclass 2015	Pr_35_31_26	Pr_35_31_26	MEP equipment systems
Architectural Elements	Uniclass 2015	Ac_45_10_12	Ac_45_10_12	Architectural finishes

ELEMENT CATEGORY	CLASSIFICATION SYSTEM	CODE FORMAT	EXAMPLE CODE	DESCRIPTION
Space Classification	SfB/Uniclass	(21) Office Areas	(21) Office Areas	Space classification codes
Asset Data	COBie	Type.Component.Asset	Type.Component.Asset	Asset management data
Building Services	Uniclass 2015	Ss_25_40_20	Ss_25_40_20	HVAC distribution systems
Construction Products	Uniclass 2015	Pr_20_93_45	Pr_20_93_45	Insulation materials and products
Work Results	Uniclass 2015	Zz_25_10_35	Zz_25_10_35	Concrete work execution standards

9.11 Data Exchange Protocols

EXCHANGE TYPE	FORMAT	FREQUENCY	DELIVERY METHOD
IFC Coordination	IFC 4.0	Weekly	BIM 360 upload
Issue Management	BCF 2.1	Daily as needed	BCF workflow
Drawing Sets	PDF + DWG	At milestones	Client portal
FM Handover	COBie + IFC	Final delivery	Secure transfer

10. Quality Assurance and Control

10.1 Quality Assurance Framework

QA ACTIVITY	RESPONSIBILITY	FREQUENCY	TOOLS/METHODS
Automated Model Checking	BIM Coordinator	Daily	Solibri Model Checker + custom rules
Manual Design Reviews	Discipline Leads	Weekly	Navisworks review sessions
Clash Detection	BIM Coordinator	Bi-weekly	Navisworks Manage + BCF reports
Standards Compliance	Information Manager	Monthly	Compliance checklist + audit trail
Client Reviews	Project Manager	At milestones	Formal review meetings + sign-off

10.2 Model Validation Procedures

Automated checking using Solibri Model Checker for geometric accuracy, completeness, and standard compliance. Manual reviews for design intent and buildability.

10.3 Review Processes

Stage gate reviews at each RIBA stage, weekly coordination reviews, monthly progress reviews, and formal design freeze approvals.

10.4 Approval Workflows

Task team lead approval, discipline coordination review, project manager authorization, and client sign-off for major milestones.

10.5 Compliance Verification

Regular audits against ISO 19650 requirements, BIM standards compliance checks, and quality metrics monitoring.

10.6 Information Model Review and Authorisation

Information model review and authorisation follows ISO 19650 approval protocols:

1. TASK TEAM REVIEW: Model authors perform self-checking using Revit warnings cleanup, visual inspection, and parameter verification before submission. Task Team Leader validates quality before progression to Shared state.

2. COORDINATION REVIEW: BIM Coordinator conducts clash detection and spatial coordination checks. BCF issues raised for identified conflicts with assigned resolution responsibilities and deadlines.

3. TECHNICAL REVIEW: Discipline leads review technical content for design compliance, buildability assessment, and standards adherence. Sign-off required before milestone submission.

4. INFORMATION MANAGER APPROVAL: Final authorisation for progression to Published state. Validates naming conventions, metadata completeness, and CDE compliance. Maintains audit trail of all approvals.

5. CLIENT MILESTONE REVIEW: Formal client review at defined data drops. Feedback incorporated through change management process. Published status confirmed upon client acceptance.

11. Information Security and Privacy

11.1 Data Classification

CLASSIFICATION LEVEL	DESCRIPTION	EXAMPLES	ACCESS CONTROLS
Public	Information that can be freely shared with external parties	Marketing materials, project brochures, general site photos	No access restrictions, publicly available
Internal	Information for internal project team use only	Design development work, meeting minutes, progress reports	Project team members only, authenticated access required
Confidential	Sensitive business information requiring protection	Commercial pricing, tender information, contractual details	Senior team members only, need-to-know basis, encryption required
Restricted	Highly sensitive information with security implications	Security-sensitive building systems, access control details, critical infrastructure plans	Authorized personnel only, enhanced security measures, audit trails mandatory
Commercial-in-Confidence	Commercially sensitive information affecting business operations	Cost breakdowns, supplier agreements, procurement strategies	Commercial team only, encrypted storage, controlled distribution
Technical-Confidential	Technical information requiring specialized protection	Detailed BIM models, structural calculations, MEP system designs	Discipline experts only, version control, watermarked documents

11.2 Access Permissions

Granular permissions based on project roles, need-to-know basis for sensitive information, regular access reviews, and immediate revocation upon project completion.

11.3 Encryption Requirements

AES-256 encryption for data at rest, TLS 1.3 for data in transit, encrypted email for sensitive communications, and secure file transfer protocols.

11.4 Data Transfer Protocols

Secure cloud transfer through approved CDE, encrypted email for sensitive documents, secure FTP for large files, and audit trails for all transfers.

11.5 Privacy Considerations

GDPR compliance for all personal data, data retention policies, right to erasure procedures, and privacy impact assessments for data processing.

12. Training and Competency

12.1 BIM Competency Levels

Level 1 (Awareness): All project staff
Level 2 (Knowledge): Discipline leads and coordinators
Level 3 (Competence): BIM specialists and managers
Level 4 (Expertise): Information manager and senior BIM roles

12.2 Training Requirements

Software proficiency certification, ISO 19650 awareness training, project-specific BIM procedures, and CDE platform training for all users.

12.3 Certification Requirements

BIM certification for key personnel, software vendor certifications, ISO 19650 practitioner certification, and ongoing professional development.

12.4 Project-Specific Training

Project induction covering BIM requirements, CDE usage training, modeling standards workshop, and regular update sessions for process changes.

13. Coordination, Collaboration & Risk Management

13.1 Coordination Meetings

Weekly BIM coordination meetings, monthly progress reviews, quarterly stakeholder updates, and ad-hoc sessions for critical issues.

13.2 Issue Resolution Process

BCF-based issue tracking, responsibility assignment, deadline management, escalation procedures, and resolution verification process.

13.3 Communication Protocols

Project collaboration platform for daily communication, formal reporting channels, escalation matrix, and documented decision-making process.

13.4 Information-Related Risks

Data loss through inadequate backup procedures, information security breaches, quality issues from insufficient checking, interoperability failures between software platforms.

13.5 Technology-Related Risks

Software compatibility issues, hardware failures affecting productivity, network connectivity problems, cloud service outages, and version control conflicts.

13.6 Risk Mitigation Strategies

Robust backup strategies, comprehensive security measures, regular quality audits, software compatibility testing, and redundant system capabilities.

13.7 Contingency Plans

Alternative CDE platforms identified, backup workflow procedures, emergency communication protocols, and rapid response teams for critical issues.

13.8 Performance Metrics and KPIs

Model quality scores, coordination efficiency metrics, information delivery timeline adherence, and stakeholder satisfaction ratings.

13.9 Monitoring Procedures

Monthly performance reviews, automated quality checking, delivery milestone tracking, and continuous improvement feedback loops.

13.10 Audit Trails

Comprehensive logging of all CDE activities, version history tracking, approval records, and change management documentation.

13.11 Change Management Process

CHANGE REQUEST PROCEDURE

All changes to project information requirements must follow formal change management:

1. CHANGE INITIATION: Any stakeholder can raise a change request via the CDE change request form, documenting proposed changes, justification, and impact assessment.

2. IMPACT ASSESSMENT: Information Manager evaluates impact on BEP, delivery schedules, resource requirements, and costs within 5 working days.

3. REVIEW & APPROVAL: Changes reviewed at monthly Information Management Review meeting. Critical changes escalated to Project Director for expedited review.

4. IMPLEMENTATION: Approved changes documented in BEP revision log, communicated to all stakeholders, and incorporated into relevant TIDPs within 10 working days.

5. VERIFICATION: Implementation verified through quality audits and stakeholder confirmation.

13.12 Update Processes

Quarterly BEP reviews, change request procedures, stakeholder approval for modifications, and continuous alignment with project requirements.

13.13 Project Key Performance Indicators (KPIs)

KPI NAME	TARGET VALUE	MEASUREMENT METHOD	RESPONSIBILITY
Model Coordination Effectiveness	<5 clashes per 1000 elements	Weekly Navisworks clash detection reports	BIM Coordinator
Information Delivery Timeliness	≥95% on-time delivery	MIDP milestone tracking dashboard	Information Manager
Data Quality Compliance	≥90% first-time validation pass	Solibri validation reports at data drops	Information Manager
RFI Reduction	≥40% reduction vs baseline	Monthly RFI log analysis	Project Manager
Design Change Efficiency	≤5 working days response time	Change request tracking system	BIM Manager
CDE Adoption Rate	≥98% via CDE (not email)	Monthly CDE usage analytics	CDE Administrator
Team Competency Compliance	100% meeting requirements	Quarterly competency assessments	Information Manager

14. Appendices

Appendix A: COBie Data Requirements

COMPONENT TYPE	REQUIRED PARAMETERS	DATA SOURCE	VALIDATION METHOD
Doors	Fire Rating, U-Value, Warranty Period, Manufacturer, Model	Architectural Model + Specification	Automated checking + Manual review

COMPONENT TYPE	REQUIRED PARAMETERS	DATA SOURCE	VALIDATION METHOD
Windows	U-Value, Solar Heat Gain, Acoustic Rating, Warranty, Installation Date	Architectural Model + Product Data	IFC export validation + COBie reports
HVAC Equipment	Capacity, Energy Rating, Maintenance Schedule, Serial Number, Commissioning Date	MEP Model + Equipment Schedules	Equipment database validation
Lighting Fixtures	Wattage, Light Output, Control System, Replacement Cycle, Warranty	MEP Model + Lighting Schedules	Automated parameter checking
Structural Elements	Material Grade, Load Capacity, Fire Rating, Installation Date, Inspection Schedule	Structural Model + Material Data	Structural analysis integration

Appendix B: Software Version Compatibility Matrix

SOFTWARE	VERSION	FILE FORMATS SUPPORTED	INTEROPERABILITY NOTES
Autodesk Revit	2024.2	RVT, RFA, RTE, IFC 4, DWG, DXF, PDF	Primary authoring tool for all disciplines; IFC export validated with buildingSMART certification
Autodesk Navisworks Manage	2024.1	NWD, NWF, NWC, IFC, DWG, RVT, FBX	Federation and clash detection; direct Revit links; BCF export for issue tracking

SOFTWARE	VERSION	FILE FORMATS SUPPORTED	INTEROPERABILITY NOTES
Solibri Model Checker	9.13	IFC 2x3, IFC 4, BCF 2.1, SMC	Model validation and rule checking; IFC-only workflow; BCF issue export
Autodesk Construction Cloud	Current SaaS	All common formats via web interface	Cloud CDE platform; Revit Cloud Worksharing; Design Collaboration
Microsoft 365	Current SaaS	DOCX, XLSX, PDF, SharePoint	Document management; Teams integration; SharePoint for WIP documents
Synchro Pro	2024 SP1	IFC, NWD, MPP, P6 XER	4D scheduling; imports from Navisworks and P6
BIMcollab Zoom	8.0	IFC, BCF 2.1, BCF 3.0	Issue management; BCF workflow; integrates with Revit and Navisworks
AutoCAD	2024	DWG, DXF, PDF	2D documentation; legacy drawing support; Revit DWG export compatible

Appendix C: Referenced Documents and Standards

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