

REPUBLIC OF TÜRKİYE MINISTRY OF INTERIOR AFAD, WORLD BANK, AND İZMİR METROPOLITAN MUNICIPALITY

RESILIENT İZMİR: URBAN RESILIENCE AND MULTI-HAZARD RISK ASSESSMENT

PROTOCOL FOR CLOSING DATA GAPS, BILATERAL DATA EXCHANGE SCHEMA, AND INSTITUTIONAL CLOUD GOVERNANCE PLAN

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Prepared by: Dokuz Eylül University Department of City and Regional Planning & Resilient İzmir Technical Working Group

Addressed Entities: Disaster and Emergency Management Authority (AFAD), World Bank (TAFF Mission), İzmir Metropolitan Municipality (İBB), Academic Domain Expert Committee

1. EXECUTIVE SUMMARY AND PROTOCOL PURPOSE

In line with the strategic decisions reached at the Technical Coordination Meeting on October 1, 2026, and the scientific guidelines directed by Prof. Dr. Evren Erdin; the **2.15 GB institutional data package** transmitted by AFAD has been successfully processed, spatial taxonomies reconciled, and dynamically integrated into the **Resilient İzmir Web Decision Support Platform v3.8**.

The integrated 2.15 GB dataset comprises: 1. **991 Critical Infrastructure Point Assets:** Georeferenced inventories for Healthcare (692), Energy (109), Transportation (131), Water/Dams (33), Disaster Response/Security (13), Hazardous Chemical/Seveso (8), and Food Logistics (5). 2. **1,157 Network and Transmission Lines:** TEİAŞ high-voltage transmission lines, BOTAŞ natural gas transmission pipelines, and DSİ flood control canals. 3. **MTA 2026 Active Fault Database:** 1,102 active fault segments across the İzmir metropolitan region. 4. **Post-Disaster Building Damage Registry:** 215,603 buildings surveyed by ÇŞİDB and AFAD following the October 30, 2020 Samos-İzmir earthquake, including 1,710 heavily damaged or collapsed building coordinates.

However, as highlighted during the technical conference, for the **Multi-Hazard Vulnerability Model** and the **Cost-Benefit Analysis (CBA)** led by Assoc. Prof. Dr. İsmail Çağrı Özcan to advance from the current **60% operational baseline to 100% analytical**

certainty, the **remaining 40% data inventory** must be formally acquired from stakeholder institutions.

This protocol articulates the official institutional data request matrix, database schemas, integration workflow for academic domain experts, and the shared 5-tier institutional cloud repository architecture (Drive/Nextcloud).

2. REMAINING 40% DATA INVENTORY & INSTITUTIONAL REQUEST MATRIX

The matrix below specifies the exact datasets to be formally requested through AFAD coordination, consistent with the September 15, 2026 CBA Data Requirements and ToR T5–T9 benchmarks:

No	Target Institution / Agency	Requested Dataset	Required Format / Attributes	Role in Resilient İzmir Model	Priority Level
01	Ministry of Health (Provincial Directorate)	66 Hospitals & 497 Primary Health Centers: Construction year, structural framing (C1/C2/S1), seismic base isolation status, bed count, and backup generator fuel autonomy.	Excel / Tabular (.xlsx, .csv)	Critical Infrastructure Fragility Index, Outage Disruption Loss Functions	Critical (P1)
02	Ministry of National Education (MEB)	850+ Schools: Construction year, retrofitting history	Excel / SHP	Post-Disaster Assembly/Evacuation Capacity, Socio-	Critical (P1)

No	Target Institution / Agency	Requested Dataset	Required Format / Attributes	Role in Resilient İzmir Model	Priority Level
		(MEB/iSMEP), classroom/student capacity.		Economic Vulnerability	
03	TEİAŞ 3rd Regional Directorate & GDZ Elektrik	12 Substation Feeders (TM): Service catchment areas (neighborhood cross-walks) and transformer installed capacity (MVA).	GIS (.shp / .geojson) or Single-Line Diagram	Infrastructure Interdependency & Cascading Power Outage Simulator	Critical (P1)
04	İZSU General Directorate (İBB)	Primary drinking water transmission mains, treatment plants, booster pumping stations, and pressure reducing valves (PRVs).	GIS (.gdb / .shp)	Single Point of Failure (SPoF) Analysis & Water Supply Disruption Modeling	High (P2)
05	İzmir Transportation Center (İZUM)	Arterial intersection vehicle counts, corridor average	API / Hourly CSV	Value of Time (VOT) & Detour / Evacuation Travel Delay	High (P2)

No	Target Institution / Agency	Requested Dataset	Required Format / Attributes	Role in Resilient İzmir Model	Priority Level
		travel speeds, and Level of Service (LOS) records.		Feasibility	
06	Ministry of Environment, Urbanization and Climate Change	Official 2026 unit costs for building retrofitting and reconstruction (USD/m ² or TL/m ² for structural classes III-B, IV-A, IV-C).	Official Decree / Gazette	Validation of Strategy S-02 Building Retrofit CAPEX & NPV	High (P2)
07	Chambers of Industry & Commerce (EBSO/İZTO)	Organized Industrial Zones (Aliağa, Çiğli, Torbalı, Kemalpaşa) average daily gross output / value-added loss coefficients	Sectoral Statistical Report	Business Interruption (BI) Multipliers	Medium (P3)
08	MTA & AFAD Earthquake Department	Geotechnical borehole database (V_{s30} , ZD-ZE soil classification)	Borehole Registry (.xlsx)	Microzonation & Site Amplification Metric (H) Refinement	Medium (P3)

No	Target Institution / Agency	Requested Dataset	Required Format / Attributes	Role in Resilient İzmir Model	Priority Level
		n, site fundament al periods).			

3. ECONOMETRIC PARAMETERS FOR ASSOC. PROF. DR. İSMAİL ÇAĞRI ÖZCAN CBA MODEL

To bring the Cost-Benefit Analysis (CBA) to World Bank Investment Committee appraisal standards, the following econometric parameter set has been harmonized:

3.1. Value of Statistical Life (VSL)

- **World Bank Türkiye Baseline Benchmark:** USD 1,450,000 (Purchasing Power Parity - PPP adjusted).
- **İzmir Regional GDP-Adjusted Value (Recommended): USD 1,820,000**
(Justification: According to TurkStat 2024 Provincial Per Capita GDP data, İzmir exceeds the national average by +25.8%, reflecting higher regional human capital and urban economic concentration).
- **Conservative Lower Bound:** USD 950,000 (Direct statutory compensation and emergency medical care floor).

3.2. Social Discount Rate (*r*) and Evaluation Horizon (*T*)

- **Central Baseline Scenario:** $r = 5.0\% - 6.0\%$, Time Horizon $T = 25$ Years.
- **Sensitivity Boundaries:** $r = 3.0\%$ (Intergenerational resilience / green infrastructure) to $r = 10.0\%$ (Stringent capital opportunity cost).

3.3. Business Interruption Multiplier (*BI*)

- **Standard Urban Area:** $1.20 \times$ direct physical asset damage.
- **Critical Industrial & Logistics Corridor (Aliğa - Menemen - Torbalı):** $1.65 \times - 2.20 \times$ (Accounting for port disruption and supply chain spillovers).

4. SHARED INSTITUTIONAL CLOUD (GOOGLE DRIVE / NEXTCLOUD) ARCHITECTURE

To address the requirements highlighted during the stakeholder coordination meeting—namely data confidentiality, avoidance of version collision, and seamless cross-disciplinary inspection among academic researchers—the following **5-Tier Folder Architecture** is established:

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[RESILIENT_IZMIR_CLOUD_ROOT]
├── 01_RAW_INSTITUTIONAL_DATA (Read-Only Archive)
│   ├── AFAD_Official_Package_202609 (2.15 GB Original Repository)
│   ├── IBB_GIS_Layers (Assembly zones, fire stations, cemeteries)
│   ├── TUIK_2024_Demographics (Neighborhood demographics, age, building
counts)
│   └── DASK_and_Building_Registers (2020 post-earthquake damage registry)
├── 02_PREPROCESSED_EXPERT_LAYERS (Academic Domain Expert Workspace)
│   ├── Geo_Seismic_Hazard (PGA, active fault lines, liquefaction suscept
ibility)
│   ├── Hydro_Coastal_Flood (Flood discharge models, tsunami inundation)
│   ├── Structural_Building_Stock (Typology, floor heights, vintage cohor
ts)
│   ├── Transportation_Network (Road topology graph, bridges, SPoF nodes)
│   └── Critical_Infrastructure_Assets (991 facility structural attribute
s)
├── 03_MULTI_HAZARD_SYNTHESIS (Multi-Hazard & Vulnerability Integration)
│   ├── F_BWM_Weights_and_Matrices (Weight matrices, consistency ratios)
│   ├── Master_GeoJSON_1317 (1,317 neighborhoods canonical attribute matr
ix)
│   └── Priority_Tiers_A_B_C (Tier-A/B/C core hotspot spatial polygons)
├── 04_CBA_AND_FEASIBILITY (Assoc. Prof. Dr. İsmail Çağrı Özcan Workspace)
│   ├── Input_Financial_Parameters (VSL, unit construction rates, discoun
t series)
│   ├── Damage_Loss_Functions (Fragility curves, direct/indirect losses)
│   └── Investment_Packages_S01_S06 (CAPEX, OPEX, BCR, NPV model outputs)
└── 05_EXECUTIVE_DELIVERABLES (Official Deliverable Packages & Web Distri
bution)
    ├── Technical_Reports_PDF_DOCX (D1.1, D1.2, CBA Reports - TR & EN)
    ├── Coordination_Toolkits_XLSX (Indicator matrices, Gantt schedules)
    ├── HighRes_Atlas_300DPI (51+ thematic maps and cartographic atlas)
    └── Web_Platform_Releases (Cloudflare Pages live release bundles)

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4.1. Access Rights and Governance Matrix

Role	Authoriz ed Groups	01_RAW	02_EXPERT	03_SYNTHE SIS	04_CBA	05_DELIVE RABLES
Principa l Investig	Prof. Dr. Evren Erdin,	Full Access	Full Access	Full Access	Full Access	Full Access

Role	Authorized Groups	01_RAW	02_EXPERT	03_SYNTHESIS	04_CBA	05_DELIVERABLES
Project Director						
Domain Experts	Seismology, Hydrology, Transportation, Structural Faculty	Read	Write / Upload	Read	Read	Read
Lead Economist	Assoc. Prof. Dr. İsmail Çağrı Özcan	Read	Read	Read	Write / Upload	Review
Institutional Stakeholder	AFAD, World Bank, İBB Delegates	Read	Read	Read	Read	Official Download

5. EXPERT SCIENTIFIC CONSENSUS & CALIBRATION PIPELINE

With the deployment of the “**Export Expert Consensus Set**” engine on the web platform, scientific contributions will be streamlined via four structured phases:

1. **Preprocessing & Normalization:** Domain experts process raw indicators and deposit standardized layers into Level 02.
2. **Coefficient Calibration:** In the Scenario Simulator interface, researchers calibrate F-BWM weight sliders according to empirical disciplinary findings.
3. **Official Consensus Artifact Generation:** Clicking the export button produces a verifiable Resilient_Izmir_Uzman_Konsensus_Seti_[Date].json uploaded to Level 03.
4. **Backend Model Automation:** The Python core pipeline digests this consensus parameter set to lock the final vulnerability and prioritization indices across all 1,317 neighborhoods.

6. DATA PRIVACY AND CYBERSECURITY COMMITMENT

Sensitive critical infrastructure coordinates, energy distribution topologies, and public facility records are rigorously protected under Personal Data Protection Law No. 6698 (KVKK) and the Presidency Digital Transformation Office Information and Communication Security Guide: * Raw institutional records and restricted GIS datasets **shall never be hosted in public source repositories (GitHub/GitLab)**. * Spatial indicators delivered via the web platform are protected by **Cloudflare Pages Edge Middleware** with SHA-256 session tokenization and two-factor stakeholder credential gating (evren / tapu1234). * Inter-agency data transmissions are conducted exclusively via encrypted TLS 1.3 institutional cloud channels.

Approved on Behalf of the Resilient İzmir Technical Working Group:

Prof. Dr. Evren Erdin & Yusuf Eminoğlu

Dokuz Eylül University Faculty of Architecture Department of City and Regional Planning

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