Annex: List of Applied Research projects awarded

Focus Area	Project Title and Objective	Research Team
Focus Area 1: Sustainable Materials for Coastal Protection Infrastructure	**Development and Field Demonstration of Low-Cost Durable Seepage Cut-off Walls for Preventing Seawater Intrusion based on Sustainably Sourced Materials** To investigate the utilisation of wastes in seepage cut-off wall construction in the coastal environment. Aims: 1) To replace bentonite with waste marine clay modified with polymers; and 2) To replace cement with binder made using industry wastes (e.g. carbide lime, magnesia, ground granulated blast furnace slag [GGBS]).	Principal Investigator: Associate Professor Yi Yaolin, Nanyang Technological University Co-Investigator(s): National University of Singapore Collaborator(s): SJ Group, EnGro Corporation Limited
	Self-Healing Ductile Cementitious Composites for Durable and Resilient Coastal Protection Infrastructure To develop an innovative self-healing strain-hardening cementitious composite (SH-SHCC) incorporating PUB sludge-derived biochar, studying its corrosion resistance and service life through field investigations and lifecycle assessments, for application in new and existing coastal infrastructure	Principal Investigator: Associate Professor Yang En-Hua, Nanyang Technological University Co-Investigator(s): Nanyang Technological University Collaborator(s): Alliance Concrete Singapore Pte. Ltd.

Focus Area	Project Title and Objective	Research Team
	including seawalls, breakwaters, and ports.	
	Bio-based Fiber Reinforced Polymer (FRP) as a Novel Low-Carbon Corrosion Protection Technology for Steel Structures under Severe Marine Environments To investigate bio-based FRP as a superior alternative to conventional protective methods, offering extended lifespan (100 years versus 25 years), enhanced corrosion resistance in marine environments, and versatile applications from tidal gates to smaller components, while focusing on underwater joint protection and maintenance solutions.	Principal Investigator: Associate Professor Pang Sze Dai, National University of Singapore Co-Investigator(s): National University of Singapore, Fyfe Asia Pte. Ltd.
	High-Performance and Sustainable Coastal Protection Materials: Lightweight Aggregates Produced from Singapore's Solid Wastes To investigate innovative waste valorisation by converting diverse local waste materials - including incineration bottom ash, fly ash, biomass ash, oil sludge ash, concrete slurry, and retired solar panels - into lightweight aggregates (LWA) through sintering for structural marine concrete applications.	Principal Investigator: Dr. Sun Xiaolong, Zerowaste Asia Co-Investigator(s): Nanyang Technological University

Focus Area	Project Title and Objective	Research Team
	Innovative Utilisation of Waste Materials for Sustainable CO_2 Mineralised Synthetic Cold-Bonded Lightweight Aggregate (SCBLA) To develop a sustainable cold-bonded lightweight aggregate (SCBLA) using local waste materials from concrete production, incorporating CO_2 mineralisation technology to create concrete that's 15% lighter than conventional mixes while maintaining structural performance and durability standards.	Principal Investigator: Dr. Anne Thymotie, Pan-United Concrete Pte. Ltd. Co-Investigator(s): Pan-United Concrete Pte. Ltd., Nanyang Technological University
	Sustainable Concrete Solutions for Coastal Protection Using Locally Sourced Recycled Concrete Fines (RCF) To investigate the valorisation of recycled concrete fines (RCF) from local construction and demolition waste as a cement alternative for coastal infrastructure, incorporating optimised carbonation processes to enhance both carbon capture efficiency and material properties.	Principal Investigator: Dr. Du Hongjian, National University of Singapore Co-Investigator(s): National University of Singapore Collaborator(s): A*STAR, Samwoh Innovation Centre Pte. Ltd.
	Development of Novel Low-carbon Durable Concrete incorporating Local Waste-derived Materials for Coastal Protection Structures To develop a low-carbon, durable concrete for coastal protection structures using ground sludge-	Principal Investigator: Professor Tan Kang Hai, Nanyang Technological University Co-Investigator(s): Temasek Polytechnic, Pan-United Concrete

Focus Area	Project Title and Objective	Research Team
	derived slag (GSDS) as a supplementary cementitious material (SCM).	Pte. Ltd. Collaborator(s): Hunan University
Focus Area 2: Smart Structural Health Monitoring (SHM) System for Coastal Infrastructure	**Smart Continuous Monitoring System for Coastal Infrastructure based on Distributed Fibre Optic Sensing (FOS) and Wireless Internet of Things (IoT) Technologies** To develop and validate a fibre optic monitoring system for seawalls and dikes, integrating AI-driven predictive modelling and marine environment testing.	Principal Investigator: Assistant Professor Fu Yuguang, Nanyang Technological University Co-Investigator(s): Nanyang Technological University, Terralab Technologies Pte. Ltd. Collaborator(s): SJ Group, Singapore Institute of Technology
	Integrated AI-Enhanced Coastal Infrastructure Monitoring and Physics-Guided Analytics System (AI-Coastal MaPS) To develop an Artificial Intelligence-powered (AI-powered) satellite monitoring system for coastal infrastructure assessment and predictive maintenance through remote sensing technology.	Principal Investigator: Dr. Zhang Shanli, Technology Centre for Offshore and Marine, Singapore Co-Investigator(s): National University of Singapore, Centre for Remote Imaging Sensing and Processing Collaborator(s): Fugro Singapore Land Pte. Ltd.
	Periodic Inspection and Defect Detection of Coastal Infrastructure using Autonomous Underwater Vehicles	Principal Investigator: Assistant Professor Geng Guoqing, National University of Singapore

Focus Area	Project Title and Objective	Research Team
	To develop an autonomous underwater vehicle system integrating AI, sonar, and modified Non-Destructive Testing (NDT) technologies for subsea structural inspection and corrosion assessment.	Co-Investigator(s): National University of Singapore, BeeX Pte. Ltd. Collaborator(s): Delta Marine Consultants
	Non-Destructive Testing and Assessment of Structural Integrity for Onshore and Nearshore Infrastructure To develop a seismic monitoring system with machine learning capabilities for detecting anomalies in underground and submerged structures.	Principal Investigator: Associate Professor Wu Wei, Nanyang Technological University Co-Investigator(s): Nanyang Technological University Collaborator(s): SJ Group, Kajima Technical Research Institute Singapore
Focus Area 3: Comprehensive Decision Matrix for Adaptive Coastal Protection Planning	**Comprehensive Decision Matrix for Adaptive Coastal Protection Planning** To develop a framework for adaptive coastal protection planning by incorporating social costs, cost-benefit analysis, and a multicriteria optimisation tool focused on resilience.	Principal Investigator: Dr. Olivia Jensen, National University of Singapore Co-Investigator(s): National University of Singapore, Royal Haskoning DHV Collaborator(s): National University of Singapore
Focus Area 4: Innovative Engineering	**nAture-BaSed infrastructure (NbI) COastal pRotection system with submerged Bund integrated with**	Principal Investigator: Dr. Lim Kian Yew, Technology Centre for

Focus Area	Project Title and Objective	Research Team
Solutions for Coastal Protection and Flood Management	**shell-filled gridS (ABSORBS)** Proposes an adaptive Nature-based Infrastructure system using submerged soil bunds and biogenic shell-filled grids to provide sustainable coastal protection while promoting biodiversity and waste upcycling.	Offshore and Marine, Singapore Co-Investigator(s): Technology Centre for Offshore and Marine, Singapore, SJ Group, Tropical Marine Science Institute
Focus Area 5: Innovative Monitoring Techniques for Sediment Transport	**A New Multidimensional Approach for the Monitoring of Nearshore Suspended Sediments in Singapore's Coastal Waters** To develop an integrated coastal water monitoring system that combines remote sensing and in-situ sensors to measure suspended sediments and particle sizes across surface and depth levels.	Principal Investigator: Professor Adrian Law, National University of Singapore Co-Investigator(s): National University of Singapore, Nanyang Technological University Collaborator(s): Hyundai Engineering & Construction Co. Ltd.