Annex 5

WATER QUALITY TESTING RESULTS

Sampling Station

Test Results

Palau EQPB Water Quality Laboratory Test Results

Minatobashi Bridge Water Quality July 20, 2023

Sample ID			Enteroccoci	Turbidity	pH	Temp	DO	Salinity	TDS		
Location	Time	Date	MPN per 100ml Sample	NTU	Units	°C	mg/L	ppt	g/L	Conductivity ug/L	Sample Type
1	11:38	7/20/2023	1,652	0.6	8.1	29.7	4.3	33.08	32890	55157	Grab
2	11:47	7/20/2023	2,005	0.9	8.4	29.6	4.9	32.52	32435	54686	Grab

Analysis No.	Parameter	Method	Equipment
1	Enterococci	IDEXX Enterolert Method	Incubator 41.0 +/- 0.5 °Celcius
2	Turbidity	EPA Method 180.1	2100P Turbidimeter Hach
3	pH		EXTECH INSTRUMENT
4	Temp.	YSI	YSI 556
5	DO	YSI	YSI 556
6	Salinity	YSI	YSI 556
7	TDS	YSI	YSI 556
8	Condu--	YSI	YSI 556

Released by: Jesse Sengebau Lab. Manager
Date 7/21/2023

Palau EQPB Water Quality Laboratory Test Results

Minatobashi Bridge Water Quality November 17, 2023

Sample ID			Enteroccoci	Turbidity	pH	Temp	DO	Salinity	TDS		
Location	Time	Date	MPN per 100ml Sample	NTU	Units	°C	mg/L	ppt	g/L	Conductivity ug/L	Sample Type
Station # 3	10:53	11/17/2023	0	1.0	8.5	28.9	5.6	n/t	n/t	n/t	Grab
Station # 4	11:00	11/17/2023	20	3.4	8.6	29.3	5.2	n/t	n/t	n/t	Grab

Analysis No.	Parameter	Method	Equipment
1	Enterococci	IDEXX Enterolert Method	Incubator 41.0 +/- 0.5 °Celcius
2	Turbidity	EPA Method 180.1	2100P Turbidimeter Hach
3	pH		EXTECH INSTRUMENT
4	Temp.	YSI	YSI 556
5	DO	YSI	YSI 556
6	Salinity	YSI	YSI 556
7	TDS	YSI	YSI 556
8	Condu--	YSI	YSI 556

n/t - not tested
Released by: Jesse Sengebau Lab. Manager
Date : November 19, 2023

Annex 6

MARINE BIOLOGICAL SURVEY RESULTS

Project: Minato Bridge Replacement Project — Analysis date:
Dataset name: Station 1 — Analysis by:
Location: Minatobashi Bridge — Lat: — Long:
File/sheetname: C:\Users\Research\Desktop\Minatobashi survey_ June 10.11, 2023\Station 1\Minatobashi sur

TRANSECT NAME	t1	t2	t3			
Number of frames	5	5	5			
Total points	25	25	25			
Total points (minus tape+wand+shadow)	25	25	25			
MAJOR CATEGORY (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)	64.00	4.00	0.00	22.67	35.85	20.70
SOFT CORAL (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	0.00	0.00	0.00	0.00	0.00
MACROALGAE (MA)	0.00	0.00	0.00	0.00	0.00	0.00
SEAGRASS (SG)	0.00	0.00	16.00	5.33	9.24	5.33
CORALLINE ALGAE (CA)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	36.00	96.00	84.00	72.00	31.75	18.33
CYANOBACTERIA (CB)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0.00	0.00	0.00	0.00	0.00	0.00
Sum (excluding tape+shadow+wand)	100.00	100.00	100.00			
SUBCATEGORIES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)						
Acanthastrea (ACAN)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora submassive (ACS)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0.00	0.00	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0.00	0.00	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0.00	0.00	0.00	0.00	0.00	0.00
Astrea (ASTR)	0.00	0.00	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0.00	0.00	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0.00	0.00	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0.00	0.00	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0.00	0.00	0.00	0.00	0.00	0.00
Catalaphyllia (CAT)	0.00	0.00	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0.00	0.00	0.00	0.00	0.00	0.00
Coeloseris (COEL)	0.00	0.00	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0.00	0.00	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0.00	0.00	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0.00	0.00	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0.00	0.00	0.00	0.00	0.00	0.00
Cynarina (CYN)	0.00	0.00	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0.00	0.00	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0.00	0.00	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0.00	0.00	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0.00	0.00	0.00	0.00	0.00	0.00

Echinopora (ECHPO)	0.00	0.00	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0.00	0.00	0.00	0.00	0.00	0.00
Favites (FAVT)	0.00	0.00	0.00	0.00	0.00	0.00
Fungia (FUNG)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxea (GAL)	0.00	0.00	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0.00	0.00	0.00	0.00	0.00	0.00
Goniastrea (GON)	0.00	0.00	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0.00	0.00	0.00	0.00	0.00	0.00
Halomitra (HALO)	0.00	0.00	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0.00	0.00	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0.00	0.00	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0.00	0.00	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0.00	0.00	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0.00	0.00	0.00	0.00	0.00	0.00
Isopora (ISOP)	0.00	0.00	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0.00	0.00	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophyllia (LOBOPH)	0.00	0.00	0.00	0.00	0.00	0.00
Madracis (MAD)	0.00	0.00	0.00	0.00	0.00	0.00
Merulina (MERU)	0.00	0.00	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0.00	0.00	0.00	0.00	0.00	0.00
Micromussa (MIC)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	28.00	4.00	0.00	10.67	15.14	8.74
Montipora encrusting (MONTIEN)	36.00	0.00	0.00	12.00	20.78	12.00
Montipora foliose (MONTIF)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0.00	0.00	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0.00	0.00	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0.00	0.00	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0.00	0.00	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0.00	0.00	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0.00	0.00	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0.00	0.00	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pavona (PAV)	0.00	0.00	0.00	0.00	0.00	0.00
Pectinia (PECT)	0.00	0.00	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0.00	0.00	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0.00	0.00	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0.00	0.00	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0.00	0.00	0.00	0.00	0.00	0.00
Podabacia (POD)	0.00	0.00	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0.00	0.00	0.00	0.00	0.00	0.00
Porites (POR)	0.00	0.00	0.00	0.00	0.00	0.00
Porites rus (PORRUS)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0.00	0.00	0.00	0.00	0.00	0.00

Porites-encrusting (PORE)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	0.00	0.00	0.00	0.00	0.00	0.00
Psammocora (PSAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0.00	0.00	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0.00	0.00	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0.00	0.00	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0.00	0.00	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0.00	0.00	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0.00	0.00	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0.00	0.00	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0.00	0.00	0.00	0.00	0.00	0.00
SOFT CORAL (SC)						
Soft Coral (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)						
Anenome (ANEM)	0.00	0.00	0.00	0.00	0.00	0.00
Ascidian (ASC)	0.00	0.00	0.00	0.00	0.00	0.00
Clams (CL)	0.00	0.00	0.00	0.00	0.00	0.00
Corallimorph (COLM)	0.00	0.00	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0.00	0.00	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0.00	0.00	0.00	0.00	0.00	0.00
Gorgonians (G)	0.00	0.00	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0.00	0.00	0.00	0.00	0.00	0.00
Millepora (MILL)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0.00	0.00	0.00	0.00	0.00	0.00
Sponges (SP)	0.00	0.00	0.00	0.00	0.00	0.00
Zoanthids (Z)	0.00	0.00	0.00	0.00	0.00	0.00
MACROALGAE (MA)						
Asparagopsis (ASP)	0.00	0.00	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0.00	0.00	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0.00	0.00	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0.00	0.00	0.00	0.00	0.00	0.00
Chlorodesmis (CHLDES)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyota (DICT)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0.00	0.00	0.00	0.00	0.00	0.00
Halimeda (HALI)	0.00	0.00	0.00	0.00	0.00	0.00
Liagora (LIAG)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0.00	0.00	0.00	0.00	0.00	0.00
Mastophora (MAST)	0.00	0.00	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0.00	0.00	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0.00	0.00	0.00	0.00	0.00	0.00
Padina (PAD)	0.00	0.00	0.00	0.00	0.00	0.00
Sargassum (SARG)	0.00	0.00	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0.00	0.00	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0.00	0.00	0.00	0.00	0.00	0.00
SEAGRASS (SG)						

Cymodocea rotundata (CR)	0.00	0.00	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0.00	0.00	8.00	2.67	4.62	2.67
Halodule pinifolia (HP)	0.00	0.00	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila minor (HM)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0.00	0.00	0.00	0.00	0.00	0.00
Oceana serrulata (OS)	0.00	0.00	0.00	0.00	0.00	0.00
Seagrass (SG)	0.00	0.00	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0.00	0.00	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0.00	0.00	8.00	2.67	4.62	2.67
Thalassodendron ciliatum (TC)	0.00	0.00	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)						
Amphiroa (AMP)	0.00	0.00	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0.00	0.00	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0.00	0.00	0.00	0.00	0.00	0.00
Jania (JAN)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)						
Carbonate (CAR)	0.00	0.00	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	32.00	20.00	0.00	17.33	16.17	9.33
Mud (MUD)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	0.00	48.00	12.00	20.00	24.98	14.42
Sand (SAND)	4.00	28.00	72.00	34.67	34.49	19.91
Turf (TURF)	0.00	0.00	0.00	0.00	0.00	0.00
CYANOBACTERIA (CB)						
Bluegreen (BG)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)						
Shadow (SHADOW)	0.00	0.00	0.00	0.00	0.00	0.00
Tape (TAPE)	0.00	0.00	0.00	0.00	0.00	0.00
Wand (WAND)	0.00	0.00	0.00	0.00	0.00	0.00
NOTES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00
NOTES (% of coral)						
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00

MAJOR CATEGORY (occurring in trarsect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**
CORAL (C)	16	1	0	17	5.67	8.96	5.17	0.69
SOFT CORAL (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0	0	0	0	0.00	0.00	0.00	0.00
MACROALGAE (MA)	0	0	0	0	0.00	0.00	0.00	0.00
SEAGRASS (SG)	0	0	4	4	1.33	2.31	1.33	0.69
CORALLINE ALGAE (CA)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	9	24	21	54	18.00	7.94	4.58	1.05
CYANOBACTERIA (CB)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0	0	0	0	0.00	0.00	0.00	
TOTAL TRANSECT POINTS	**25**	**25**	**25**	**75**				
SUBCATEGORIES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**

CORAL (C)								0.69
Acanthastrea (ACAN)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora submassive (ACS)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0	0	0	0	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0	0	0	0	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0	0	0	0	0.00	0.00	0.00	0.00
Astrea (ASTR)	0	0	0	0	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0	0	0	0	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0	0	0	0	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0	0	0	0	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0	0	0	0	0.00	0.00	0.00	0.00
Catalaphyllia (CAT)	0	0	0	0	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0	0	0	0	0.00	0.00	0.00	0.00
Coeloseris (CCEL)	0	0	0	0	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0	0	0	0	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0	0	0	0	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0	0	0	0	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0	0	0	0	0.00	0.00	0.00	0.00
Cynarina (CYN)	0	0	0	0	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0	0	0	0	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0	0	0	0	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0	0	0	0	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0	0	0	0	0.00	0.00	0.00	0.00
Echinopora (ECHPO)	0	0	0	0	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0	0	0	0	0.00	0.00	0.00	0.00
Favites (FAVT)	0	0	0	0	0.00	0.00	0.00	0.00
Fungia (FUNG)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxea (GAL)	0	0	0	0	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0	0	0	0	0.00	0.00	0.00	0.00
Goniastrea (G0N)	0	0	0	0	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0	0	0	0	0.00	0.00	0.00	0.00
Halomitra (HALO)	0	0	0	0	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0	0	0	0	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0	0	0	0	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0	0	0	0	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0	0	0	0	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0	0	0	0	0.00	0.00	0.00	0.00
Isopora (ISOP)	0	0	0	0	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0	0	0	0	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophyllia (L0BOPH)	0	0	0	0	0.00	0.00	0.00	0.00
Madracis (MAD)	0	0	0	0	0.00	0.00	0.00	0.00
Merulina (MERU)	0	0	0	0	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0	0	0	0	0.00	0.00	0.00	0.00

Micromussa (MIC)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	7	1	0	8	2.67	3.79	2.19	0.35
Montipora encrusting (MONTIEN)	9	0	0	9	3.00	5.20	3.00	0.34
Montipora foliose (MONTIF)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0	0	0	0	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0	0	0	0	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0	0	0	0	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0	0	0	0	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0	0	0	0	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0	0	0	0	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0	0	0	0	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pavona (PAV)	0	0	0	0	0.00	0.00	0.00	0.00
Pectinia (PECT)	0	0	0	0	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0	0	0	0	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0	0	0	0	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0	0	0	0	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0	0	0	0	0.00	0.00	0.00	0.00
Podabacia (POD)	0	0	0	0	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0	0	0	0	0.00	0.00	0.00	0.00
Porites (POR)	0	0	0	0	0.00	0.00	0.00	0.00
Porites rus (PORRUS)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-encrusting (PORE)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	0	0	0	0	0.00	0.00	0.00	0.00
Psammocora (PSAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0	0	0	0	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0	0	0	0	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0	0	0	0	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0	0	0	0	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0	0	0	0	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0	0	0	0	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0	0	0	0	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0	0	0	0	0.00	0.00	0.00	0.00
SOFT CORAL (SC)								0.00
Soft Coral (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)								0.00
Anenome (ANEM)	0	0	0	0	0.00	0.00	0.00	0.00
Ascidian (ASC)	0	0	0	0	0.00	0.00	0.00	0.00
Clams (CL)	0	0	0	0	0.00	0.00	0.00	0.00
Corallimorph (COLM)	0	0	0	0	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0	0	0	0	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0	0	0	0	0.00	0.00	0.00	0.00
Gorgonians (G)	0	0	0	0	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0	0	0	0	0.00	0.00	0.00	0.00

Millepora (MILL)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0	0	0	0	0.00	0.00	0.00	0.00
Sponges (SP)	0	0	0	0	0.00	0.00	0.00	0.00
Zoanthids (Z)	0	0	0	0	0.00	0.00	0.00	0.00
MACROALGAE (MA)								0.00
Asparagopsis (ASP)	0	0	0	0	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0	0	0	0	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0	0	0	0	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0	0	0	0	0.00	0.00	0.00	0.00
Chlorodesmis (CHLDES)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyota (DICT)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0	0	0	0	0.00	0.00	0.00	0.00
Halimeda (HAL)	0	0	0	0	0.00	0.00	0.00	0.00
Liagora (LIAG)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0	0	0	0	0.00	0.00	0.00	0.00
Mastophora (MAST)	0	0	0	0	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0	0	0	0	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0	0	0	0	0.00	0.00	0.00	0.00
Padina (PAD)	0	0	0	0	0.00	0.00	0.00	0.00
Sargassum (SARG)	0	0	0	0	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0	0	0	0	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0	0	0	0	0.00	0.00	0.00	0.00
SEAGRASS (SG)								0.69
Cymodocea rotundata (CR)	0	0	0	0	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0	0	2	2	0.67	1.15	0.67	0.35
Halodule pinifola (HP)	0	0	0	0	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila minor (HM)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0	0	0	0	0.00	0.00	0.00	0.00
Oceana serrulata (OS)	0	0	0	0	0.00	0.00	0.00	0.00
Seagrass (SG)	0	0	0	0	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0	0	0	0	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0	0	2	2	0.67	1.15	0.67	0.35
Thalassodendron ciliatum (TC)	0	0	0	0	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)								0.00
Amphiroa (AMP)	0	0	0	0	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0	0	0	0	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0	0	0	0	0.00	0.00	0.00	0.00
Jania (JAN)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)								1.05
Carbonate (CAR)	0	0	0	0	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	8	5	0	13	4.33	4.04	2.33	0.34
Mud (MUD)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	0	12	3	15	5.00	6.24	3.61	0.36
Sand (SAND)	1	7	18	26	8.67	8.62	4.98	0.35

Turf (TURF)	0	0	0	0	0.00	0.00	0.00	0.00
CYANOBACTERIA (CB)								0.00
Bluegreen (BG)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)								
Shadow (SHADOW)	0	0	0	0	0.00	0.00	0.00	
Tape (TAPE)	0	0	0	0	0.00	0.00	0.00	
Wand (WAND)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in coral)								
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	

Shannon-Weaver Index	**0.65**	**0.17**	**0.44**
CORAL (C)	0.29	0.13	0.00
SOFT CORAL (SC)	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	0.00	0.00
MACROALGAE (MA)	0.00	0.00	0.00
SEAGRASS (SG)	0.00	0.00	0.29
CORALLINE ALGAE (CA)	0.00	0.00	0.00
SUBSTRATE (SUBS)	0.37	0.04	0.15
CYANOBACTERIA (CB)	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)			

Project: Minato Bridge Replacement Project
Dataset name: Station 2
Location: Minatobashi Bridge
File/sheetname:

Analysis date:
Analysis by:
Lat: Long:
C:\Users\Research\Desktop\Minatobashi survey_ June 10,11, 2023\Station 2\Minatobashi sun

TRANSECT NAME	t1	t2	t3			
Number of frames	5	5	5			
Total points	25	25	25			
Total points (minus tape+wand+shadow)	25	25	25			
MAJOR CATEGORY (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)	0.00	8.00	8.00	5.33	4.62	2.67
SOFT CORAL (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	0.00	0.00	0.00	0.00	0.00
MACROALGAE (MA)	0.00	8.00	0.00	2.67	4.62	2.67
SEAGRASS (SG)	0.00	0.00	4.00	1.33	2.31	1.33
CORALLINE ALGAE (CA)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	100.00	84.00	88.00	90.67	8.33	4.81
CYANOBACTERIA (CB)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0.00	0.00	0.00	0.00	0.00	0.00
Sum (excluding tape+shadow+wand)	100.00	100.00	100.00			
SUBCATEGORIES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)						
Acanthastrea (ACAN)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora submassive (ACS)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0.00	0.00	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0.00	0.00	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0.00	0.00	0.00	0.00	0.00	0.00
Astrea (ASTR)	0.00	0.00	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0.00	0.00	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0.00	0.00	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0.00	0.00	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0.00	0.00	0.00	0.00	0.00	0.00
Catalaphyllia (CAT)	0.00	0.00	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0.00	0.00	0.00	0.00	0.00	0.00
Coeloseris (COEL)	0.00	0.00	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0.00	0.00	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0.00	0.00	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0.00	0.00	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0.00	0.00	0.00	0.00	0.00	0.00
Cynarina (CYN)	0.00	0.00	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0.00	0.00	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0.00	0.00	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0.00	0.00	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0.00	0.00	0.00	0.00	0.00	0.00

Echinopora (ECHPO)	0.00	0.00	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0.00	0.00	0.00	0.00	0.00	0.00
Favites (FAVT)	0.00	0.00	0.00	0.00	0.00	0.00
Fungia (FUNG)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxea (GAL)	0.00	0.00	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0.00	0.00	0.00	0.00	0.00	0.00
Goniastrea (GON)	0.00	0.00	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0.00	0.00	0.00	0.00	0.00	0.00
Halomitra (HALO)	0.00	0.00	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0.00	0.00	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0.00	0.00	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0.00	0.00	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0.00	0.00	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0.00	0.00	0.00	0.00	0.00	0.00
Isopora (ISOP)	0.00	0.00	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0.00	0.00	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophyllia (LOBOPH)	0.00	0.00	0.00	0.00	0.00	0.00
Madracis (MAD)	0.00	0.00	0.00	0.00	0.00	0.00
Merulina (MERU)	0.00	0.00	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0.00	0.00	0.00	0.00	0.00	0.00
Micromussa (MIC)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	0.00	4.00	0.00	1.33	2.31	1.33
Montipora encrusting (MONTIEN)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora foliose (MONTIF)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0.00	0.00	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0.00	0.00	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0.00	0.00	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0.00	0.00	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0.00	0.00	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0.00	0.00	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0.00	0.00	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pavona (PAV)	0.00	0.00	0.00	0.00	0.00	0.00
Pectinia (PECT)	0.00	0.00	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0.00	0.00	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0.00	0.00	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0.00	0.00	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0.00	0.00	0.00	0.00	0.00	0.00
Podabacia (POD)	0.00	0.00	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0.00	0.00	0.00	0.00	0.00	0.00
Porites (POR)	0.00	0.00	0.00	0.00	0.00	0.00
Porites rus (PORRUS)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0.00	0.00	0.00	0.00	0.00	0.00

Porites-encrusting (PORE)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	0.00	4.00	8.00	4.00	4.00	2.31
Psammocora (PSAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0.00	0.00	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0.00	0.00	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0.00	0.00	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0.00	0.00	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0.00	0.00	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0.00	0.00	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0.00	0.00	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0.00	0.00	0.00	0.00	0.00	0.00
SOFT CORAL (SC)						
Soft Coral (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)						
Anenome (ANEM)	0.00	0.00	0.00	0.00	0.00	0.00
Ascidian (ASC)	0.00	0.00	0.00	0.00	0.00	0.00
Clams (CL)	0.00	0.00	0.00	0.00	0.00	0.00
Corallimorph (COLM)	0.00	0.00	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0.00	0.00	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0.00	0.00	0.00	0.00	0.00	0.00
Gorgonians (G)	0.00	0.00	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0.00	0.00	0.00	0.00	0.00	0.00
Millepora (MILL)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0.00	0.00	0.00	0.00	0.00	0.00
Sponges (SP)	0.00	0.00	0.00	0.00	0.00	0.00
Zoanthids (Z)	0.00	0.00	0.00	0.00	0.00	0.00
MACROALGAE (MA)						
Asparagopsis (ASP)	0.00	0.00	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0.00	0.00	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0.00	0.00	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0.00	0.00	0.00	0.00	0.00	0.00
Chlorodesmis (CHLDES)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyota (DICT)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0.00	0.00	0.00	0.00	0.00	0.00
Halimeda (HALI)	0.00	0.00	0.00	0.00	0.00	0.00
Liagora (LIAG)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0.00	0.00	0.00	0.00	0.00	0.00
Mastophora (MAST)	0.00	0.00	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0.00	0.00	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0.00	0.00	0.00	0.00	0.00	0.00
Padina (PAD)	0.00	8.00	0.00	2.67	4.62	2.67
Sargassum (SARG)	0.00	0.00	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0.00	0.00	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0.00	0.00	0.00	0.00	0.00	0.00
SEAGRASS (SG)						

Cymodocea rotundata (CR)	0.00	0.00	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0.00	0.00	0.00	0.00	0.00	0.00
Halodule pinifolia (HP)	0.00	0.00	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila minor (HM)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0.00	0.00	0.00	0.00	0.00	0.00
Oceana serrulata (OS)	0.00	0.00	0.00	0.00	0.00	0.00
Seagrass (SG)	0.00	0.00	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0.00	0.00	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0.00	0.00	4.00	1.33	2.31	1.33
Thalassodendron ciliatum (TC)	0.00	0.00	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)						
Amphirca (AMP)	0.00	0.00	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0.00	0.00	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0.00	0.00	0.00	0.00	0.00	0.00
Jania (JAN)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)						
Carbonate (CAR)	0.00	0.00	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	44.00	0.00	12.00	18.67	22.74	13.13
Mud (MUD)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	20.00	8.00	12.00	13.33	6.11	3.53
Sand (SAND)	4.00	12.00	64.00	26.67	32.58	18.81
Turf (TURF)	32.00	64.00	0.00	32.00	32.00	18.48
CYANOBACTERIA (CB)						
Bluegreen (BG)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)						
Shadow (SHADOW)	0.00	0.00	0.00	0.00	0.00	0.00
Tape (TAPE)	0.00	0.00	0.00	0.00	0.00	0.00
Wand (WAND)	0.00	0.00	0.00	0.00	0.00	0.00

NOTES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00
NOTES (% of coral)						
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00

MAJOR CATEGORY (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**
CORAL (C)	0	2	2	4	1.33	1.15	0.67	0.56
SOFT CORAL (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0	0	0	0	0.00	0.00	0.00	0.00
MACROALGAE (MA)	0	2	0	2	0.67	1.15	0.67	0.00
SEAGRASS (SG)	0	0	1	1	0.33	0.58	0.33	0.00
CORALLINE ALGAE (CA)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	25	21	22	68	22.67	2.08	1.20	1.33
CYANOBACTERIA (CB)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0	0	0	0	0.00	0.00	0.00	
TOTAL TRANSECT POINTS	**25**	**25**	**25**	**75**				

SUBCATEGORIES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**

CORAL (C)								0.56
Acanthastrea (ACAN)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora submassive (ACS)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0	0	0	0	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0	0	0	0	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0	0	0	0	0.00	0.00	0.00	0.00
Astrea (ASTR)	0	0	0	0	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0	0	0	0	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0	0	0	0	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0	0	0	0	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0	0	0	0	0.00	0.00	0.00	0.00
Catalaphyllia (CAT)	0	0	0	0	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0	0	0	0	0.00	0.00	0.00	0.00
Coeloseris (COEL)	0	0	0	0	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0	0	0	0	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0	0	0	0	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0	0	0	0	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0	0	0	0	0.00	0.00	0.00	0.00
Cynarina (CYN)	0	0	0	0	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0	0	0	0	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0	0	0	0	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0	0	0	0	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0	0	0	0	0.00	0.00	0.00	0.00
Echinopora (ECHPO)	0	0	0	0	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0	0	0	0	0.00	0.00	0.00	0.00
Favites (FAVT)	0	0	0	0	0.00	0.00	0.00	0.00
Fungia (FUNG)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxea (GAL)	0	0	0	0	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0	0	0	0	0.00	0.00	0.00	0.00
Goniastrea (GON)	0	0	0	0	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0	0	0	0	0.00	0.00	0.00	0.00
Halomitra (HALO)	0	0	0	0	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0	0	0	0	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0	0	0	0	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0	0	0	0	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0	0	0	0	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0	0	0	0	0.00	0.00	0.00	0.00
Isopora (ISOP)	0	0	0	0	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0	0	0	0	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophyllia (LOBOPH)	0	0	0	0	0.00	0.00	0.00	0.00
Madracis (MAD)	0	0	0	0	0.00	0.00	0.00	0.00
Merulina (MERU)	0	0	0	0	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0	0	0	0	0.00	0.00	0.00	0.00

Micromussa (MIC)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	0	1	0	1	0.33	0.58	0.33	0.35
Montipora encrusting (MONTIEN)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora foliose (MONTIF)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0	0	0	0	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0	0	0	0	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0	0	0	0	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0	0	0	0	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0	0	0	0	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0	0	0	0	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0	0	0	0	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pavona (PAV)	0	0	0	0	0.00	0.00	0.00	0.00
Pectinia (PECT)	0	0	0	0	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0	0	0	0	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0	0	0	0	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0	0	0	0	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0	0	0	0	0.00	0.00	0.00	0.00
Podabacia (POD)	0	0	0	0	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0	0	0	0	0.00	0.00	0.00	0.00
Porites (POR)	0	0	0	0	0.00	0.00	0.00	0.00
Porites rus (PORRUS)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-encrusting (PORE)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	0	1	2	3	1.00	1.00	0.58	0.22
Psammocora (PSAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0	0	0	0	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0	0	0	0	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0	0	0	0	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0	0	0	0	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0	0	0	0	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0	0	0	0	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0	0	0	0	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0	0	0	0	0.00	0.00	0.00	0.00
SOFT CORAL (SC)								0.00
Soft Coral (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)								0.00
Anenome (ANEM)	0	0	0	0	0.00	0.00	0.00	0.00
Ascidian (ASC)	0	0	0	0	0.00	0.00	0.00	0.00
Clams (CL)	0	0	0	0	0.00	0.00	0.00	0.00
Corallimorph (COLM)	0	0	0	0	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0	0	0	0	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0	0	0	0	0.00	0.00	0.00	0.00
Gorgonians (G)	0	0	0	0	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0	0	0	0	0.00	0.00	0.00	0.00

Millepora (MILL)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0	0	0	0	0.00	0.00	0.00	0.00
Sponges (SP)	0	0	0	0	0.00	0.00	0.00	0.00
Zoanthids (Z)	0	0	0	0	0.00	0.00	0.00	0.00
MACROALGAE (MA)								0.00
Asparagopsis (ASP)	0	0	0	0	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0	0	0	0	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0	0	0	0	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0	0	0	0	0.00	0.00	0.00	0.00
Chlorodesmis (CHLDES)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyota (DICT)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0	0	0	0	0.00	0.00	0.00	0.00
Halimeda (HALI)	0	0	0	0	0.00	0.00	0.00	0.00
Lagora (LIAG)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0	0	0	0	0.00	0.00	0.00	0.00
Mastophora (MAST)	0	0	0	0	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0	0	0	0	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0	0	0	0	0.00	0.00	0.00	0.00
Padina (PAD)	0	2	0	2	0.67	1.15	0.67	0.00
Sargassum (SARG)	0	0	0	0	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0	0	0	0	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0	0	0	0	0.00	0.00	0.00	0.00
SEAGRASS (SG)								0.00
Cymodocea rotundata (CR)	0	0	0	0	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0	0	0	0	0.00	0.00	0.00	0.00
Halodule pinifolia (HP)	0	0	0	0	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila minor (HM)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0	0	0	0	0.00	0.00	0.00	0.00
Coeana serrulata (OS)	0	0	0	0	0.00	0.00	0.00	0.00
Seagrass (SG)	0	0	0	0	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0	0	0	0	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0	0	1	1	0.33	0.58	0.33	0.00
Thalassodendron ciliatum (TC)	0	0	0	0	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)								0.00
Amphiroa (AMP)	0	0	0	0	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0	0	0	0	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0	0	0	0	0.00	0.00	0.00	0.00
Jania (JAN)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)								1.33
Carbonate (CAR)	0	0	0	0	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	11	0	3	14	4.67	5.69	3.28	0.33
Mud (MUD)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	5	2	3	10	3.33	1.53	0.88	0.28
Sand (SAND)	1	3	16	20	6.67	8.14	4.70	0.36

Turf (TURF)	8	16	0	24	8.00	8.00	4.62	0.37
CYANOBACTERIA (CB)								0.00
Bluegreen (BG)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)								
Shadow (SHADOW)	0	0	0	0	0.00	0.00	0.00	
Tape (TAPE)	0	0	0	0	0.00	0.00	0.00	
Wand (WAND)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in coral)								
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	

Shannon-Weaver Index	**0.00**	**0.55**	**0.44**
CORAL (C)	0.00	0.20	0.20
SOFT CORAL (SC)	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	0.00	0.00
MACROALGAE (MA)	0.00	0.20	0.00
SEAGRASS (SG)	0.00	0.00	0.13
CORALLINE ALGAE (CA)	0.00	0.00	0.00
SUBSTRATE (SUBS)	0.00	0.15	0.11
CYANOBACTERIA (CB)	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)			

Project: Minato Bridge Replacement Project
Dataset name: Station 3
Location: Minatobashi Bridge
File/sheetname:

Analysis date:
Analysis by:
Lat: Long:
C:\Users\Research\Desktop\Minatobashi survey_ June 10,11, 2023\Station 3\Minatobashi sun

TRANSECT NAME	t1	t2	t3			
Number of frames	6	5	5			
Total points	30	25	25			
Total points (minus tape+wand+shadow)	30	25	25			
MAJOR CATEGORY (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)	46.67	16.00	8.00	23.56	20.41	11.78
SOFT CORAL (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	4.00	4.00	2.67	2.31	1.33
MACROALGAE (MA)	0.00	0.00	0.00	0.00	0.00	0.00
SEAGRASS (SG)	0.00	0.00	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	53.33	80.00	88.00	73.78	18.15	10.48
CYANOBACTERIA (CB)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0.00	0.00	0.00	0.00	0.00	0.00
Sum (excluding tape+shadow+wand)	100.00	100.00	100.00			
SUBCATEGORIES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
CORAL (C)						
Acanthastrea (ACAN)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora submassive (ACS)	0.00	0.00	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0.00	0.00	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0.00	0.00	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0.00	0.00	0.00	0.00	0.00	0.00
Astrea (ASTR)	0.00	0.00	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0.00	0.00	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0.00	0.00	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0.00	0.00	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0.00	0.00	0.00	0.00	0.00	0.00
Catalaphyllia (CAT)	0.00	0.00	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0.00	0.00	0.00	0.00	0.00	0.00
Coeloseris (COEL)	0.00	0.00	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0.00	0.00	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0.00	0.00	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0.00	0.00	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0.00	0.00	0.00	0.00	0.00	0.00
Cynarina (CYN)	0.00	0.00	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0.00	0.00	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0.00	0.00	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0.00	0.00	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0.00	0.00	0.00	0.00	0.00	0.00
Echinopora (ECHPO)	0.00	0.00	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0.00	0.00	0.00	0.00	0.00	0.00
Favites (FAVT)	0.00	0.00	0.00	0.00	0.00	0.00
Furgia (FUNG)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxea (GAL)	0.00	0.00	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0.00	0.00	0.00	0.00	0.00	0.00
Goniastrea (GON)	0.00	0.00	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0.00	0.00	0.00	0.00	0.00	0.00
Halomitra (HALO)	0.00	0.00	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0.00	0.00	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0.00	0.00	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0.00	0.00	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0.00	0.00	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0.00	0.00	0.00	0.00	0.00	0.00
Isopora (ISOP)	0.00	0.00	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0.00	0.00	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0.00	0.00	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophyllia (LOBOPH)	0.00	0.00	0.00	0.00	0.00	0.00
Madracis (MAD)	0.00	0.00	0.00	0.00	0.00	0.00
Merulina (MERU)	0.00	0.00	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0.00	0.00	0.00	0.00	0.00	0.00
Micromussa (MIC)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	3.33	0.00	0.00	1.11	1.92	1.11
Montipora encrusting (MONTIEN)	6.67	0.00	0.00	2.22	3.85	2.22
Montipora foliose (MONTIF)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0.00	0.00	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0.00	0.00	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0.00	0.00	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0.00	0.00	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0.00	0.00	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0.00	0.00	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0.00	0.00	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0.00	0.00	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pavona (PAV)	0.00	0.00	0.00	0.00	0.00	0.00
Pectinia (PECT)	0.00	0.00	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0.00	0.00	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0.00	0.00	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0.00	0.00	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0.00	0.00	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0.00	0.00	0.00	0.00	0.00	0.00
Podabacia (POD)	0.00	0.00	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0.00	0.00	0.00	0.00	0.00	0.00
Porites (POR)	13.33	4.00	0.00	5.78	6.84	3.95
Porites rus (PORRUS)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0.00	0.00	0.00	0.00	0.00	0.00

Porites-encrusting (PORE)	0.00	0.00	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	23.33	12.00	8.00	14.44	7.95	4.59
Psammocora (PSAM)	0.00	0.00	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0.00	0.00	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0.00	0.00	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0.00	0.00	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0.00	0.00	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0.00	0.00	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0.00	0.00	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0.00	0.00	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0.00	0.00	0.00	0.00	0.00	0.00
SOFT CORAL (SC)						
Soft Coral (SC)	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)						
Anenome (ANEM)	0.00	0.00	0.00	0.00	0.00	0.00
Ascidian (ASC)	0.00	0.00	0.00	0.00	0.00	0.00
Clams (CL)	0.00	4.00	0.00	1.33	2.31	1.33
Corallimorph (COLM)	0.00	0.00	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0.00	0.00	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0.00	0.00	0.00	0.00	0.00	0.00
Gorgonians (G)	0.00	0.00	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0.00	0.00	0.00	0.00	0.00	0.00
Milepora (MILL)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0.00	0.00	0.00	0.00	0.00	0.00
Sponges (SP)	0.00	0.00	4.00	1.33	2.31	1.33
Zoanthids (Z)	0.00	0.00	0.00	0.00	0.00	0.00
MACROALGAE (MA)						
Asparagopsis (ASP)	0.00	0.00	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0.00	0.00	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0.00	0.00	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0.00	0.00	0.00	0.00	0.00	0.00
Chorodesmis (CHLDES)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0.00	0.00	0.00	0.00	0.00	0.00
Dictyota (DICT)	0.00	0.00	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0.00	0.00	0.00	0.00	0.00	0.00
Halimeda (HALI)	0.00	0.00	0.00	0.00	0.00	0.00
Liagora (LIAG)	0.00	0.00	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0.00	0.00	0.00	0.00	0.00	0.00
Mastophora (MAST)	0.00	0.00	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0.00	0.00	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0.00	0.00	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0.00	0.00	0.00	0.00	0.00	0.00
Padina (PAD)	0.00	0.00	0.00	0.00	0.00	0.00
Sargassum (SARG)	0.00	0.00	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0.00	0.00	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0.00	0.00	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0.00	0.00	0.00	0.00	0.00	0.00
SEAGRASS (SG)						

Cymodocea rotundata (CR)	0.00	0.00	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0.00	0.00	0.00	0.00	0.00	0.00
Halodule pinifolia (HP)	0.00	0.00	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila minor (HM)	0.00	0.00	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0.00	0.00	0.00	0.00	0.00	0.00
Oceana serrulata (OS)	0.00	0.00	0.00	0.00	0.00	0.00
Seagrass (SG)	0.00	0.00	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0.00	0.00	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0.00	0.00	0.00	0.00	0.00	0.00
Thalassodendron ciliatum (TC)	0.00	0.00	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)						
Amphiroa (AMP)	0.00	0.00	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0.00	0.00	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0.00	0.00	0.00	0.00	0.00	0.00
Jania (JAN)	0.00	0.00	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)						
Carbonate (CAR)	0.00	0.00	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	33.33	20.00	20.00	24.44	7.70	4.44
Mud (MUD)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0.00	0.00	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	16.67	0.00	20.00	12.22	10.72	6.19
Sand (SAND)	3.33	60.00	48.00	37.11	29.86	17.24
Turf (TURF)	0.00	0.00	0.00	0.00	0.00	0.00
CYANOBACTERIA (CB)						
Bluegreen (BG)	0.00	0.00	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)						
Shadow (SHADOW)	0.00	0.00	0.00	0.00	0.00	0.00
Tape (TAPE)	0.00	0.00	0.00	0.00	0.00	0.00
Wand (WAND)	0.00	0.00	0.00	0.00	0.00	0.00
NOTES (% of transect)				**MEAN**	**STD. DEV.**	**STD. ERROR**
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00
NOTES (% of coral)						
Bleached Coral (BC)	0.00	0.00	0.00	0.00	0.00	0.00

MAJOR CATEGORY (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**
CORAL (C)	14	4	2	20	6.67	6.43	3.71	1.03
SOFT CORAL (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0	1	1	2	0.67	0.58	0.33	0.69
MACROALGAE (MA)	0	0	0	0	0.00	0.00	0.00	0.00
SEAGRASS (SG)	0	0	0	0	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)	16	20	22	58	19.33	3.06	1.76	1.02
CYANOBACTERIA (CB)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)	0	0	0	0	0.00	0.00	0.00	
TOTAL TRANSECT POINTS	**30**	**25**	**25**	**80**				
SUBCATEGORIES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	**SW INDEX**

CORAL (C)								1.03
Acanthastrea (ACAN)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora branching (ACB)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora digitate (ACD)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora encrusting (ACE)	0	0	0	0	0.00	0.00	0.00	0.00
Acropora submassive (ACSI	0	0	0	0	0.00	0.00	0.00	0.00
Acropora tabular (ACT)	0	0	0	0	0.00	0.00	0.00	0.00
Alveopora (ALVEO)	0	0	0	0	0.00	0.00	0.00	0.00
Anacropora (ANAC)	0	0	0	0	0.00	0.00	0.00	0.00
Astrea (ASTR)	0	0	0	0	0.00	0.00	0.00	0.00
Astreopora (ASTRP)	0	0	0	0	0.00	0.00	0.00	0.00
Bernardpora (BERN)	0	0	0	0	0.00	0.00	0.00	0.00
Blastomussa (BLAS)	0	0	0	0	0.00	0.00	0.00	0.00
Cantharellus (CAN)	0	0	0	0	0.00	0.00	0.00	0.00
Cataiaphyllia (CAT)	0	0	0	0	0.00	0.00	0.00	0.00
Caulastraea (CAUL)	0	0	0	0	0.00	0.00	0.00	0.00
Coeloseris (COEL)	0	0	0	0	0.00	0.00	0.00	0.00
Coral Unknown (CRUNK)	0	0	0	0	0.00	0.00	0.00	0.00
Coscinaraea (COSC)	0	0	0	0	0.00	0.00	0.00	0.00
Ctenactis (CTEN)	0	0	0	0	0.00	0.00	0.00	0.00
Cycloseris (CYCL)	0	0	0	0	0.00	0.00	0.00	0.00
Cynarina (CYN)	0	0	0	0	0.00	0.00	0.00	0.00
Cyphastrea (CYPH)	0	0	0	0	0.00	0.00	0.00	0.00
Diploastrea (DIPLO)	0	0	0	0	0.00	0.00	0.00	0.00
Dipsastraea (DIPS)	0	0	0	0	0.00	0.00	0.00	0.00
Echinophyllia (ECHPHY)	0	0	0	0	0.00	0.00	0.00	0.00
Echinopora (ECHPO)	0	0	0	0	0.00	0.00	0.00	0.00
Euphyllia (EUPH)	0	0	0	0	0.00	0.00	0.00	0.00
Favites (FAVT)	0	0	0	0	0.00	0.00	0.00	0.00
Fungia (FUNG)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxea (GAL)	0	0	0	0	0.00	0.00	0.00	0.00
Gardineroseris (GARD)	0	0	0	0	0.00	0.00	0.00	0.00
Goniastrea (GON)	0	0	0	0	0.00	0.00	0.00	0.00
Goniopora (GONIO)	0	0	0	0	0.00	0.00	0.00	0.00
Halomitra (HALO)	0	0	0	0	0.00	0.00	0.00	0.00
Heliofungia (HELIOF)	0	0	0	0	0.00	0.00	0.00	0.00
Herpolitha (HERP)	0	0	0	0	0.00	0.00	0.00	0.00
Heterocyathus (HETC)	0	0	0	0	0.00	0.00	0.00	0.00
Heteropsammia (HETP)	0	0	0	0	0.00	0.00	0.00	0.00
Hydnophora (HYD)	0	0	0	0	0.00	0.00	0.00	0.00
Isopora (ISOP)	0	0	0	0	0.00	0.00	0.00	0.00
Leptastrea (LEPT)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoria (LEPTOR)	0	0	0	0	0.00	0.00	0.00	0.00
Leptoseris (LEPTOS)	0	0	0	0	0.00	0.00	0.00	0.00
Lithophyllon (LITH)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophyllia (LOBOPH)	0	0	0	0	0.00	0.00	0.00	0.00
Madracis (MAD)	0	0	0	0	0.00	0.00	0.00	0.00
Merulina (MERU)	0	0	0	0	0.00	0.00	0.00	0.00
Merulinidae (MERUD)	0	0	0	0	0.00	0.00	0.00	0.00

Micromussa (MIC)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora branching (MONTIBR)	1	0	0	1	0.33	0.58	0.33	0.15
Montipora encrusting (MONTIEN)	2	0	0	2	0.67	1.15	0.67	0.23
Montipora foliose (MONTIF)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora other (MONTIO)	0	0	0	0	0.00	0.00	0.00	0.00
Montipora submassive (MONTISB)	0	0	0	0	0.00	0.00	0.00	0.00
Mycedium (MYCED)	0	0	0	0	0.00	0.00	0.00	0.00
Oulastrea (OULA)	0	0	0	0	0.00	0.00	0.00	0.00
Oulophyllia (OULO)	0	0	0	0	0.00	0.00	0.00	0.00
Oxypora (OXYP)	0	0	0	0	0.00	0.00	0.00	0.00
Pachyseris (PACHY)	0	0	0	0	0.00	0.00	0.00	0.00
Palauastrea (PALA)	0	0	0	0	0.00	0.00	0.00	0.00
Paramontastraea (PARAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pavona (PAV)	0	0	0	0	0.00	0.00	0.00	0.00
Pectinia (PECT)	0	0	0	0	0.00	0.00	0.00	0.00
Physogyra (PHYSO)	0	0	0	0	0.00	0.00	0.00	0.00
Platygyra (PLAT)	0	0	0	0	0.00	0.00	0.00	0.00
Plerogyra (PLERO)	0	0	0	0	0.00	0.00	0.00	0.00
Plesiastrea (PLSIA)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-branching (POCB)	0	0	0	0	0.00	0.00	0.00	0.00
Pocillopora-submassive (POCSB)	0	0	0	0	0.00	0.00	0.00	0.00
Podabacia (POD)	0	0	0	0	0.00	0.00	0.00	0.00
Polyphyllia (POL)	0	0	0	0	0.00	0.00	0.00	0.00
Porites (POR)	4	1	0	5	1.67	2.08	1.20	0.35
Porites rus (PORRUS)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-branching (PORB)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-encrusting (PORE)	0	0	0	0	0.00	0.00	0.00	0.00
Porites-massive (PORMAS)	7	3	2	12	4.00	2.65	1.53	0.31
Psammocora (PSAM)	0	0	0	0	0.00	0.00	0.00	0.00
Pseudosiderastrea (PSEU)	0	0	0	0	0.00	0.00	0.00	0.00
Sandalolitha (SANDO)	0	0	0	0	0.00	0.00	0.00	0.00
Seriatopora (SERIA)	0	0	0	0	0.00	0.00	0.00	0.00
Stylocoeniella (STYLC)	0	0	0	0	0.00	0.00	0.00	0.00
Stylophora (STYLO)	0	0	0	0	0.00	0.00	0.00	0.00
Trachyphyllia (TRAC)	0	0	0	0	0.00	0.00	0.00	0.00
Tubastraea (TUB)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURBIN)	0	0	0	0	0.00	0.00	0.00	0.00
Zoopilus (ZOO)	0	0	0	0	0.00	0.00	0.00	0.00
SOFT CORAL (SC)								0.00
Soft Coral (SC)	0	0	0	0	0.00	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)								0.69
Anenome (ANEM)	0	0	0	0	0.00	0.00	0.00	0.00
Ascidian (ASC)	0	0	0	0	0.00	0.00	0.00	0.00
Clams (CL)	0	1	0	1	0.33	0.58	0.33	0.35
Corallimorph (COLM)	0	0	0	0	0.00	0.00	0.00	0.00
Discosoma (DISCO)	0	0	0	0	0.00	0.00	0.00	0.00
Distichopora (DISTI)	0	0	0	0	0.00	0.00	0.00	0.00
Gorgonians (G)	0	0	0	0	0.00	0.00	0.00	0.00
Heliopora (HELIO)	0	0	0	0	0.00	0.00	0.00	0.00

Millepora (MILL)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Invertebrate (NOIDINV)	0	0	0	0	0.00	0.00	0.00	0.00
Sponges (SP)	0	0	1	1	0.33	0.58	0.33	0.35
Zoanthids (Z)	0	0	0	0	0.00	0.00	0.00	0.00
MACROALGAE (MA)								0.00
Asparagopsis (ASP)	0	0	0	0	0.00	0.00	0.00	0.00
Boodlea (BOOD)	0	0	0	0	0.00	0.00	0.00	0.00
Bryopsis (BRYP)	0	0	0	0	0.00	0.00	0.00	0.00
Caulerpa (CLP)	0	0	0	0	0.00	0.00	0.00	0.00
Chlorodesmis (CHLDES)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyosphaeria (DYCTY)	0	0	0	0	0.00	0.00	0.00	0.00
Dictyota (DICT)	0	0	0	0	0.00	0.00	0.00	0.00
Galaxaura (GLXU)	0	0	0	0	0.00	0.00	0.00	0.00
Halimeda (HALI)	0	0	0	0	0.00	0.00	0.00	0.00
Liagora (LIAG)	0	0	0	0	0.00	0.00	0.00	0.00
Lobophora (LOBO)	0	0	0	0	0.00	0.00	0.00	0.00
Mastophora (MAST)	0	0	0	0	0.00	0.00	0.00	0.00
Microdictyon (MICDTY)	0	0	0	0	0.00	0.00	0.00	0.00
Neomeris (NEOM)	0	0	0	0	0.00	0.00	0.00	0.00
Not ID Macroalgae (NOIDMAC)	0	0	0	0	0.00	0.00	0.00	0.00
Padina (PAD)	0	0	0	0	0.00	0.00	0.00	0.00
Sargassum (SARG)	0	0	0	0	0.00	0.00	0.00	0.00
Schizothrix (SCHIZ)	0	0	0	0	0.00	0.00	0.00	0.00
Turbinaria (TURB)	0	0	0	0	0.00	0.00	0.00	0.00
Tydemania (TYDM)	0	0	0	0	0.00	0.00	0.00	0.00
SEAGRASS (SG)								0.00
Cymodocea rotundata (CR)	0	0	0	0	0.00	0.00	0.00	0.00
Enhalus acoroides (EA)	0	0	0	0	0.00	0.00	0.00	0.00
Halodule pinifolia (HP)	0	0	0	0	0.00	0.00	0.00	0.00
Halodule uninervis (HU)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila minor (HM)	0	0	0	0	0.00	0.00	0.00	0.00
Halophila ovalis (HO)	0	0	0	0	0.00	0.00	0.00	0.00
Oceana serrulata (OS)	0	0	0	0	0.00	0.00	0.00	0.00
Seagrass (SG)	0	0	0	0	0.00	0.00	0.00	0.00
Syringodium isoetifolium (SI)	0	0	0	0	0.00	0.00	0.00	0.00
Thalassia hemprichii (TH)	0	0	0	0	0.00	0.00	0.00	0.00
Thalassodendron ciliatum (TC)	0	0	0	0	0.00	0.00	0.00	0.00
CORALLINE ALGAE (CA)								0.00
Amphiroa (AMP)	0	0	0	0	0.00	0.00	0.00	0.00
Crustose Coralline (CCA)	0	0	0	0	0.00	0.00	0.00	0.00
Fleshy-Coralline (FCA)	0	0	0	0	0.00	0.00	0.00	0.00
Jania (JAN)	0	0	0	0	0.00	0.00	0.00	0.00
SUBSTRATE (SUBS)								1.02
Carbonate (CAR)	0	0	0	0	0.00	0.00	0.00	0.00
Carbonate_turf (CAR_TURF)	10	5	5	20	6.67	2.89	1.67	0.37
Mud (MUD)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble (RUBBLE)	0	0	0	0	0.00	0.00	0.00	0.00
Rubble_turf (RUBBLE_TURF)	5	0	5	10	3.33	2.89	1.67	0.30
Sand (SAND)	1	15	12	28	9.33	7.37	4.26	0.35

Turf (TURF)	0	0	0	0	0.00	0.00	0.00	0.00
CYANOBACTERIA (CB)								0.00
Bluegreen (BG)	0	0	0	0	0.00	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)								
Shadow (SHADOW)	0	0	0	0	0.00	0.00	0.00	
Tape (TAPE)	0	0	0	0	0.00	0.00	0.00	
Wand (WAND)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in transect)				**SUMS**	**MEAN**	**STD. DEV.**	**STD. ERROR**	
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	
NOTES (occurring in coral)								
Bleached Coral (BC)	0	0	0	0	0.00	0.00	0.00	

Shannon-Weaver Index	**0.69**	**0.60**	**0.44**
CORAL (C)	0.36	0.29	0.20
SOFT CORAL (SC)	0.00	0.00	0.00
OTHER INVERTEBRATES (OI)	0.00	0.13	0.13
MACROALGAE (MA)	0.00	0.00	0.00
SEAGRASS (SG)	0.00	0.00	0.00
CORALLINE ALGAE (CA)	0.00	0.00	0.00
SUBSTRATE (SUBS)	0.34	0.18	0.11
CYANOBACTERIA (CB)	0.00	0.00	0.00
TAPE, WAND, SHADOW (TWS)			

Photo 6-1 Sea surface nearby culvert facing southwest

Photo 6-2 Sea surface nearby culvert facing southeast

Photo 6-3 Inside sea nearby culvert (corals) 1

Photo 6-4 Inside sea nearby culvert (corals) 2

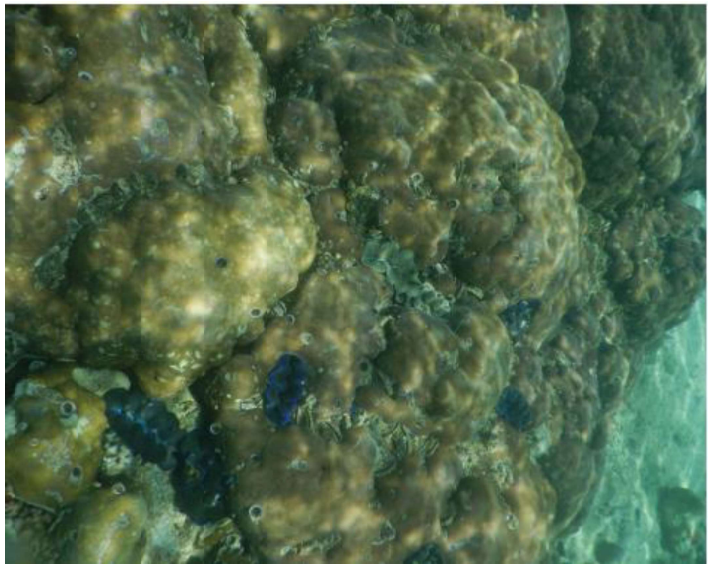

Photo 6-5 Porites spp.

Photo 6-6 Montipora spp.

Annex 7

AVIFAUNAL SURVEY RESULTS

Rev. August 1, 2010

EQPB PROTOCOL FOR BIRD DIVERSITY SURVEYS

GENERAL INSTRUCTIONS:

1. Conduct the survey between 0630 and 0730 hours at a central location on the site where you can simultaneously observe forest and sky.
2. DO NOT conduct the survey under any of the following conditions:
   a. Rain
   b. Fog
   c. Excessive wind (Beaufort Number 4 or above)
   d. Background noise (loud insects, machinery, traffic *etc.*)
3. Use an EQPB Bird Survey Data Sheet or facsimile to record birds that are seen with the unaided eye or heard. Confirm identifications with binoculars as necessary.

MONITORING INSTRUCTIONS:

1. Enter the following in the appropriate spaces at top of the Data Sheet:
   a. Date
   b. Location
   c. Time
   d. Temperature (° C)
   e. Cloud Conditions (estimated percent cloud coverage)
   f. Wind Conditions (Beaufort Scale)
2. Species Richness Survey
   a. Record the presence (only) and species identification of all birds seen or heard during a single 15-minute interval by placing an "X" in the appropriate space in the center column of the Data Sheet.
   b. Use the species list in the left column of the Data Sheet to record the presence and identity of common species.
   c. Use the spaces below the species list to record the presence and identity, if known, of other species. Use the back of the Data Sheet if necessary.
   d. Use a separate designation for each unidentified species (*e.g.*, Species A, Species B, Species C, *etc.*). Briefly describe each unidentified species in the Field Observations and Comments column of the Data Sheet.
   d. Enter the total number of species in the space provided near the bottom of the Data Sheet.
3. Record other noteworthy observations and comments in the spaces in the right column of the Data Sheet next to the appropriate species.

SIGNATURE CERTIFICATION:

Enter name and signature of the person who conducted the survey at the bottom of the Data Sheet to certify the authenticity of the survey results. Submit the original Data Sheet or a true copy thereof with the Environmental Assessment Report.

Page 1 of 3

EQPB Bird Survey Data Sheet

Date 6/29/23 Location Minatohasi Bridge project

Start Time 6:00 AM 1:30PM 5:45PM

Temperature (°C)

Cloud Conditions 30%

Wind (Beaufort Scale) #1

Place an "X" in the appropriate space for each species that you see or hear during a 15-minute interval.		**Field Observations and Comments**
Palau Fruit-Dove		
Palau Bush-Warbler		Birds are mostly
Micronesian Starling	X	back-forward from
Palau Swiftlet	X	Normal Conversation
Dusky White-eye	X	(Long Tailed)
Palau Fantail		
Palau Flycatcher		
Micronesian Honeyeater	X	
Cicadabird	X	
Collared Kingfisher	X	
Micronesian Kingfisher		
Morningbird		
Micronesian Imperial-Pigeon		
Nicobar Pigeon		
Palau Ground Dove		
Micronesian Megapode		
Other:		
White tern	X	Fly over
Black Naped tern	X	circling
Black Noddy	X	Fly over
White-Tailed Tropic bird	X	Fly over
Great Crested tern	X	Fly over

Record the total number of species below

TOTAL NO. SPECIES 11

Name (print) Bonifacio Eberdong Signature

Beaufort Scale

Beaufort #	Wind	Effects (on land)
0	CALM	Air still: smoke rises vertically
1	LIGHT AIR	Smoke drifts downwind
2	LIGHT BREEZE	Wind felt on face; leaves rustle
3	GENTLE BREEZE	Leaves and twigs move constantly
4	MODERATE BREEZE	Loose paper raised; small twigs/branches move
5	FRESH BREEZE	Small trees begin to sway
6	STRONG BREEZE	Large branches move; umbrellas hard to control
7	STRONG WIND	Whole trees move; wind resistance to walkers
8	FRESH GALE	Twigs break off trees; walking impeded
9	STRONG GALE	Slight structural damage; roof tiles removed
10	WHOLE GALE	Much structural damage; trees uprooted
11	STORM	Widespread damage
12	TYPHOON	

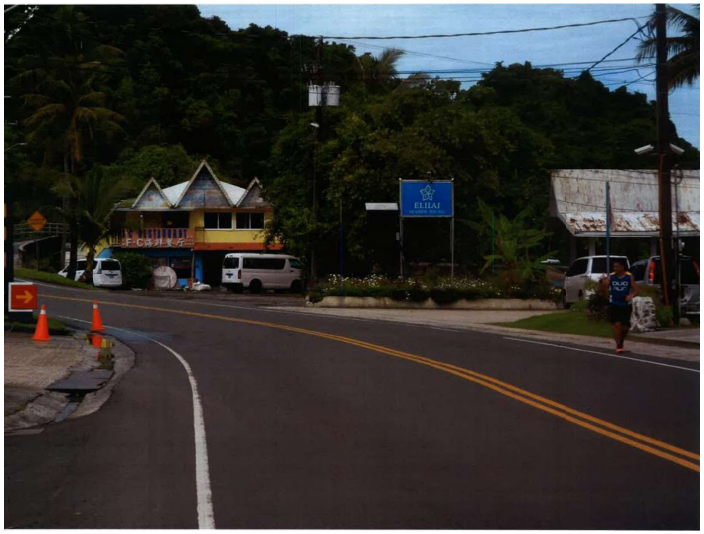

Photo 7-1 Trees behind the Waiting House

Photo 7-2 Long Island Park (in the background of Minato Bridge and Malakal Causeway)

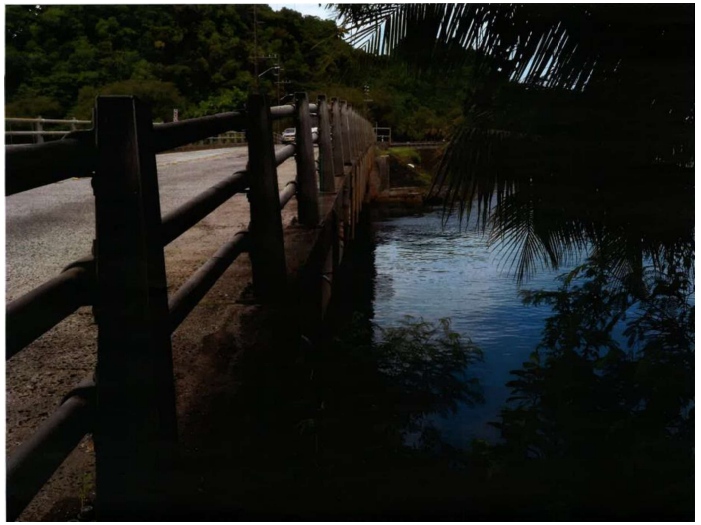

Photo 7-3 Coconut tree by Minato Bridge

Photo 7-4 Tree distribution nearby Minato Bridge

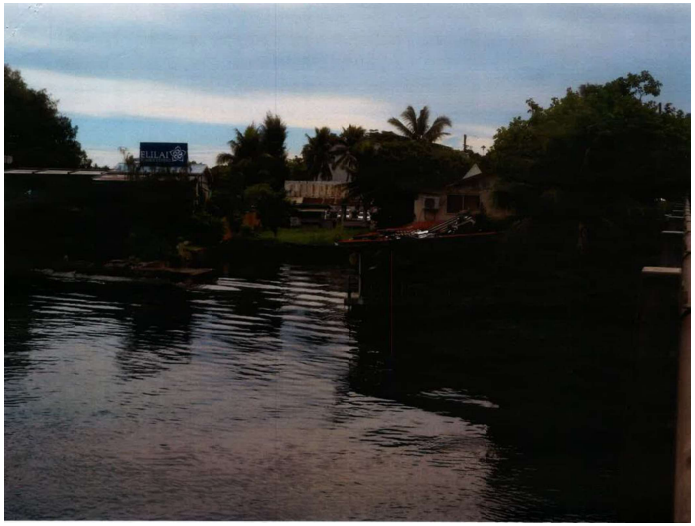

Photo 7-5 Tree distribution nearby Minato Bridge

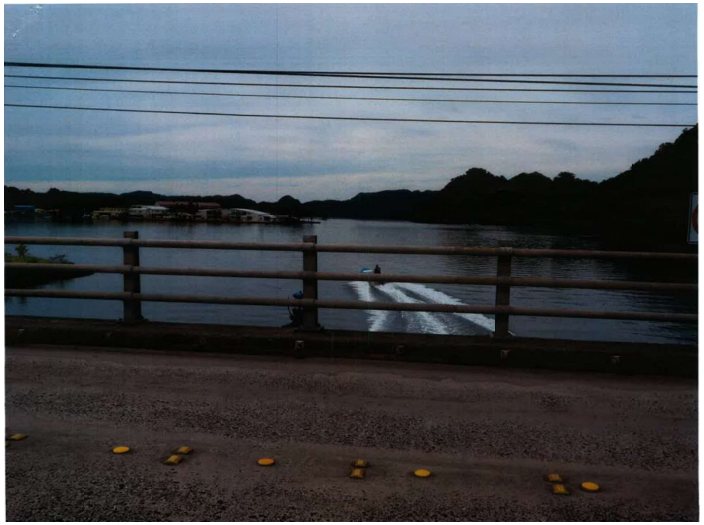

Photo 7-6 Ship passing under Minato Bridge and electric wires

Photo 7-7 Trees, electric wires and pole nearby Minato Bridge

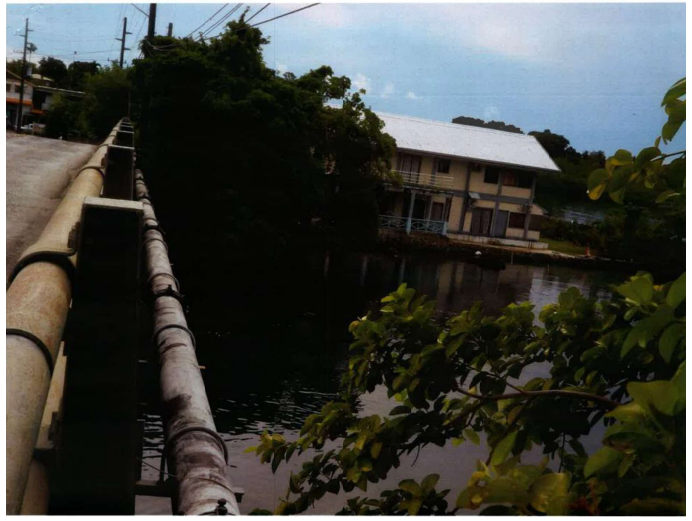

Photo 7-8 Trees and house near Minato Bridge

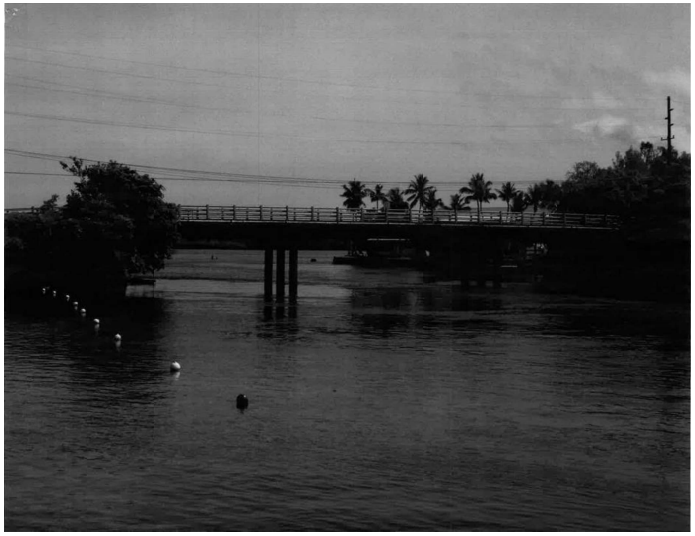

Photo 7-9 Overview of Minato Bridge and trees nearby

Annex 8

ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Matrix

	Source of Impact	Potential Impact	Mitigation and Management Plan	Implementing Organization	Responsible Organization	Cost
Pre-construction stage						
1	Air Pollution	Dust emissions and gas emissions that deteriorate air quality	• Spray water at dust-causing construction workplace and at regular basis • Reduce the amount of emission gas by limiting the speed of transport vehicles • Maintain construction vehicles and equipment in good operating condition to limit emissions. Perform regular maintenance to eliminate defective machinery and vehicles. • Notify residents in the vicinity of the construction plan in advance and ensure that they are aware of the plan.	BPW	BPW	BPW
2	Water Pollution	• Discharge of debris and sediment into the ocean • General drainage • Disposal of sewage effluent, wastewater, and other liquid wastes	• Ensure drainage management to reduce or minimize sediment runoff • Monitor the occurrence of turbid water and runoff and review the measures taken as required. • Refer the Palau Erosion & Sediment Control Field Guide (version 1.0 for Contractors and Site Inspections) as required and develop appropriate measures (https://www.palaugov.pw/wp-content/uploads/2017/05/Erosion-and-Sedimentaion-Guide.pdf)	BPW	BPW	BPW
3	Sediment	Removal of topsoil and soil runoff from land reclamation work	• Measures to prevent erosion and runoff at demolition and clearing sites. • Prevent runoff by installing pollution control facilities.	BPW	BPW	BPW
4	Noise and Vibration	Intrusive and nuisance noise and vibration impacts to the local community while demolition of building	• No night-time construction work. • Implement noise mitigation measures where practical, to reduce the noise level to acceptable levels • Conduct consultation with local citizens • Keep construction vehicles and equipment in good condition and maintain them properly	BPW	BPW	BPW
5	Waste	Construction waste generation	• Ensure management of storage, transportation, and treatment (including recycling/reuse options) of construction waste generated from demolition.	BPW	BPW	BPW
6	Land Acquisition and Resettlemen t	The existing 2-storied building owned by KSG will be demolished and removed.	• ARAP is to be approved by BPW/MTII, and incentives shall be given by KSG to the 1st lessees and 2nd lessees as in ARAP.	BPW/ Koror State Government	BPW/ Koror State Government	BPW/ Koror State Government
	t		(Note) The proposed project is located on Koror State land, and land acquisition is not required.			
7	Land Use and Local Resource Use	Planted trees, vegetation /habitat loss and fragmentation	• The site is an urbanized area with only limited trees, shrubs and grass. • Clearance will be done only within the project limits and follow agreed construction plans.	BPW	BPW	BPW
8	Existing Social Infrastructur e and Social Services	Removal and relocation of existing poles and communication facilities	• Liaison and coordination among related agencies for relocation and switchover. • If services are to be temporarily interrupted, the residents will be notified widely in advance to ensure that they are aware of the situation.	PNCC, PPUC	BPW	BPW
9	Occupational Health and Safety (including Occupational Safety)	Occurrence of Worker Accidents / Injuries	• All workers will participate in induction course and on-site training on health and safety. • Workers from outside receive guidance on workplace codes of conduct. • Provide PPE to workers and train them in its use.	BPW	BPW	BPW
10	Accident	General safety risks around the construction site	• Restrict access to construction sites. • Separate the construction site with a fence or other means and post security guards. • Activities that involve noise and hauling routes should be announced in advance and made known to the public. • Explain safety and health precautions and requirements, and set up information boards.	BPW	BPW	BPW
Construction phase						
1	Air Pollution	Dust emissions and exhaust gas emissions that deteriorate air quality	• Spray water at dust-causing construction workplace and at regular basis • Reduce the amount of emission gas by limiting the speed of transport vehicles • Maintain construction vehicles and equipment in good operating condition to limit emissions. Perform regular maintenance to eliminate defective machinery and vehicles. • Service diesel-powered equipment regularly. • Notify residents in the vicinity of the construction plan in advance and ensure that they are aware of the plan. • Review mitigation measures in accordance with local consultations	contractor	BPW ／ Construction Supervision Consultant	Included in construction cost

	Source of Impact	Potential Impact	Mitigation and Management Plan	Implementing Organization	Responsible Organization	Cost
2	Water Pollution	• Discharge of construction waste and sediment into the ocean • General drainage (Contamination from leaks or spillages of fuels, oils due to transport, storage, and handling of these materials) • Disposal of sewage effluent, wastewater, and other liquid wastes • Seawater pollution (turbidity, etc.)	• Reduce disturbance of natural drainage channels and avoid blocking existing drainage channels with graded material. • Develop and implement site-specific stormwater management procedures (installation of sediment traps, facilities that prevent water pollution, prevention of soil runoff by cover sheet while raining, prohibition of storing fuel and oil outside, maintenance of construction equipment and vehicle, installation of portable toilet with septic tank, etc.) • Employ spill prevention measures by using secondary containment / collection basins while refuelling, etc. • Monitor the occurrence of turbid water and runoff and review the measures taken as required. • Refer the Palau Erosion & Sediment Control Field Guide (version 1.0 for Contractors and Site Inspections) as required and develop appropriate measures (https://www.palaugov.pw/wp-content/uploads/2017/05/Erosion-and-Sedimentaion-Guide.pdf)	contractor	BPW ／ Construction Supervision Consultant	Included in construction cost
3	Soil Pollution	Removal of topsoil and soil Erosion due to reclamation and excavation work.	• Measures to prevent erosion and runoff (gravel, etc.) at the work site • Prevent and limit sediment discharge into surrounding areas by installing pollution control facilities to prevent erosion and sedimentation	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
4	Sediment	Soil erosion resulting in reduced water quality during rainy seasons.	• Prevent and limit sediment discharge into surrounding areas by installing pollution control facilities to prevent erosion and sedimentation	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
5	Noise and Vibration	Intrusive and nuisance noise impacts to the local community.	• No night-time construction work • Implement noise mitigation measures where practical, to reduce the noise level to acceptable levels • Conduct consultation with local citizens • Keep construction vehicles and equipment in good condition and maintain them properly	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
6	Offensive Odors	Domestic waste generated at workers' quarters and site office	• Store at closed place away from dogs and cats Arrange garbage collection regularly	contractor	BPW ／ Construction Supervision	Included in construction cost

	Source of Impact	Potential Impact	Mitigation and Management Plan	Implementing Organization	Responsible Organization	Cost
					Consultant	
7	Waste	Construction waste	• Establish appropriate processes for material, handling, storage, transportation, and disposal (including recycling/ reuse options), including establishment of a waste inventory and details in relation to waste minimization. • Establish site-specific hazardous material management plans (issuance of Material Safety Data Sheet, avoidance or minimization of hazardous materials use, storage, use of secondary containment systems, handling procedures, etc.) • Develop site-specific waste management plan to minimize contamination of soil and waster and impacts to ambient air. • Prohibit burning of solids/debris, install portable toilet with septic tank, removal of solid waste and contaminated soil from site, recycle wastes produced from construction work and debris, minimize the volume of waste.	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
8	Protected Area	Evacuation of wildlife and habitat degradation due to construction	• Erosion and sedimentation control measures (silt curtains, silt fences, silt socks, immediate revegetation, etc.) to prevent adverse effects on the surrounding area, Long Island Park & Conservation Area, and nearby marine areas.	BPW	BPW	BPW
9	Ecosystems	Impact caused by turbid water and sediment	• To use facilities that prevent water pollution and other applicable erosion and sediment control measures to contain any suspended sediments that results from construction activities. • To take erosion and sedimentation control measures to prevent negative impacts to nearby marine areas in the Long Island Park and Conservation Area.	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
10		Tree cutting and removal of flowers and grasses	• To replant trees, flowers and grasses after the construction work is over where space is available and appropriate.	BPW	BPW	BPW
	Land Acquisition and Resettlement	Temporary land use	• To bear the rental cost for temporary contractor's facilities. • To recover the land to the pre-condition level after the construction work is over.	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
11	Local Economy, including Employment	Disturbance to the local economy caused by temporary land use	• To provide continued access for surrounding properties. • To provide warning signs at the periphery of work site warning the public not to enter the active construction site and stated in the EMP.	contractor	BPW／ Construction Supervision	Included in construction cost

	Source of Impact	Potential Impact	Mitigation and Management Plan	Implementing Organization	Responsible Organization	Cost
	and Means of Livelihood		• To keep providing information regarding traffic control and others and communicate with the area residents and the public prior to the event.		Consultant	
12	Landscape	Temporary changes in the city landscape	• To replant trees, flowers and grasses after the construction work is over where space is available and appropriate.	BPW	BPW	BPW
			• Remove blockage from the site, materials and equipment immediately upon the completion of construction work.	contractor	BPW／ Construction Supervision Consultant	Included in construction cost
13	Working Environment (Including Occupational Safety)	Accident/Injury to Workers at Work	• Provide orientation to all workers and on-site training about health and safety. • Any workers from outside the area instructed on code of conduct at the workplace. • The contractor will prepare health and safety plan (HSP) for safety management, improvement of workers' health and sanitation condition. • Provide PPE to construction workers and train them in its use. • All construction vehicles/machinery to be properly maintained and operated. • All solid waste to be removed from site and managed appropriately not to create additional wastes, • All contaminated soils to be removed.	contractor	BPW ／ Construction Supervision Consultant	Included in construction cost
14	Accident	Safety risks for adjacent community during work	• Only authorized people access construction site; • Site to be secured with fencing and guard; • Excavation sites shall be marked with high visibility tapes and barriers; • Public notices in advance advising of noisy activities, haulage routes, etc., • Any visitors to site to be inducted on health and safety precautions and requirements,	contractor	BPW/Construction Supervision Consultant	Included in construction cost
15	UXO	Chance discovery of physical resources and UXO	• To immediately stop work where the discovery is made. • Remove UXO, if any, and resume work on the site only after confirming safety of all workers.	BPW	BPW	BPW
Operation phase						
None.						

Annex 9

ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring Matrix

	Source of Impact	Potential Impact	Monitoring Method	Standard	Monitoring Point	Monitoring Frequency	Implementing Organization	Cost
Pre-construction stage (demolition and removal of existing buildings and site preparation work will be conducted for a short period of time and will basically be visual and spot monitoring)								
1	Air Pollution	Dust emissions and gas emissions that deteriorate air quality	Site observation	Chapter 2401-71 Air Pollution Control Regulations	Demolition site	As needed	BPW	BPW
2	Water Pollution	• Discharge of debris and sediment into the ocean • General drainage (Contamination from leaks or spillages of fuels, oils due to transport, storage, and handling of these materials) • Disposal of sewage effluent, wastewater, and other liquid wastes	Site observation	Chapter 2401-11 Marine and Fresh Water Quality Regulations, Chapter 2401-13 Wastewater Treatment and Disposal Regulations	Demolition site	As needed	BPW	BPW
3	Sediment	Removal of topsoil and soil runoff from land reclamation work	Site observation	Chapter 2401-1 Earthmoving Regulations	Demolition and preparation site	As needed	BPW	BPW
4	Noise and Vibration	Intrusive and nuisance noise and vibration impacts to the local community while demolition of building	Noise Level	IFC Environmental, Health and Safety Guidelines	Demolition site	• At the start of land preparation work • One time during the work (*Consultation with residents shall be conducted as needed.) • At the ending time	BPW	BPW
5	Waste	Construction waste generation	Waste Transportation Record	Chapter 2401-31 Solid Waste Management Regulations	Demolition site	As needed	BPW	BPW
6	Land Acquisition and Resettlemen t	Demolition and removal of the existing 2-storied building owned by KSG	Demolition progress	N/A	Demolition and preparation site	At the start and end of land preparation work (based on ARAP)	BPW / Koror State	BPW / Koror State
7	Land Use and Local Resource Use	Removal of planted trees, vegetation /habitat loss and fragmentation	Logging and removal progress	N/A	Demolition and preparation site	At the start and end of land preparation work (based on ARAP)	BPW	BPW
8	Existing Social Infrastructure and Social Services	Removal and relocation of existing poles and communication facilities	Confirmation of relocation, changeover, and removal work	N/A	Demolition site	When relocation, switching work, and removal work	PNCC, PPUC	BPW
9	Working environment (Occupational Safety and Health)	Occurrence of Worker Accidents / Injuries	Number of safety training sessions, contents, and No. of participants	PNCA Title 30 (Labor)	Training and TBM (toolbox meeting) record	As needed	BPW	BPW
			Availability of PPE		Equipment registration			
			Work Contents		Operation record			
			Workers' health condition		Health Examination Record			
			No. of work-related accidents		Workers' Accident Records			
			Working hours		Labor time record			
10	Accident	General safety risks around the construction site	Description of work at the time of post-occurrence	PNCA Title 34 (Public Health, Safety and Welfare)	Operation record	Upon occurrence of accidents	BPW	BPW
			Construction and transportation vehicle operations		Vehicle operation record			
			No. of accidents involving the general public		Accident record (at police)			
		Construction stage						
1	Air Pollution	Dust emissions and exhaust gas emissions that deteriorate air	Site observation PM10, PM2.5	Chapter 2401-71 Air Pollution	Construction site and surrounding area	As needed (daily) • One time at the start of construction	Contractor	Included in the construction cost

	Source of Impact	Potential Impact	Monitoring Method	Standard	Monitoring Point	Monitoring Frequency	Implementing Organization	Cost
		quality		Control Regulations		• One morning and one afternoon each day. (*Consultation with residents shall be provided as needed.) • One time at the end of the day		
2	Water quality	• Discharge of construction waste and sediment into the ocea • General drainage • Disposal of sewage effluent, wastewater, and other liquid wastes	• Wastewater treatment record • Fuel and lubricant leakage records Site observation	Chapter 2401-11 Marine and Fresh Water Quality Regulations, Chapter 2401-13 Wastewater Treatment and Disposal Regulations	Construction site	• As needed	Contractor	Included in the construction cost
		• Seawater pollution (turbidity, etc.)	Measurement and analysis (turbidity, pH, water temperature, dissolved oxygen, salinity, total dissolved solids)		Underwater construction execution sites (filling, piling work, etc.)	• One time at the start of construction • As needed at the time of the relevant work • One time at the end		
3	Soil Pollution	Removal of topsoil and soil erosion due to reclamation and excavation work.	Site observation	Chapter 2401-1 Earthmoving Regulations	construction site	As needed	Contractor	Included in the construction cost
4	Sediment	Soil erosion resulting in reduced water quality during rainy seasons.	See above 2. Water quality (measurement and analysis)					
5	Noise emissions from construction equipment.	Intrusive and nuisance noise impacts to the local community.	Noise Level	IFC Environmental, Health and Safety Guidelines	construction site	• At the starting time • Once in morning and another in afternoon each day (*Consultation with residents shall be provided as needed.) • At the ending time	Contractor	Included in the construction cost
6	Offensive	Domestic waste	Waste Management	N.A.	Workers'	Once a week	Contractor	Included in

	Source of Impact	Potential Impact	Monitoring Method	Standard	Monitoring Point	Monitoring Frequency	Implementing Organization	Cost
	Odors		Records		quarters and site office			construction cost
7	Waste	Construction waste	Waste Transfer Records	Chapter 2401-31 Solid Waste Management Regulations	Construction site	Once a month	Contractor	Included in construction cost
8	Protected Area	Evacuation of wildlife and habit degradation due to construction work	Animal Observation Record	nashi (Pyrus pyrifolia, esp. var. culta)	Long Island Park & Conservation Area, neighboring waters	Once every 3 months	BPW	BPW
9	Ecosystems	Impact caused by turbid water and sediment	See above 2. Water quality (measurement and analysis)				Contractor	Contractor
		Tree cutting and removal of flowers and grasses	Revegetation	N.A.	Around the replacement bridge	Construction completion stage	BPW	BPW
10	Land Acquisition and Resettlement	Temporary land use restriction	Usage and rental status management	N.A.	construction site on Koror Island side	• At the start of construction • Once every three months • At the end of the project (confirmation of restoration to original condition)	Contractor	Included in the construction cost
11	Local Economy, including Employment and Means of Livelihood	Disturbance to the local economy due to temporary land use restriction	Site management (e.g., entry restrictions and boundary management)	N.A.	construction site	Once every 3 months (*Consultation with residents shall be provided as needed.)	BPW	BPW
12	Landscape	Temporary changes in the city landscape	Revegetation	N.A.	Around the replaced bridge	Construction completion stage	BPW	BPW
			Material removal	N.A.	construction site	Construction completion stage	Contractor	Included in the construction cost
13	Working Environment	Accident/Injury to Workers at Work	Number of safety training sessions, contents, and No. of	PNCA Title 30 (Labor)	Training and TBM (toolbox meeting) record	Once every 3 months (*Make sure that wearing PPE and	Contractor	Included in the construction cost

	Source of Impact	Potential Impact	Monitoring Method	Standard	Monitoring Point	Monitoring Frequency	Implementing Organization	Cost
	(Occupational Safety and Health)		participants			daily safety precautions are implemented in the TBM each morning)		
			Availability of PPE		Equipment registration			
			Work Contents		Operation record			
			Workers' health condition		Health Examination Record			
			No. of work-related accidents		Workers' Accident Records			
			Working hours		Labor time record			
14	Accident	Safety risks for adjacent community during work	Description of work at the time of post-occurrence	PNCA Title 34 (Public Health, Safety and Welfare)	Operation record	at the time of an accident	Contractor	Included in the construction cost
			Construction and transportation vehicle operations		Vehicle operation record			
			No. of accidents involving the general public		Accident record (at police)			
15	UXO	Chance discovery of physical resources and UXO	Found article	Palau UXO Policy, Geneva International Center for Humanitarian Demining (GICHD)	construction site	At the time of discovery	BPW	BPW
			Disposal of UXO					
Operation stage								
None.								

Annex 10

OUTLINE OF AN EMP MONITORING REPORT

MONITORING FORM (DRAFT)

This form contents are subject to change according to the results of detailed design and contractor's construction plan.

<Pre-construction stage>

1. Air Pollution

- Monitoring item: Dust emissions and gas emissions that deteriorate air quality
- Monitoring method: Site observations
- Monitoring frequency: as needed

	Date	Work stage*1	Exact location	Incidents of pollution*2	Actions *3
1				-	
2					
3					

(Note 1) Work stage implies demolition of 2-storied building, removal of construction waste such as debris, land preparation.
(Note 2) Incidents of pollution can be represented as dust, exhaust emissions, etc.
(Note 3) Actions can be water spraying, putting cover sheet on the ground, access restrictions, etc.

2. Water Pollution

- Monitoring item: (i) Discharge of debris and sediment into the ocean, (ii) General drainage (Contamination from leaks or spillages of fuels, oils due to transport, storage, and handling of these materials, etc.) (iii) Disposal of sewage effluent, wastewater, and other liquid wastes
- Monitoring method: Site observations
- Monitoring frequency: as needed

	Date	Work stage*1	Exact location	Incidents of pollution*2	Actions *3
1				-	
2					
3					

(Note 1) Work stage implies demolition of 2-storied building, removal of construction waste such as debris, land preparation.
(Note 2) Incidents of pollution can be runoff water, contamination, wastewater, etc.
(Note 3) Actions can be installation of facilities that prevent water pollution, wastewater treatment on site, etc.

3. Sediment

- Monitoring item: Removal of topsoil and soil runoff from land reclamation work
- Monitoring method: Site observations
- Monitoring frequency: as needed

	Date	Work stage*1	Exact location	Incidents of pollution*2	Actions *3
1				-	

	Date	Work stage*1	Exact location	Incidents of pollution*2	Actions *3
2					
3					

(Note 1) Work stage implies demolition of 2-storied building, removal of construction waste such as debris, land preparation.
(Note 2) Incidents of pollution can be removal of topsoil, soil runoff, leaks or spillages of fuels, oils, disposal of sewage effluent, wastewater, and other liquid wastes etc.
(Note 3) Actions can be installation of facilities that prevent water pollution, wastewater treatment on site, etc.

4. Noise and vibration

(1) Noise level

- Monitoring item: Intrusive and nuisance noise and vibration impacts to the local community while demolition of building
- Monitoring method: Measurement
- Monitoring frequency: (i) At the start of land preparation work, (ii) One time during the work, (iii) At the ending time.

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards*	Remarks. (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(Note) As there is no standard stipulated in Palau, IFC standards are applied.

(2) Complaints

- Monitoring item: Complaints by residents about noise and vibration
- Monitoring frequency: as needed

	Date	Work stage*	Exact location	Complaints	Actions
1				-	
2					
3					

(Note) Work stage implies demolition of 2-storied building, removal of construction waste such as debris, land preparation.

5. Waste

- Monitoring item: Construction waste generation
- Monitoring method: Waste transportation record
- Monitoring frequency: as needed

	Date	Work stage*1	Exact location	Amount collected and waste contents*2	Actions*3
1				-	
2					

	Date	Work stage*1	Exact location	Amount collected and waste contents*2	Actions*3
3					

(Note 1) Work stage implies demolition of 2-storied building, removal of construction waste such as debris, land preparation.
(Note 2) waste contents can be debris, woods, furniture, concretes, etc.
(Note 3) Actions can be “delivered to landfill site”, “recycled”, “reused”, etc.

6. Land acquisition and resettlement

- Monitoring item: Demolition and removal of the existing 2-storied building
- Monitoring method: Observation of demolition and removal process and progress
- Monitoring frequency: At the start and end of land preparation work

	Date	Work progress and process*	Exact location	Remarks
1				
2				
3				

(Note) “Work” implies demolition of 2-storied building and land preparation.

7. Land use and local resource use

- Monitoring item: Removal of planted trees, vegetation /habitat loss and fragmentation
- Monitoring method: Logging and removal progress
- Monitoring frequency: At the start and end of land preparation work

	Date	Exact location	Process	Remarks
1				
2				
3				

8. Existing social infrastructures and services

- Monitoring item: Removal and relocation of existing poles and communication facilities
- Monitoring method: Process and progress record of relocation, switching work and removal work
- Monitoring frequency: When relocation, switching work, and removal work

	Date	Removal item	Exact location	Implementation body*	Remarks
1					
2					
3					

(Note) Implementation body can be PNCC, PPUC, BPW and others.

9. Working environment (occupational safety and health)

- Monitoring item: Occurrence of Worker Accidents/Injuries
- Monitoring method: Number of safety training sessions, contents, and No. of participants, Availability of PPE, Work Contents, Workers’ health condition, No. of work-related accidents, Working hours
- Monitoring frequency: As needed

Date	Record	Review period and details	Remarks
	Training and TBM (toolbox meeting) record	*Number of training, content and number and characteristics of participants, etc.*	
	Equipment registration	*Number of PPE, etc.*	
	Operation record		
	Health Examination Record		
	Workers' Accident Records	*Location, number of accidents and work when accident occurred, etc.*	
	Labor time record		

10. Accidents

- Monitoring item: General safety risks around the construction site
- Monitoring method: Work contents of accident occurrence, construction and transportation vehicle operations, and number of accidents involving the general public
- Monitoring frequency: When accidents occur

Date	Location of accident	Circumstances and details of the accident	Notes (e.g. maps)
	Operation record		
	Vehicle operation record		
	Accident record (at police)	Location of the accident, map, circumstances and details of the accident, and response to the parties involved.	

<Construction Phase>

1. Air Pollution

(1) Daily site observation

- Monitoring item: Dust emissions and gas emissions that deteriorate air quality
- Monitoring method: Site observations
- Monitoring frequency: as needed (every day)

	Date	Work contents	Exact location	Incidents of pollution*1	Actions *2
1				-	
2					
3					

(Note 1) Incidents of pollution can be represented as dust, exhaust emissions, etc.
(Note 2) Actions can be water spraying, putting cover sheet on the ground, access restrictions, etc.

(2) Measurement

- Monitoring item: PM10, PM2.5
- Monitoring method: measurement
- Monitoring frequency: measurements are taken (i) One time at the start of construction, (ii) One morning and one afternoon each day, and (iii) One time at the end of construction

(Date)

(Location)

Item (Unit)	Baseline value	Measured value (Average value)	Measured value (Max. value)	Palauan standard	IFC standards	Remarks (e.g. location, frequency and method of measurement)
PM10 ($\mu g/m^3$)				24 hours: 45 μg/ m3 1 year: 15 μg/ m3	24 hours: 150 μg/ m3	Measured by PM meter for 30 minutes
PM2.5 ($\mu g/m^3$)				24 hours: 35 μg/ m3 1 year: 15 μg/ m3 for secondary and 12 μg/ m3 for primary	24 hours: 35 μg/ m3 1 year: 15 μg/ m3 for secondary and 12 μg/ m3 for primary	Measured by PM meter for 30 minutes

2. Water pollution

(1) Wastewater treatment records

- Monitoring item: (i) Discharge of construction waste and sediment into the ocean, (ii) General drainage (Contamination from leaks or spillages of fuels, oils due to transport, storage, and handling of these materials, etc.) (iii) Disposal of sewage effluent, wastewater, and other liquid wastes
- Monitoring method: Site observations & Check contractor's record ledgers
- Monitoring frequency: As required

	Date	Work contents	Exact location	Incidents of pollution*1	Actions *2
1					
2					
3					

(Note 1) Incidents of pollution can be runoff water, water contamination, wastewater, etc.
(Note 2) Actions can be installation of facilities that prevent water pollution, wastewater treatment on site, etc.

(2) Seawater pollution

- Monitoring item: seawater contamination (turbidity, pH, water temperature, dissolved oxygen, salinity, total dissolved solids)
- Monitoring method: measurement and analysis
- Monitoring frequency: measurements are taken (i) one time at the start (baseline), (ii) as needed at the time of relevant work in the sea, (iii) one time at the end of construction work (endline)

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measured value (Max. value)	Palauan standard (Class B seawater*)	Japanese standard (reference only)	Remarks (e.g. location, frequency and method of measurement)
turbidity				< 2NTU	-	Turbidity meter / sensor
pH (measure of acidity)				7.7-8.5	7.0-8.3	Portable pH meter
water				-	-	water thermometer

Item (unit)	baseline value	measured value (Average value)	measured value (Max. value)	Palauan standard (Class B seawater*)	Japanese standard (reference only)	Remarks (e.g. location, frequency and method of measurement)
temperature (°C)						
dissolved oxygen				80%	2mg/l =<	DO meter / sensor
salinity				Depend on temperature	-	Salinity meter
total dissolved solids				-	-	TDS meter

Note: The seawater of the project area falls in Class B.
Source: Chapter-2401-11-Marine-And-Fresh-Water-Quality-Regulations (https://www.palaugov.pw/wp-content/uploads/2022/02/Chapter-2401-11-Marine-And-Fresh-Water-Quality-Regulations_R1.pdf) (accessed in Nov 2023)https://www.palaugov.pw/wp-content/uploads/2022/02/Chapter-2401-11-Marine-And-Fresh-Water-Quality-Regulations_R1.pdf

3. Soil Pollution

- Monitoring item: Removal of topsoil and soil erosion due to excavation work
- Monitoring method: Site observations
- Monitoring frequency: as needed

	Date	Work contents	Exact location	Incidents of pollution*1	Actions *2
1				-	
2					
3					

(Note 1) Incidents of pollution can be removal of topsoil, soil runoff, leaks or spillages of fuels, oils, disposal of sewage effluent, wastewater, and other liquid wastes etc.
(Note 2) Actions can be installation of facilities that prevent water pollution, wastewater treatment on site, etc.

4. Sediment

- Monitoring item: Soil erosion resulting in reduced water quality during rainy seasons
- Monitoring method: see 2 (2) above
- Monitoring frequency: see 2 (2) above

5. Noise and vibration

(1) Noise level

- Monitoring item: Intrusive and nuisance noise impacts to the local community
- Monitoring method: Measurement of Noise Level
- Monitoring frequency: (i) At the start of construction work (baseline), (ii) Once in the morning time and another in the afternoon time every day, (iii) At the end of construction work (endline).

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards*	Remarks. (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(Note) As there is no standard stipulated in Palau, IFC standards are applied.

(2) Complaints

- Monitoring item: Complaints by residents about noise and vibration
- Monitoring frequency: as needed

	Date	Work contents	Exact location	Complaints	Actions
1				-	
2					
3					

6. Offensive Odors

- Monitoring item: domestic waste generation at workers' quarters and site office
- Monitoring method: waste management records
- Monitoring frequency: once a week

	Date	Location*1	Waste contents*2	Actions*3
1				
2				
3				

(Note 1) Location shall be either workers' quarters or site office, or elsewhere that generate domestic wastes.
(Note 2) Waste contents can be food waste, recyclable wastes (e.g., cans, glasses, paper, etc.), non-recyclable items, etc.
(Note 3 Actions can be "delivered to M-dock, landfill site", "recycled", "reused", etc.

7. Waste

- Monitoring item: Construction waste
- Monitoring method: waste management records
- Monitoring frequency: once a month

	Date	Work contents	Exact location	Amount collected and waste contents*1	Actions*2
1					
2					
3					

(Note 1) waste contents can be debris, woods, materials, concretes, etc.
(Note 2) Actions can be "delivered to landfill site", "recycled", "reused", etc.

8. Protected Area

- Monitoring item: Evacuation of wildlife and habitat degradation due to construction work
- Monitoring method: Animal Observation Record
- Monitoring frequency: Once every quarter

9. Ecosystems

(1) Marine environment

- Monitoring item: Impact caused by turbid water and sediment
- Monitoring method: see 2 (2) above
- Monitoring frequency: see 2 (2) above

(2) Terrestrial plants and grasses

- Monitoring item: Tree cutting and removal of flowers and grasses
- Monitoring method: replantation and revegetation
- Monitoring frequency: at the end of construction work

Date	Location	Replanted items	Remarks

10. Land acquisition and resettlement

- Monitoring item: Temporary land use restrictions
- Monitoring method: Land usage and rental status management
- Monitoring frequency: (i) At the start of construction work, (ii) Once every three months, (iii) At the end of the project (confirmation of restoration to original condition)

(Date)

(Location)

Purpose of usage & rental	Rental period	Site management status	Issues (if any)	Actions for solution

11. Local Economy, including Employment and Means of Livelihood

(1) Impact on the local economy

- Monitoring item: Disturbance to the local economy due to temporary land use restrictions
- Monitoring method: Site management (e.g., entry restrictions and boundary management)
- Monitoring frequency: Once every three months

	Date	Work contents	Exact location	Issues, Complaints	Actions
1					
2					
3					

(2) Complaints

- Monitoring item: Complaints by residents
- Monitoring frequency: as needed

	Date	Work contents	Exact location	Complaints	Actions
1				-	
2					
3					

12. Landscape

(1) Revegetation

- Monitoring item: status of vegetation recovery
- Monitoring method: replantation
- Monitoring frequency: at the end of construction work

Date	Location	Replanted items	Remarks

(2) Material removal

- Monitoring item: Material removal from the site
- Monitoring method: Work progress monitoring
- Monitoring frequency: at the end of construction work

Date	Location	Replanted items	Remarks

13. Working environment (occupational safety and health)

- Monitoring item: Accident/Injury to Workers at Work
- Monitoring method: Number of safety training sessions, contents, and No. of participants, Availability of PPE, Work Contents, Workers' health condition, No. of work-related accidents, Working hours
- Monitoring frequency: Once every 3 months*

Date	Record	Review period and details	Remarks
	Training and TBM (toolbox meeting) record	*Number of training, content and number and characteristics of participants, etc.*	
	Equipment registration	*Number of PPE, etc.*	
	Operation record		
	Health Examination Record		
	Workers' Accident Records	*Location, number of accidents and work when accident occurred, etc.*	
	Labor time record		

(Note) Make sure that wearing PPE and daily safety precautions are implemented in the TBM every morning.

14. Accident

- Monitoring item: Safety risks for adjacent community during work
- Monitoring method: Work contents of accident occurrence, construction and transportation vehicle operations, and number of accidents involving the general public

・ Monitoring frequency: when accidents occur

Date	Record	Contents	Notes
	Operation record		
	Vehicle operation record		
	Accident record (at police)	Location of the accident, map, circumstances and details of the accident, and response to the parties involved.	

15. UXO

・ Monitoring item: Chance discovery of Physical resources and UXO
・ Monitoring method: Chance discovery
・ Monitoring frequency: At the time of discovery

Date	Date of discovery	Detection point	Contents*1	Action*2	Month and date of resumption of construction

(Note 1) In case UXO is found, describe its type and features, etc.
(Note 2) In case of UXO, describe date of processing, finishing, etc.

Annex 11

GRIEVANCE INTAKE FORM

Name of Project:

Site Location:

Project_____welcomes complaints, suggestions, comments, and queries regarding project implementation and its stakeholders. We encourage persons with grievances to provide their name and contact information to enable us to get in touch for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing "(CONFIDENTIAL)" above your name.

Thank you.

Contact Information			
Name		Gender	□ Male □ Female
Home Address		Age	
		Phone No.	
City/Province		Email	

Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below:

How do you want us to reach you for feedback or update on your comment/grievance?

Portion to be filled in by the staff:

Date received:	
Received through:	___ In person _mail _email _fax _phone _SMS
Name of staff who received comment/ complaint	
Position of staff:	
Type of grievance:	
Remarks	
Signature of staff	

Update on the case:

Date:	Update