

# APPENDIX A. INVENTORY AND INSPECTION OF ACHUGAO DRAINAGE STRUCTURES

Table A1. Inlets and Catch Basins

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN300	Concrete. Pipe: 2ft w x 5 in H.	◐	●		◐	●
AN301	Metal. Pipe: CB 10ft deep. Inv: 10 ft.	?				
AN306	Concrete. Pipe: 2.5' x5'. Leads to structure in grass.	◐	●			●
AN307	Clay. Pipe: 6". Inv: 0.9 ft. Sump. Shallow- standing water.	◐			○	●
AN309	Concrete. Pipe: 2". Inv: 0.08 ft. No sump. along Aqua Resort walkway.	○				
AN310	Trench drain. Concrete. Pipe: 1.5' W x 2' deep. Inv: 2 ft. Trench drain across Magazine Dr. leads to concrete channel alongside of perpendicular road.	●	●		○	●
AN311	Pipe: 3'W x 2'L x 4' ft deep. Inv: 4 ft. Pipe likely continues downhill next to house; tree growing in structure.	○			○	
AN313	Continue trench drain. Concrete. Pipe: 18"W x 12" deep. Inv: 1 ft. No sump. veg and other debris covering part of grate. The trench drain extends across the school parking lot and into fenced off veg area.	◐				●
AN317	Pipe: 3'w x 2'L x 4' ft deep. Inv: 4 ft.	○			○	
AN324	Concrete. Pipe: 2' Wx1' H. Inv: 1.5 ft. No sump. Inlet from parking lot at Kensington to concrete channel.	◐			○	●
AN325	Concrete. Pipe: 30"W x2"H. Inv: 0.2 ft. No sump. Concrete swale to catch basin- feeds in from other side of road.	●			◐	●
AN326	Concrete. Pipe: 30"W x2"H. Inv: 0.2 ft. No sump. concrete drainage structure runs along the side of the road and turns this corner.	○			○	
AN327	Concrete. Pipe: 30"W x2"H. Inv: 0.2 ft. No sump. Runs along launch road and Marpi St.	○			○	
AN329	Concrete. Pipe: 3". Inv: 0.5 ft Sump. Market parking lot.	◐			○	●
AN330	Concrete. Pipe: 3". Inv: 0.83 ft. Sump. Floating layer, no sheen, leaves.	●			○	●
AN339	Concrete. Pipe: 5x5'. Inv: 2.5 ft. No sump. Flows towards aqua property across street.	◐			◐	●
AN340	Concrete. Pipe: 2'Wx0.17"H (inlet on road) , CB 4'x2.5'. Inv: 2.5 ft. No sump. invert is depth of catch basin.	○			○	
AN341	Concrete. Pipe: 2"x3'. Inv: 3.5 ft. No sump. catch basin has vegetation growing out it. Should be cleaned out.	●			◐	●
AN346	Concrete. Pipe: 4'Lx 0.5'W CB; culvert 2.3'W x 3" H. Inv: 0.2 ft. No sump. Repair needed on structure. Clean out debris.	●	●			●
AN348	Concrete. Pipe: Inlet 5'Wx3"H;24" RCP, GRATE 4'x4'. Inv: 5 ft. Sump. Corner of school 2 inlets and CB.	◐				●
AN349	Concrete. Pipe: 2'x 1'. Inv: 0.2 ft. No sump.	●	●		○	●
AN352	Trench Drain. Concrete. Pipe: 18"W x12" deep. Inv: 1 ft. No sump. No sediment forebay. No controlled outlet. Vulnerable near school.	●			○	●

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AS100	Concrete. Pipe: 6' x 8in parabolic. Inv: 0.6 ft. No sump. Rob: overflows during rainy season, very high velocity. Pulls out veg. Goes under road 100yds downstream.	○				
AS103	Concrete. Did not see pipe, had water.	○				
AS107	Concrete. No pipes seen. Full.	●				●
AS110	Concrete. No sump. Inlet for channel to AS109.	◐				●
AS111	Concrete. Pipe: 15" Inv: 1.5 ft. Culvert from curbed ditch goes across road to CB that is clogged. Goes to outfall into maybe leaching area? rain garden?	○				
AS117	Ductile iron pipe. Pipe: 36". Inv: 5.9 ft.	○				
AS118	Concrete. Pipe: 36". Inv: 6.2 ft. No sump.	○				
AS121	Concrete. No pipes seen. No sump. Inlet concrete swale to Dogas Stream right above AS120 culvert. Needs cleaning.	○			○	●
AS124	Concrete. Pipe: 2-2'x3". Others up road.	?				
AS160	Concrete. Pipe: 8'x4". No sump. Box CB. 36" pipe to S along middle rd.	○				
AS161	Concrete. Pipe: 36". Inv: 6.4 ft. Sump. Box 4.5'x4.5'. Needs cleaning.	◐			○	●
AS163	Concrete. Pipe: 2x3' box. Inv: 3 ft. No sump.	○				
AS164	Leaching catch basin. Pipes with hoods coming in from bldg?. Concrete.	?				
AS165	Leaching catch basin. 6" in from bldg.	?				
AS166	Concrete. Pipe In: 2' diameter with 3' invert. Out: 3' with 3.9' invert. 4'x4.5' box across street with 3.15' invert.	○	●		○	●

<sup>1</sup> Sediment accumulation and dry weather flow observed is ●high, ◐medium, ○low, or ? unknown

<sup>2</sup> Visible damage or observed erosion is ●yes or ? unsure

<sup>3</sup> Structure was identified as ●yes, needs cleaning, repair, or inspection due to clogging, sediment levels, damage, or other.

Table A2. Culverts

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN302	Concrete. Pipe: 3ft Wx2ft H. Inv: 10 ft. Leads into veg swale alongside road - potential for trash rack.	○				
AN303	Concrete. Pipe: 3 ft 3 in W x2 ft 2inH. Inv: 10 ft. Trash. Connects to inlet on sidewalk and likely to other side of road.	○				●
AN304	Concrete. Pipe: 5'W x3'H. Inv: 12 ft. Pipe running underground on top of structure leads to swale.	○			○	
AN305	Concrete. Pipe: 5'W x3'H. Inv: 12 ft. Standing water. Visible trash- 2 pipes can hear water flowing; can't see where 45° pipe comes from, layer on top looks like fat or grease; no odor no sheen.	○		◐	○	●
AN314	Concrete. Pipe: 5'Hx10'W. Inv: 5 ft. Lots of debris, channel coming from residential area.	●	●			●
AN316	Concrete. Pipe: Length of road, 4'W, 6' deep. Inv: 6 ft. Same concrete channel- culvert.	○				
AN331	Concrete. Pipe: 4'W x2.5'H. Inv: 2.5 ft. Filled with veg overgrown.	●		◐	○	●
AN336	Concrete. Pipe: 7'Wx16" H. Inv: 2 ft. Culvert is clean. Connects to trench drain in front of Aqua.	○			○	

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN337	Concrete. Pipe: 4'Wx1'H. Inv: 2 ft. Old access drive. Catch basin connects to culvert.	◐			◐	●
AN338	Concrete. Pipe: 18". Inv: 2 ft. Vegetated swale runs along property in front of Aqua Resort and through these culverts.	◐			○	●
AN342	Concrete. Pipe: 6'Wx3'H. Inv: 3 ft. Overgrown veg should be cleaned out.	○			◐	●
AN343	Concrete. Pipe: 6.5'Wx3'H. Inv: 5 ft. Connects wetlands on both sides.	◐			○	●
AN344	Concrete. Pipe: 6'Wx3'H. Inv: 3 ft. Serious damage to structure, electrical or phone line damaged and laying above.	◐	●			●
AN345	Concrete. Pipe: 2'Hx4'W. Inv: 4.5 ft. Lots of trash-leads into wetland area.	○				●
AN347	Concrete. Pipe: Unknown. connects to culvert across street; couldn't get a good view and/or measurements of the box culvert on this side due to veg and steep drop off from road.	?		?		
AN350	Concrete. Pipe: 10'Wx2'H large one, small one - 8'W x 1.5'H. Inv: 2 ft. 3 concrete structures inside fenced area with ponding, visible water, need to clean out whole area.	●			○	●
AN353	Concrete. Pipe: 4'Wx4'H, 4x6 other side facing house. Inv: 8 ft. Private area, natural channel coming from hill, headwater.	◐	●		◐	●
AN354	Concrete. Pipe: 3.5Wx1.5H. Inv: 2 ft. Private, downstream from piggery, odor in air from piggery.	?				
AN355	Concrete. Pipe: 5'Hx10'W. Inv: 5 ft. same as AN314 - connects to AN314 across street.	○			○	
AN356	Grass infiltration basin. Pipe: 0. Inv: 1 ft.	○				
AS101	Concrete. Pipe: 24". Inv: 3.4 ft. Double conc culvert. Inlet to box 24". No cover to box (6.5x2'). Trash.	○				●
AS104	Concrete. Pipe: Box 2.5x1.2. Inv: 4.2 ft. Erosion on sides, recently cleaned.	●			◐	●
AS113	Concrete. Bridge w culvert. Rob: very full in rainy season. Floods over bridge. 10 ft wide, 2ft deep. Sewer line in air across channel.	◐		◐		●
AS115	Concrete. Pipe: 14x4.5'. Lots of trash. Pipe over channel. Gabion walls on uphill side. Greywater discharges upstream. .	●		◐		●
AS119	Concrete. Pipe: 29x7'. Bridge w culvert, 36" pipe discharges from AS 117/118.	○			◐	●
AS120	Concrete. Pipe: 29x7'. Upstream end of culvert AS119 across middle road. Dogas stream.	◐	●		○	●
AS123	Concrete. Pipe: 11x3'. Coming out of Imperial Casha site. scour below step down.	○			○	
AS125	Concrete. Pipe: 12'x5' (to top of water). Bridge/culvert. Greywater discharges.	?		◐		
AS127	Concrete. Bridge/culvert. Water line in headwall. Possibly dug during WW2 to drain wetland.	◐	●		○	●
AS130	Concrete. Pipe: 17'x6' but clogged. Water pipes across channel. Very sediment clogged. Agatan stream. Flowing.	●		◐	○	●
AS131	Concrete. Pipe: 36". Dry, headwalls. Very clogged.	●			○	●
AS133	Concrete. Clogged culvert. See AS132/135.	●			○	●

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AS135/136	Concrete. Pipe: 3x2'.	○		◐	○	
AS144	12" PVC	○				
AS146	Two 8" ductile iron pipes.	○		◐		
AS158	Concrete. Should be cleaned. Unclear which direction flows. .	●		◐	○	●
AS167	Concrete.	○		◐	○	
AS169	Concrete. Inv: 3 ft. 3x3' box. 100% clogged.	●			○	●
AS200	Concrete. Inv: 4 ft. Standing water, trash and veg, pipe filled with sediment is next to it.	●	●		◐	●
AS201	Concrete. Inv: 6 ft. Standing water/trash on open side—trash/large veg/no standing water on other.	◐				●

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<sup>2</sup> Visible damage or observed erosion is ●yes or ? unsure

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Table 3. Outfalls and Stream Outlets

ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN308	Concrete. Inv: 5 ft. Storm gate - needs repair.	◐	●			●
AN312	Metal pipe: 12". Inv: 1 ft. Sediment filled up halfway up the pipe.	●			○	●
AN318	Stream outlet. Outlet for culvert near Dogas Ln.	◐	●		●	●
AN322	Stream outlet. Pipe: 4'W x2'H. Inv: 2 ft. Visible flow, might be coming from Middle Rd. culverts.	●	●	◐	◐	●
AN-500	Concrete outfall on beach draining Kensington ponds: 4'W x2'H (buried). Inv: 2 ft. Flowing.	●		◐	◐	
AS112	Concrete.	◐			○	
AS114	Concrete. Pipe: 14'x6'. depth of water 2'. Bridge/culvert aka DPW bridge. Outfall of south end of south Achugao.	○		◐		
AS116	Outlet of Dogas Stream below culvert AS115. Largest sea grass beds in Saipan right below outfall. LOTS of trash, incl diapers (fecal source).	◐		◐		●
AS126	Outfall from Agatan (culvert AS125).	○		◐		
AS129	Concrete. Pipe: 8' wide arch. Old tide gate at end of channel. Possibly pre-war.	○	●	◐	◐	●
AS143	Outfall from AS142 (retrofit). Looks good.	○				
AS162	Concrete. Pipe: 36". No sump. Headwall to wetland from box CB.	◐			○	●

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<sup>2</sup> Visible damage or observed erosion is ●yes or ? unsure

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Table 7. Existing Stormwater BMPs

ID	Description/Notes	~DA (total/IC acres)	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN320	Sediment trap at base of concrete drainage ditch. Flow observed. Ditch overflowing into swale along road. <i>Clean</i>	1.0/0.7	●		◐		●
AN323	Series of ponds and stormwater wetland at Kensington. <i>Check design plans to evaluate drainage system components (vs. aesthetic feature). Outlet structure collecting organic debris. Clean. Great spot for a WQ and educational retrofit.</i>	10/8	○		◐	○	●
AN356	Grass infiltration basin at San Roque School. Inv: 1 ft.	3.5/3.0	○				
AN510	Ponding basin at Saipan Globe built in a natural wetland. May serve as a temporary sediment basin. <i>Design plans should be further evaluated. See Restoration Opportunities section.</i>	5.0/2.5					●
AS141	Stone infiltration trench. 3" pipe along wall of Tanapag MS.	0.2/0.2	○			○	
AS145	Rain garden at school. <i>Clean out inlet. Widen and clean outlet/spillway (may need to lower spillway elevation or deepen RG. Maintain positive drainage on outlet side to road.</i>	0.5/0.4	◐			○	●
AS148/149	Ponding basin is 4-6' deep, varies in width; up to 20'. Outfall in corner by trench drain in the NW corner of school. Takes roof, walkway and field runoff. Veg is overgrown and should be cut and maintained. Standing water observed. Water overtops in the SW corner of basin and contributes to drainage issues at AS142. <i>Clean basin. Explore expanding capacity and address overflow (see restoration opportunity AS149.</i>	3.7/1.0	○			○	●
AS155	Swale w/o culvert. Lots of trash.	3.2/1	◐	●		○	●
AS500	Sediment basins at Imperial Casha need to be inspected. Two near entrance have erosion on side slopes, are full of sediment, and require removal of accumulated material. Others on east side not investigated.	10/0	●			●	●

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<sup>2</sup> Visible damage or observed erosion is ●yes or ? unsure

<sup>3</sup> Structure was identified as ●yes, needs cleaning, repair, or inspection due to clogging, sediment levels, damage, or other.

Table 8. Uncategorized

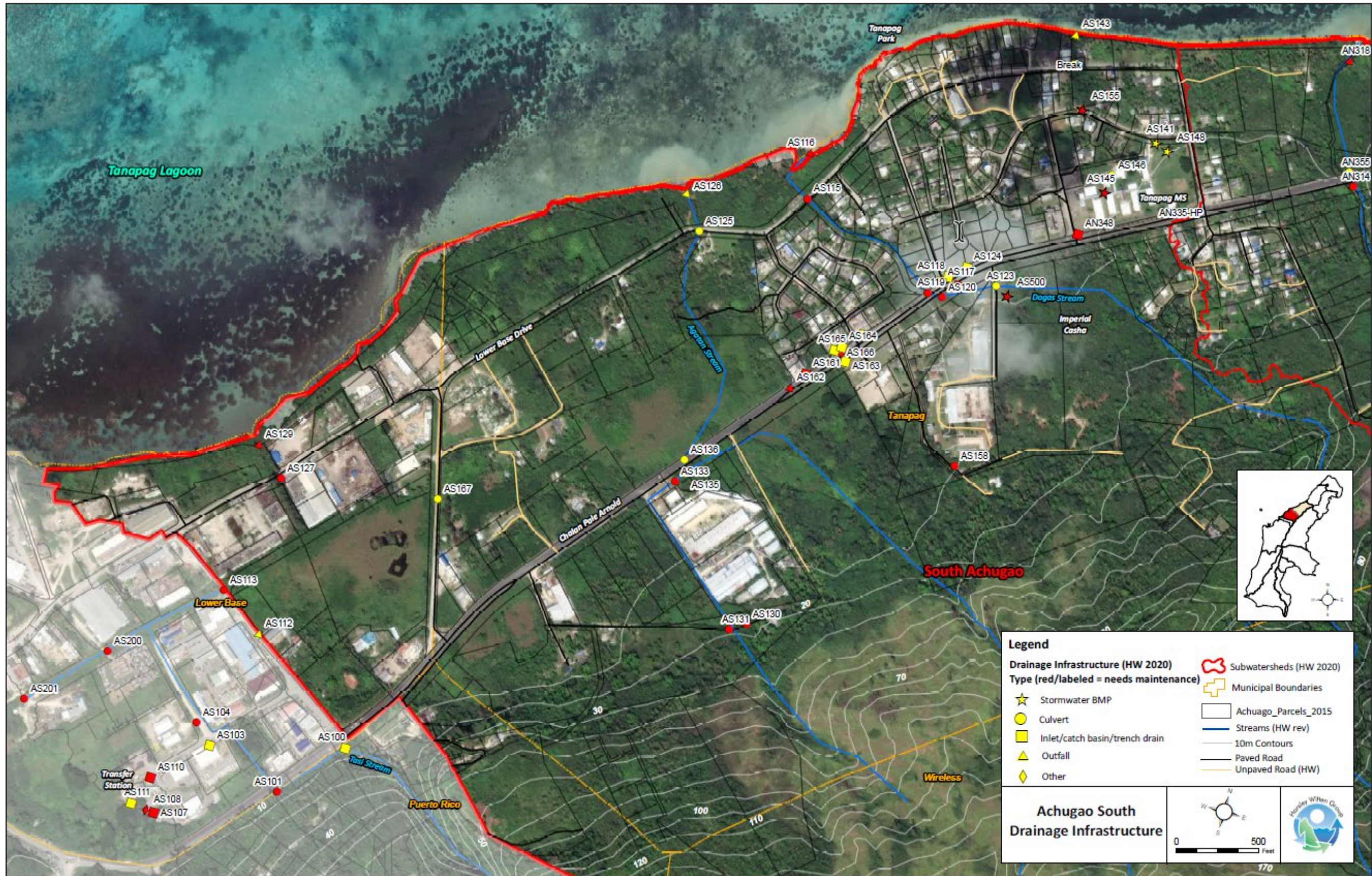
ID	Description/Notes	Sediment <sup>1</sup>	Damage <sup>2</sup>	Flow <sup>2</sup>	Erosion <sup>1</sup>	Needs Attention <sup>3</sup>
AN315	Natural channel. Channel goes to concrete channel on diablo. Path on the side of the road leads to gorge - stream flows during wet season.	○				
AN319	Channel. Concrete. Pipe: Length of road, 4'W ,6 ' deep. Inv: 6 ft. Extends entire road up to concrete swale, intersection of Matsuri and San Roque.	○			○	
AN328	Concrete swale. Low point on road near market and gas station collects sediment. Milky substance near gas station.	●			●	●
AN351	Concrete swale running the length of the road. Recommend cleaning out swale.	●			◐	●
AS108	Convergence of two concrete swales.	●				●

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<sup>2</sup> Visible damage or observed erosion is ●yes or ? unsure

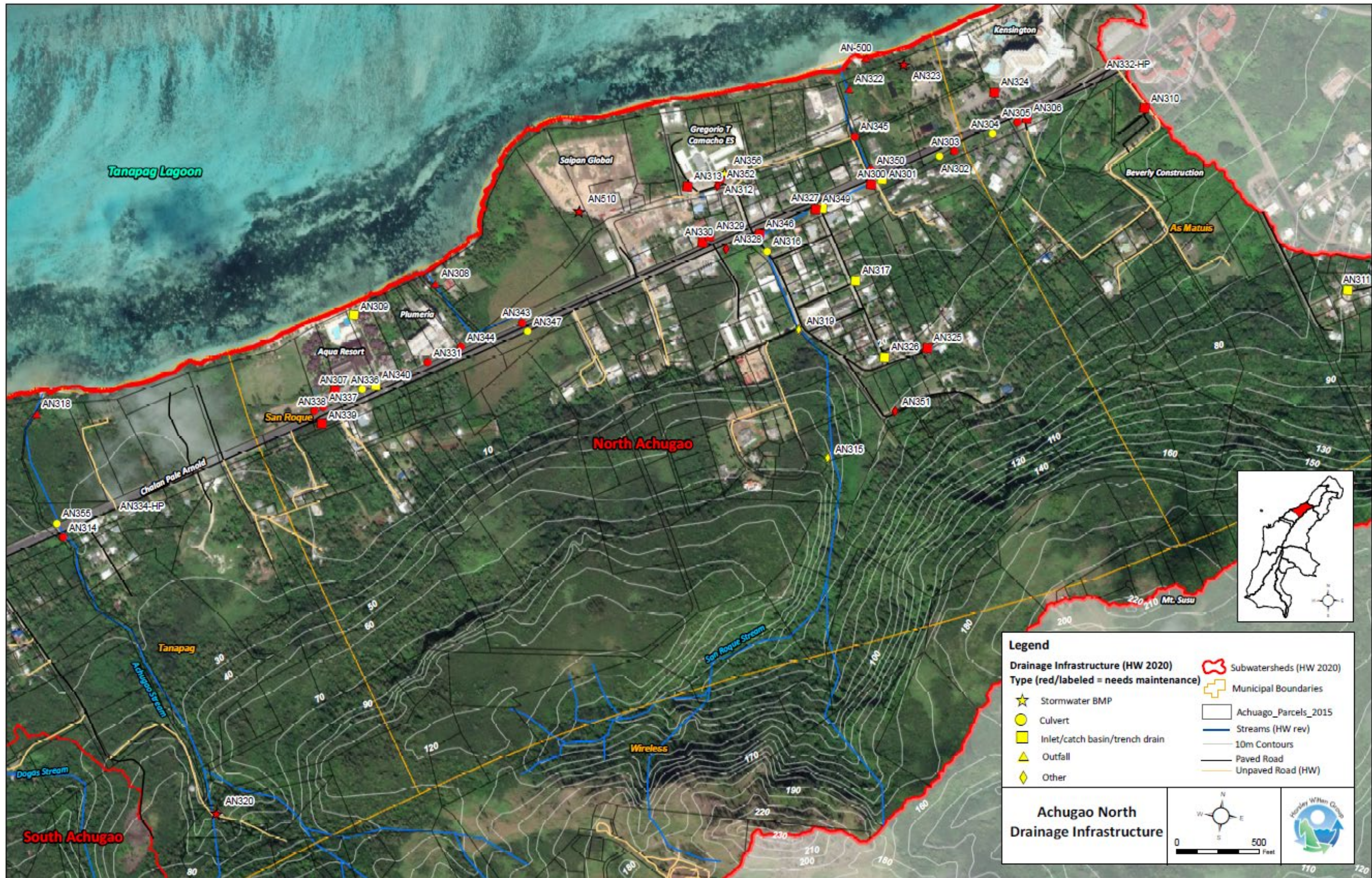
<sup>3</sup> Structure was identified as ●yes, needs cleaning, repair, or inspection due to clogging, sediment levels, damage, or other.





Map B1. Drainage structures in Achugao South assessed by HW in 2020 (red indicates needing attention)





Map B2. Drainage structures in Achugao North assessed by HW in 2020 (red indicates needing attention)