

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0013 723939

(Note: As practicable as possible the JIT report is to be signed in the field by all the participating parties)

A. GENERAL INFORMATION:

1. Spill incident Number: 723939 2. Type of incident* OIL SPILL
 3. Name of Location 24" ALAKIRI - BONNY PIPELINE
 4. Name of nearest community ILOMATORY 5. State: RIVERS 6. LGA BONNY
 7. Type of Production facility/Installation PIPELINE 8. Asset owner/District UIC/INEP

B. INCIDENT INFORMATION:

9. Details of incident

a. Date of incident: 5TH OCTOBER, 2011

b. Date/Period of investigation: 8TH OCTOBER, 2011

c. Description of spill point environment

- | | | |
|---|--|--|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input type="checkbox"/> Previously excavated area |
| <input type="checkbox"/> Under water | <input checked="" type="checkbox"/> Swampy | <input checked="" type="checkbox"/> Exposed pipe surface |
| <input type="checkbox"/> Well Platform (on Water) | | <input type="checkbox"/> Rig |

d. Description of leak point (tick as applicable);

- | | | |
|---|---|---|
| <input checked="" type="checkbox"/> Drilled hole | <input type="checkbox"/> Hack saw cut | <input type="checkbox"/> Explosive tear, |
| <input type="checkbox"/> Complete Rupture | <input type="checkbox"/> Inward dent, | <input type="checkbox"/> Well head tampering |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | | <input type="checkbox"/> Missing Pipeline/Flowline) |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | | <input type="checkbox"/> Third party tampering with Clamp |
| <input type="checkbox"/> Third party tampering with valve setting, | | <input type="checkbox"/> Third party tampering with flange, |
| <input type="checkbox"/> External Corrosion | | <input type="checkbox"/> Internal Corrosion |
| <input type="checkbox"/> Saver-pit over flow, | <input type="checkbox"/> Surge vessel overflow, | <input type="checkbox"/> Outward dent |
| <input type="checkbox"/> Flare System/Bund wall Failure | <input type="checkbox"/> Valve Failure | <input type="checkbox"/> com unit failure |
| <input type="checkbox"/> Cold vent | <input type="checkbox"/> Relief valve failure | <input type="checkbox"/> Others (specify) _____ |

e. Incident due to:

- Third party interference Operational Others (specify) _____

f. Spill point coordinates

Measuring unit <u>meter</u>	
Point	Coordinates
POINT 1.	Northing: 58370.78 Easting: 514652.55
POINT 2.	58276.94 2- 514643.31
POINT 3	58383.11 3- 514630.99
POINT 4	58386.19 4- 514624.98
POINT 5	58386.19 5- 514624.88
POINT 6	58389.27 6- 514621.76
POINT 7	58392.36 7- 514612.51
POINT 8	58392.36 8- 514634.08 = NON LEAKING.

} LEAKING POINTS.

*This can be: a) Oil Spill b) Drilling fluid/Chemical c) Siltation d) construction e) Encroachment f) Fire.

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C. RISK ASSESSMENT

10. Type of environment:

- Land Swamp Water Seasonal swamp

i. Type of environment to which oil has spread:

- Land Swamp Water River (identify) _____

ii. Weather condition

- Raining Sunny

11. Distance from the nearest sensitive habitat

- Government reserved and designated protected area [,m]
 Drinking water source [,m]
 Built up area [,m]
 Farmlands [,m]
 Fish Farm/Pond [,m]
 Fishing net [,m]
 Others (specify). [,m]

NOT APPLICABLE.

12. Containment measures put in place;

- Booms Trench Dyke

Others: NOT APPLICABLE.

13. Any pictures or video coverage? [Y] [N]

14. Was there any disruption to the investigation? [Y] [N]

If yes give brief description:

NOT APPLICABLE.

D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

15. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
	NONE WITHIN AREA OF IMPACT				

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16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
	NONE WITHIN AREA OF IMPACT					

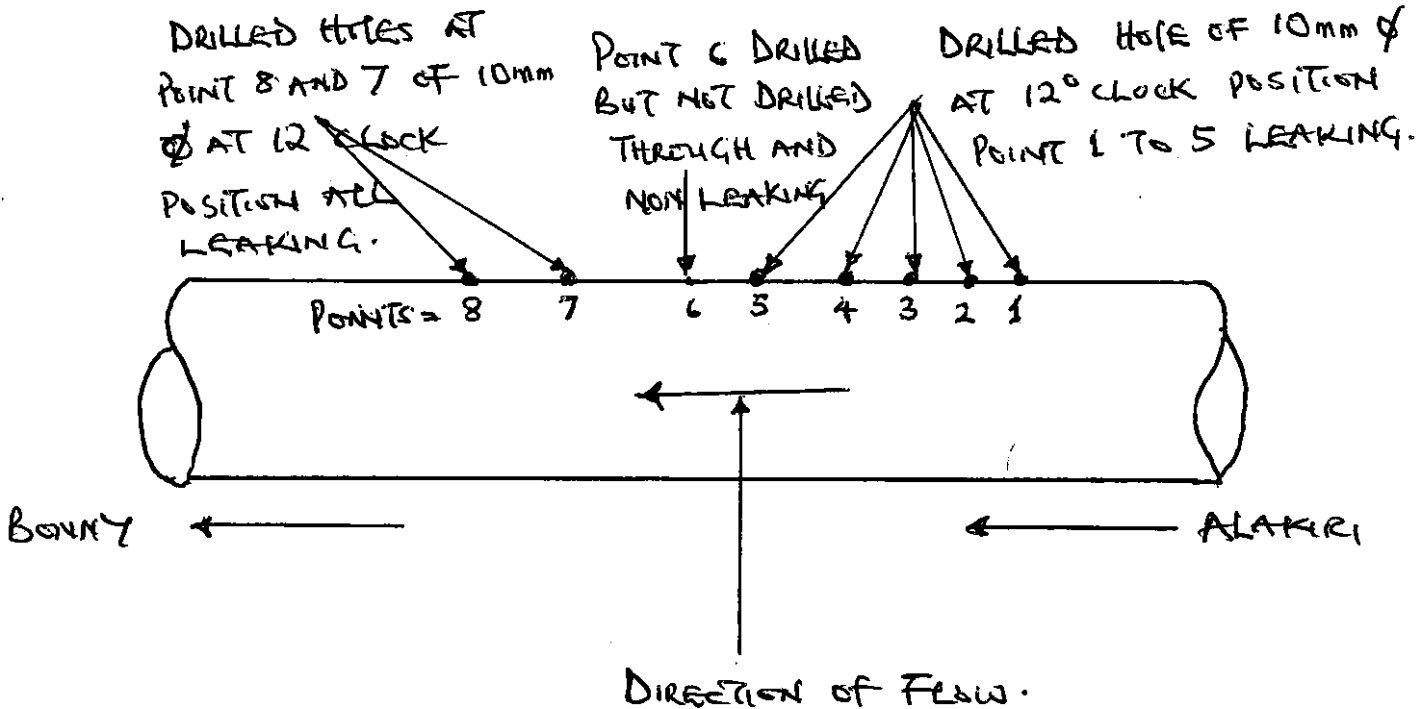
17. Fish/Nets/Ponds

S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

18. Others (Specify) i.e. Animal Traps

S/N	Others	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

E. GRAPHIC DESCRIPTION OF LEAK POINT (Overview sketch of the site should be added as an appendix1)



24" ALAKIRI - BONNY PIPELINE AT ILOMATORY (SKETCH OF LEAK POINT)

24" Alakiri - Bonny Trunck Line Spill (723939)			
name	east	north	
spill points			
85	514652.55	58370.78	
86	514643.31	58376.94	
87	514630.99	58383.11	
89	514627.92	58386.19	
90	514624.83	58386.19	
91	514621.76	58389.27	
92	514612.51	58392.36	
Non - Leak drilled hole.			
88	514634.08	58383.1	
water impact (loop 1)			
115	513668.18	59478.6	
116	513686.03	59484.13	
117	513708.4	59464.27	
118	513795.51	59295.59	
119	513800.16	59284.4	
120	513805.19	59265.29	
121	513807.45	59242.92	
122	513805.31	59200.56	
123	513790.1	59105.78	
124	513767.1	59036.02	
125	513748.87	59002.59	
126	513709.03	58952.43	
127	513677.94	58930.09	
128	513661.55	58922.82	
129	513380.44	58844.28	
130	513367.19	58843	
131	513348.51	58845.28	
132	513283.51	58875.93	
133	513200.4	58881.91	
134	513187.29	58888.9	
135	513230.2	58894.17	
136	513294.92	58894.13	
137	513306.36	58892.77	
138	513313.73	58891.18	
139	513335.4	58884.91	
93	513352.79	58880.35	
94	513356.43	58880.02	
95	513368	58879.31	
96	513383.11	58881.67	
97	513611.16	58945.68	
102	513659.47	58961.82	
103	513686.62	58982.51	
104	513709.44	59009.75	
105	513723.48	59031.62	
106	513741.87	59069.99	
107	513750.13	59095.48	
108	513759.01	59134.57	

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109	513768.11	59193.02		
110	513771.12	59232.61		
111	513769.51	59255.52		
112	513766.32	59270.57		
113	513753.4	59299.99		
114	513673.58	59454.59		
water impact (loop 2)				
140	514300.13	58607.89		
141	514304.72	58618.89		
142	514309.34	58631.97		
143	514319.45	58667.95		
144	514322.3	58679.28		
145	514328.85	58709.94		
146	514331.95	58735.23		
147	514351.29	58810.64		
148	514366.43	58847.32		
149	514378.74	58856.98		
150	514368.39	58832.61		
151	514363.34	58811.45		
152	514360.69	58787.54		
153	514359.2	58725.69		
154	514352.87	58687.29		
155	514335.63	58622.22		
156	514326.66	58598.54		
157	514299.64	58548.87		
158	514295.51	58539.56		
159	514281.48	58506.56		
160	514275.73	58501.04		
161	514262.51	58491.39		
162	514257.34	58484.72		
163	514254.92	58476.67		
164	514241.36	58458.85		
165	514218.82	58437.35		
166	514198.36	58397.13		
167	514192.04	58398.49		
168	514223.19	58456.78		
169	514226.41	58465.06		
170	514228.76	58487.1		
171	514231.45	58498.05		
172	514236.54	58505.44		
173	514252.29	58516.97		
174	514259.01	58523.88		
175	514272.26	58555.48		
water impact (loop3)				
176	515162.8	58177.48		
177	515171.72	58170.35		
178	515185.31	58163.69		
179	515198.04	58160.09		
180	515188.59	58139.9		
181	515186.91	58133.84		

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182	515186.24	58129.64		
183	515193.84	58064.82		
184	515195.64	58053.83		
185	515200.7	58043.51		
186	515210.49	58026.99		
187	515213.56	58019.39		
188	515220.02	57986.42		
189	515238.47	57929.51		
190	515253.51	57889.12		
191	515244.75	57857.74		
192	515220.95	57852.88		
193	515218.34	57868.04		
194	515215.38	57878.82		
195	515200.22	57919.6		
196	515180.17	57983.08		
197	515177.64	57999.5		
198	515169.43	58020.5		
199	515161.69	58032.98		
200	515156.79	58044.19		
215	515150.25	58088.22		
201	515145.9	58128.67		
202	515146.69	58140.99		
203	515150	58152.2		
Land impact (loop 4)				
157	514299.64	58548.87		
156	514326.66	58598.54		
213	514510.82	58470.91		
214	514765.25	58325.92		
215	515151.02	58088.19		
200	515156.79	58044.19		
216	514776.96	58279.05		
217	514604.55	58372.79		
218	514378.57	58521.77		
Land impact (loop 5)				
126	513709.03	58952.43		
209	513838.79	58875.84		
210	514087.98	58735.94		
140	514300.13	58607.89		
175	514272.26	58555.48		
206	514162.95	58658.76		
207	513975.27	58770.12		
208	513827.91	58862.07		
127	513677.94	58930.09		
Land Impact (loop 6)				
98	512265.88	59808.99		
99	512219.77	59861.87		
211	512740.72	59575.46		
100	512989.7	59397.05		
101	513413.57	59126.75		
103	513686.62	58982.51		

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102	513659.47	58961.82		
212	512873.05	59439.24		

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b. Computation of volume of infiltrated oil in the soil (V_{inf}).

- i. Area (m^2) covered by the oil: 90,000 m^2
- ii. Area of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.001 m
- iv. Soil type: clay
- v. P_e (effective porosity of the soil): 8%

iv. Volume of infiltrated oil, V_{inf}	<u>45.29</u>	barrels
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21. Computation of volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: 50,000 m^2
- ii. Table of average depth of oil on water based on coloration *

	Thickness (mm)	Percentage coverage	Volume (m^3)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002	<u>80%</u>	<u>0.08 m^3</u>
Black oil	0.1	<u>20%</u>	<u>1 m^3</u>
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume <u>6.79</u> bbl

iii. Volume of oil on open water, V_{wat}	<u>6.79</u>	barrels
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22. Calculation of evaporated volume:

- i. Oil type: BONNY LIGHT
- ii. E-Factor: 25%

iii. Volume of evaporated oil, V_{evap}	<u>38.67</u>	barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Period Since Oil Spill	< 1 day	10%	5%
	1-7 days	25%	15%
	> 7 days	40%	25%

23. Gross Total Estimated Spilled Volume $V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recf}(bbls)$
 $38.67 + 6.79 + 45.29 + 63.91 = 154.6$ bbls

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$$V_{Est}(bbls) = 38.67 + 6.79 + 45.29 + 63.91 = 154.66 \text{ BARRELS.}$$

24. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$

$$V_{Est}(bbls) = 38.67 + (6.79 \times 0.60) + 45.29 + 63.91 = 152.02 \text{ BARRELS}$$

*Calculation of the respective estimated volume is to be done using the new spill estimation software on site

*Conversion of m3 to barrels is Total volume VT (m3) x 6.29

*Emulsification factor for spill on water to consider is 60% of volume of oil.

25. GENERAL STATUS OF THE SITE

A. Joint investigation of the incident site found that there is no residual impact After the initial response and therefore recommend that the site be closed out

B. Investigation of the incident site showed that there is residual impact on site requiring further works

26 Signatories

This report was filled and signed on the 08 / 10 / 20 11 at incident site by joint investigation representatives from

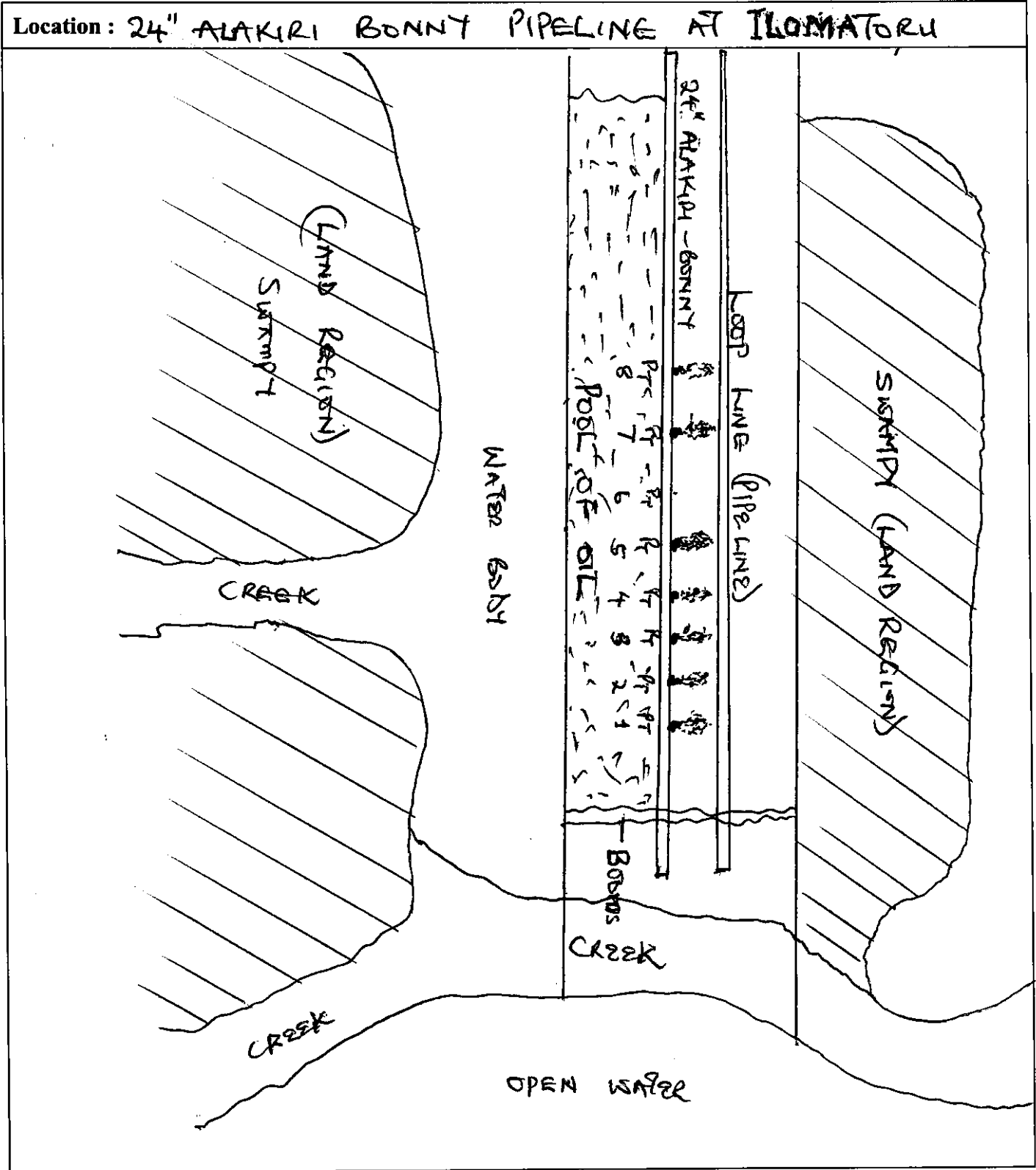
- Host Community
- Department of Petroleum Resources [DPR]:
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]:
- Shell Petroleum Development Company [SPDC]:

Tick as applicable

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20. Appendix 1: Overview sketch of the site



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21. Appendix 2: TABLE SHOWING ADDITIONAL COORDINATES TAKEN DURING JIV FOR AREA CALCULATION

(MINNA MID-BEIT)

S/N	Northing METER	Easting METER
	FIND BELOW IS THE BREAKDOWN OF THE ABOVE SUBJECT AS REQUESTED	
	LAND AREA = 10.16 HA	
	WATER AREA = 5.95 HA	
	TOTAL = 16.11 HA	