

## ***Environmental Assessment of Ogoniland Site Specific Fact Sheets***

### ***AABUE- KOROKORO***



*This fact sheet is part of a series prepared as part of the Environmental Assessment of Ogoniland by the United Nations Environment Programme (UNEP). It provides the observations and results from one of the individual sites studied in detail, plus the specific risk reduction measures for follow-up action.*

*This fact sheet should be read in conjunction with the main assessment report available at: [www.unep.org/nigeria](http://www.unep.org/nigeria).*

*July 2011*

**I - Site Description**

Site Name	AABUE- KOROKORO
Site Number	qc_008-001
LGA	TAI
Main community	AABUE KOROKORO
Surrounding communities	AABUE KOROKORO KOROKORO KOROKORO AABUE
Investigated area (ha)	7.43
Category	SPDC Legacy Site
Eastings (WGS 84, Zone 32N)	312480
Northings (WGS 84, Zone 32N)	524230



<p>Recommendations for risk reduction</p>	<ul style="list-style-type: none"> <li>- Communities should be informed in community meetings about health and safety precautions.</li> <li>- A community based security and surveillance system should be put in place so that there is voluntary compliance with the restrictions which are needed to protect public health.</li> <li>- The impacted area should be demarcated and appropriate signage put in place to indicate that the site is impacted.</li> <li>- Highly contaminated core areas should be fenced and guarded until emergency cleanup measures have been carried out.</li> <li>- Floating oil on the surface, if any, should be collected and treated off site.</li> <li>- The site should be remodelled to prevent run off from the contaminated area into the downstream swamps.</li> <li>- Runoff from the area should be monitored and if necessary collected and treated while the cleanup plan is developed and implemented.</li> <li>- Additional soil sampling along with trial pits should be done at the contaminated site to delineate the site to be excavated for clean up.</li> <li>- A detailed plan should be prepared for clean up of the contaminated soil and risk reduction at site.</li> <li>- A system of ground water monitoring wells should be installed to act as early warning for communities which are not yet impacted by ground water contamination.</li> <li>- A detailed plan should be prepared for clean up of the contaminated water and risk reduction in the community.</li> <li>- While undertaking the clean up, management of excavation water should be handled properly to ensure that no pollutants are emitted into the environment without control.</li> </ul>
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## II - Oilfield Infrastructure Type

Wells	No
Flowstations	No
Manifolds	No
Flaresites	No
Oil pipeline in operation	6" Korokoro/Tai FS to Betem MF Delivery line(DISUSED)
NNPC crude line	No
NNPC product line	No

## III - Spill History

Spills reported by SPDC	Incident Number	Incident Date
	1986_0088	19860729
	1989_00129	19890806
	1989_00139	19890906
	1989_00159	19891202
	1990_0079	19900105
Spill reported by community	Yes	

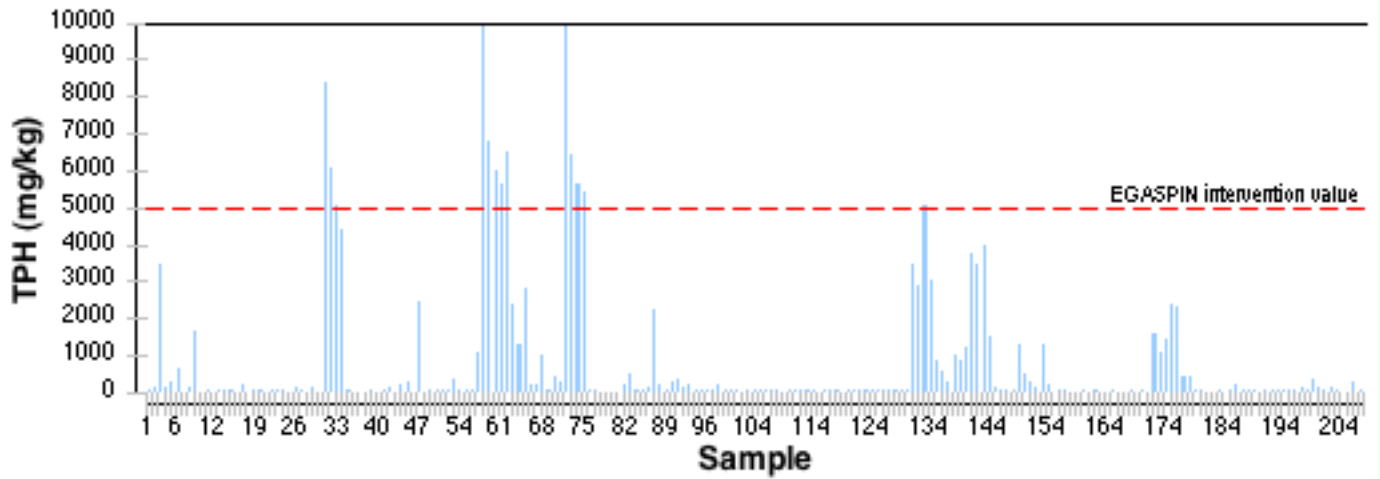
## IV - Data Screening

### **Assessment criteria**

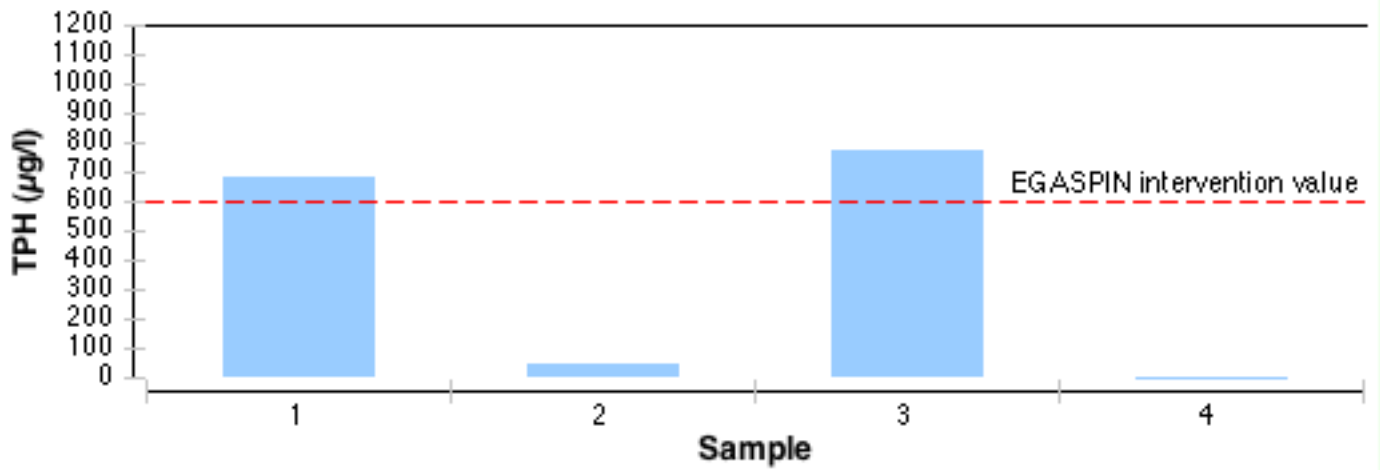
Soil contamination	Nigerian standards EGASPIN (intervention value 5000 mg/kg; target value 50 mg/kg)
Groundwater contamination	Nigerian standards EGASPIN (intervention value 600 µg/l; target value 50 µg/l)
Sediment contamination	Nigerian standards EGASPIN (intervention value 5000 mg/kg; target value 50 mg/kg)
Drinking water contamination	WHO guidelines (benzene: 10 µg/l) Nigerian drinking water standards (mineral oils: 3 µg/l)

Number of soil samples	207
Deepest investigation (m)	5.2
Maximum soil TPH (mg/kg)	14,200.000
Number of soil measurements greater than EGASPIN intervention value	13
Deepest sample greater than EGASPIN (m)	5
Number of soil measurements below 1m	171
Number of soil measurements below 1m greater than EGASPIN intervention value	12
Number of ground water samples	4
Maximum groundwater TPH (µg/l)	769
Number of groundwater measurements greater than EGASPIN intervention value	2
Number of community well samples	4
Presence of hydrocarbons in community wells	Not found
Number of CL sediment samples	0
Maximum CL sediment TPH (mg/kg)	Not applicable
Number of CL sediment measurements greater than EGASPIN intervention value	0
Presence of hydrocarbons in sediment above EGASPIN intervention value	Not applicable

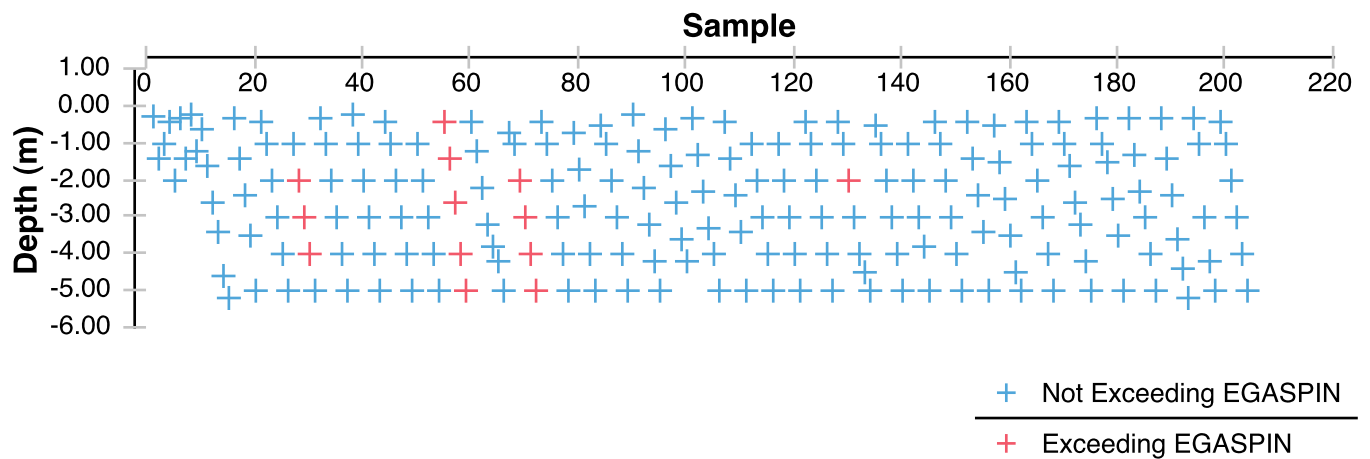
### Soil Samples



### Groundwater Samples



### Soil Samples depth





Satellite image of the site



Metres  
0 20 40  
Projection: WGS 84  
UTM Zone 32N

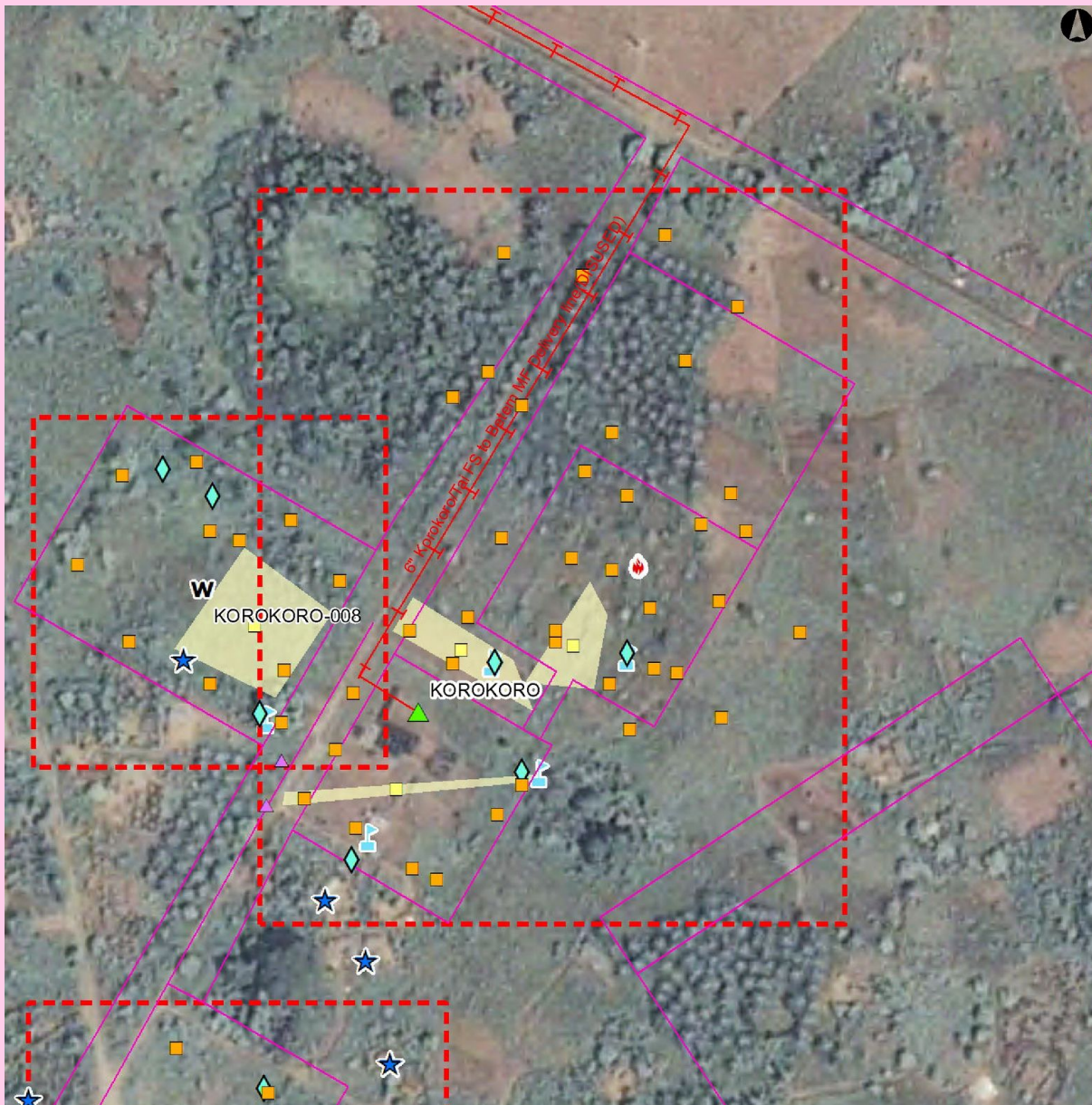


Approximate site investigation area  
(that area does not correspond to  
contamination extent).

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**Sampling location map**



**Oil Facilities**

- SPDC Right of way
- w** Wells
- Manifold
- Flow Station
- Pipeline**
- NNPC Crude
- NNPC Refined product
- SPDC Oil Pipe in operation

**Soil samples**

- Grassplot centroid
- Soil samples
- Soil Samples from GW monitoring well
- Grassplot sampling area
- Approximate site investigation area (that area does not correspond to contamination extent).
- Others**
- Air quality sampling
- Fish tissue sampling
- Sediment samples from Acquatic team
- Water Samples from Acquatic team

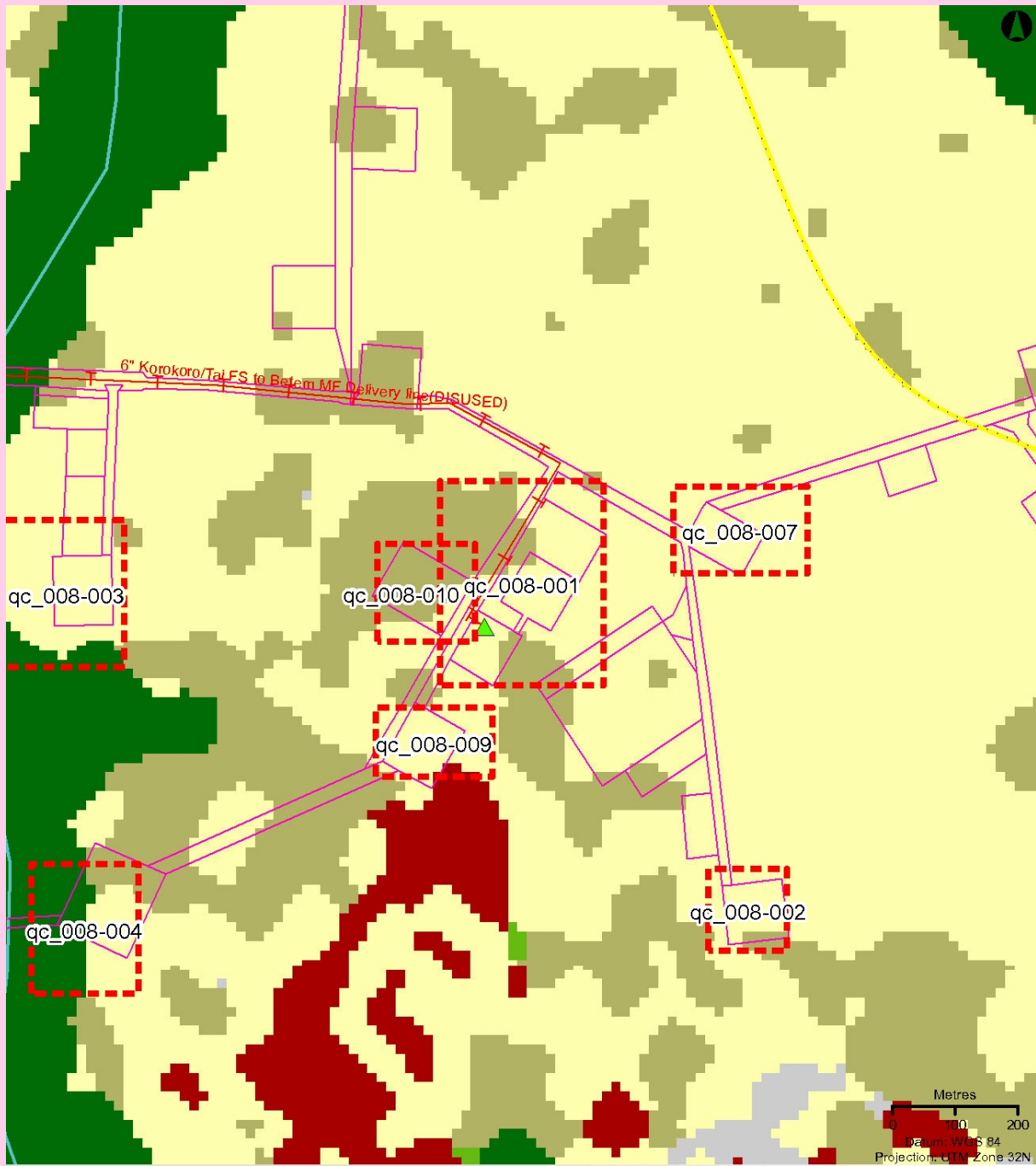
**Water samples**

- Rainwater samples (Community)
- Bore-well (community)
- Hand-dug well (community)
- Free-Phase samples
- Groundwater sample
- Surface water
- Water sample taken from an oil well
- Drilling well

Metres  
0 10 20

Datum: WGS 84  
Projection: UTM Zone 32N

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**Oil Facilities**

- SPDC Right of way (ROW)
- w** Wells
- Manifold
- ▲ FlowStation
- Pipeline
- NNPC Crude
- NNPC Refined product
- SPDC Oil Pipe in operation

Approximate site investigation area (that area does not correspond to contamination extent).

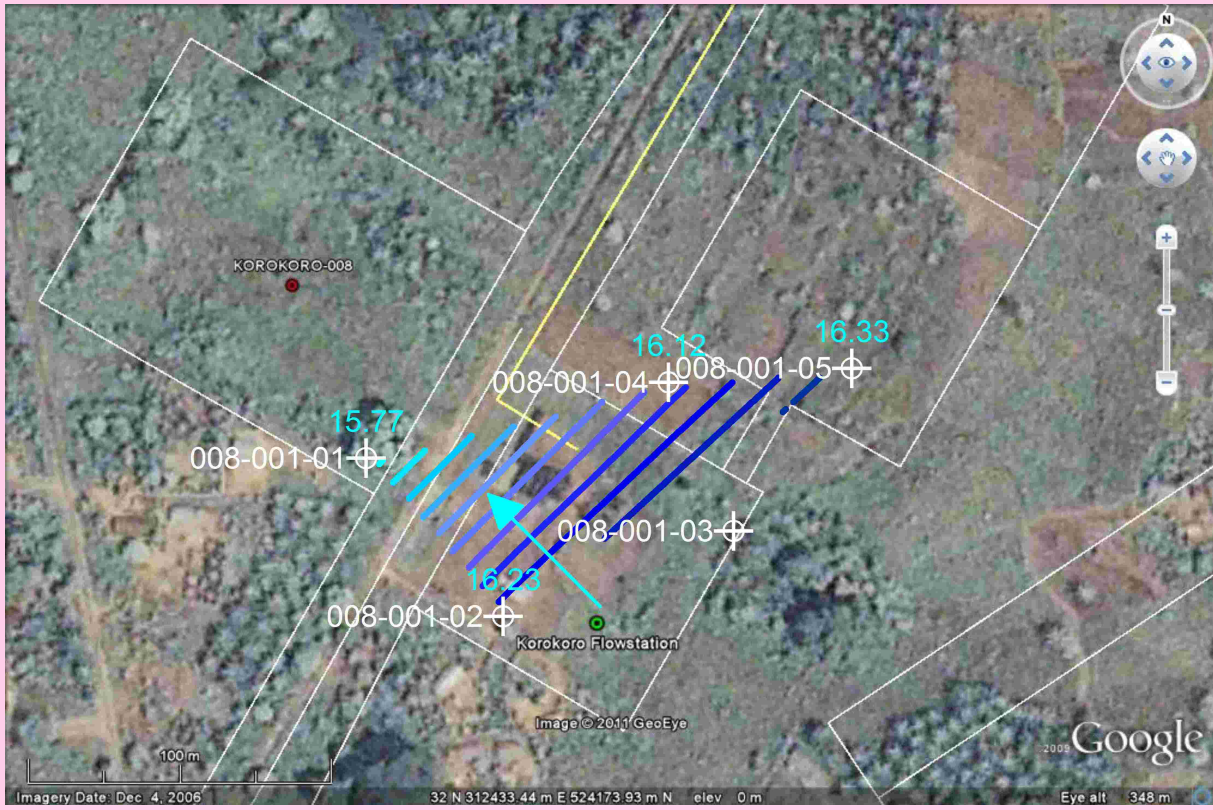
- Tree plantation
  - Farmland, low tree cover
  - Farmland, high tree cover
  - Fallow land
  - Riparian forest, including fresh water swamp forest
  - Forest on former beach ridge
- Mangrove
  - Mangrove, degraded
  - Urban
  - Bare soil, terrestrial
  - Bare soil, mud flat
  - Water

Source:  
land cover 2007  
from Aster imagery

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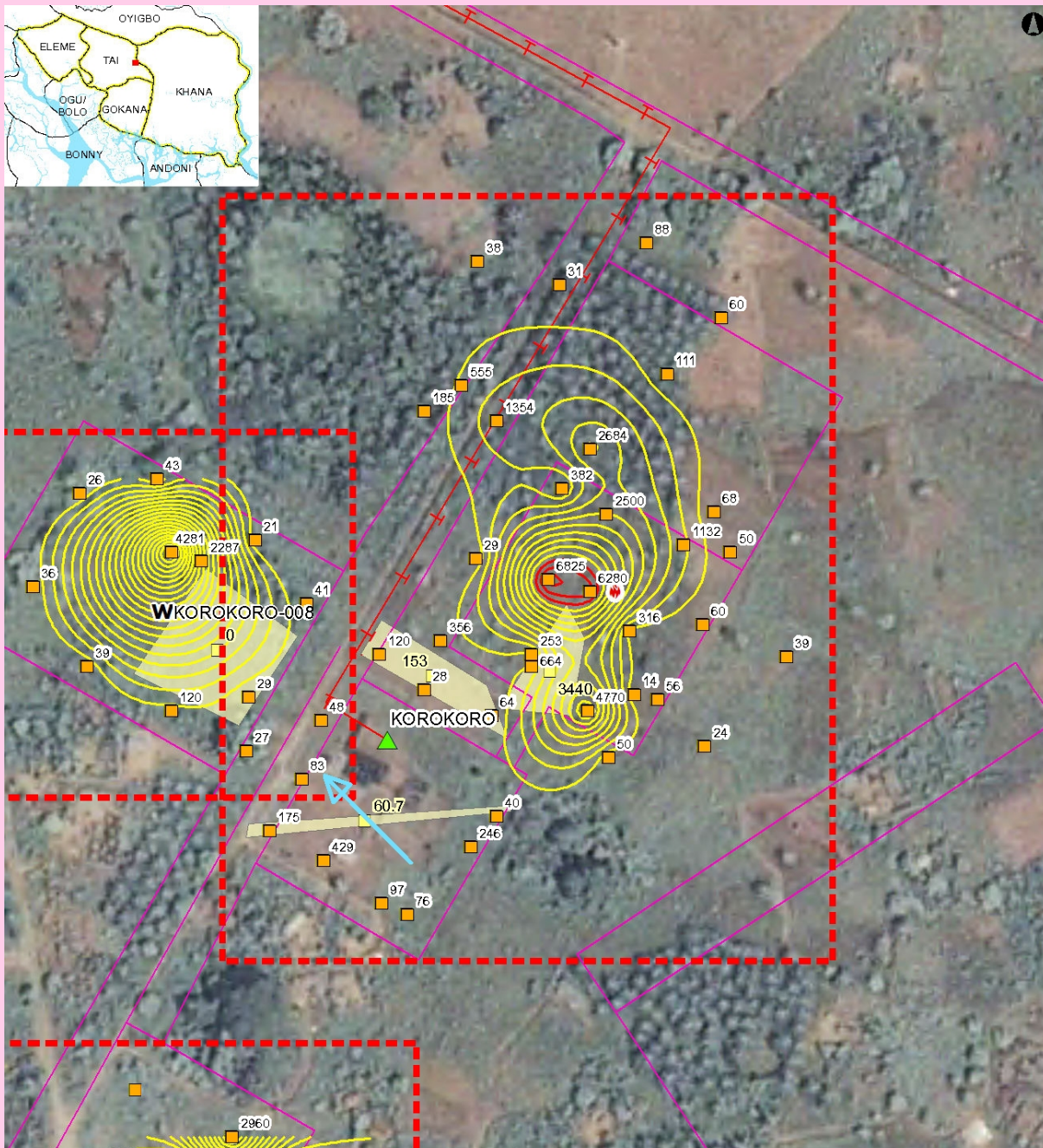


**Ground Water Elevation Map**





# Soil Contamination Map



### Oil Facilities

- SPDC Right of way (ROW)
- w** Wells
- Manifold
- ▲ FlowStation
- Pipeline
  - NNPC Crude
  - NNPC Refined product
  - SPDC Oil Pipe in operation

### Contamination contours (mg/kg)

- > 5 000
- 50 - 5 000
- < 50

### Soil samples

- Soil samples
- Grassplot centroid
- Grassplot sampling area
- Investigated area
- Groundwater flow direction

Metres  
0 20 40  
Projection: WGS 84  
UTM Zone 32 N

Approximate site investigation area (that area does not correspond to contamination extent).

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The values shown next to soil sample points represent the average TPH value for all samples taken from the borehole at that location.



**Ground photograph**



VII - Sample List

**Soil sample list**

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
1957031	275.000	1.40	312455	524115
1957072	113.000	0.25	312455	524115
1957110	664.000	1.00	312481	524192
1957151	1,660.000	0.30	312442	524203
1957192	116.000	2.00	312417	524091
1957229	72.900	0.20	312525	524180
1957270	60.700	-	312410	524126
1957461	153.000	-	312439	524188
1957484	1.670	1.20	312525	524180
1957531	BDL	1.40	312442	524203
1957569	22.700	0.40	312417	524091
2451166	433.000	0.70	312506	524224
2451174	6,460.000	3.00	312506	524224
2451188	285.000	1.00	312506	524224
2451197	5,430.000	5.00	312506	524224
2451209	13,500.000	2.00	312506	524224
2451215	5,620.000	4.00	312506	524224
2451315	1,060.000	5.00	312523	524207
2451321	41.800	3.00	312523	524207
2451330	55.200	2.00	312523	524207
2451351	350.000	1.00	312523	524207
2451366	73.200	4.00	312523	524207
2451617	6,080.000	3.00	312505	524173
2451632	5,020.000	4.00	312505	524173
2451643	4,400.000	5.00	312505	524173
2451653	8,350.000	2.00	312505	524173
2451766	997.000	4.20	312546	524244
2451775	237.000	3.20	312546	524244
2451787	2,390.000	0.40	312546	524244
2451801	2,830.000	2.20	312546	524244
2451815	1,320.000	1.20	312546	524244
2451827	187.000	3.80	312546	524244
2451843	48.500	4.00	312481	524197
2451851	80.400	5.00	312481	524197
2451862	69.100	3.00	312481	524197
2451883	79.500	2.00	312481	524197
2451909	not analyzed for TPH	1.00	312481	524197
2451937	22.900	2.40	312466	524128
2452008	44.300	3.50	312466	524128
2452048	42.100	5.00	312466	524128



Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2452059	55.800	0.30	312466	524128
2452074	42.800	1.40	312466	524128
2452144	190.000	4.60	312428	524086
2452155	28.600	5.20	312428	524086
2452164	73.200	0.60	312428	524086
2452179	58.500	1.60	312428	524086
2452362	38.800	2.60	312428	524086
2452372	10.000	3.40	312428	524086
2452527	85.500	0.40	312457	524238
2452583	29.400	2.00	312457	524238
2452599	8.840	5.00	312457	524238
2452635	47.700	1.00	312457	524238
2452659	20.800	4.00	312457	524238
2452676	23.300	3.00	312457	524238
2452770	24.300	2.00	312435	524182
2452847	11.000	1.00	312435	524182
2452863	21.200	5.00	312435	524182
2452878	75.200	0.30	312435	524182
2452899	54.700	4.00	312435	524182
2452930	7.400	3.00	312435	524182
2453113	110.000	2.00	312464	524171
2453144	44.200	3.00	312464	524171
2453166	62.300	0.40	312464	524171
2453201	2.930	4.00	312464	524171
2453224	15.800	1.00	312464	524171
2453339	127.000	5.00	312464	524171
2453743	117.000	1.00	312416	524197
2453862	5.590	5.00	312416	524197
2453903	9.790	2.00	312416	524197
2453932	217.000	3.00	312416	524197
2453974	99.800	0.20	312416	524197
2454026	255.000	4.00	312416	524197
2454119	14,200.000	0.40	312488	524229
2454157	6,020.000	2.60	312488	524229
2454191	5,630.000	4.00	312488	524229
2454223	6,530.000	5.00	312488	524229
2454259	6,810.000	1.40	312488	524229
2454696	88.000	5.00	312546	524244
2454796	2,470.000	0.40	312481	524197
2454901	not analyzed for TPH	1.00	312505	524173

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2461537	190.000	1.00	312392	524109
2461615	149.000	5.00	312392	524109
2461645	106.000	2.00	312392	524109
2461728	394.000	4.00	312392	524109
2461833	268.000	3.00	312392	524109
2461910	2,270.000	0.50	312392	524109
2461945	38.300	0.60	312391	524169
2461969	51.400	1.60	312391	524169
2461999	42.300	4.20	312391	524169
2462035	67.800	2.60	312391	524169
2462081	49.100	4.20	312383	524144
2462108	44.400	2.20	312383	524144
2462143	200.000	0.20	312383	524144
2462513	81.600	1.20	312383	524144
2462548	36.300	3.20	312383	524144
2462579	202.000	5.00	312383	524144
2462645	32.500	3.60	312391	524169
2462675	26.800	5.00	312554	524210
2462709	71.300	3.00	312554	524210
2462743	80.800	4.00	312554	524210
2462770	91.000	2.00	312554	524210
2462794	30.700	1.00	312554	524210
2462814	98.100	3.80	312494	524268
2462828	128.000	2.00	312494	524268
2462849	1,490.000	1.00	312494	524268
2462865	90.900	5.00	312494	524268
2462879	106.000	3.00	312494	524268
2462898	67.000	0.30	312514	524153
2462929	45.900	1.30	312514	524153
2463206	78.900	2.30	312514	524153
2463231	46.300	4.00	312514	524153
2463254	15.000	5.00	312514	524153
2463269	56.000	3.30	312514	524153
2463282	3,440.000	0.40	312513	524257
2463292	2,880.000	1.00	312513	524257
2463302	890.000	4.00	312513	524257
2463320	260.000	5.00	312513	524257
2463340	5,020.000	2.00	312513	524257
2463359	596.000	4.50	312513	524257
2463381	3,060.000	3.00	312513	524257

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2463401	47.400	0.40	312559	524258
2463431	68.100	4.00	312559	524258
2463450	82.000	1.00	312559	524258
2463464	52.400	5.00	312559	524258
2463485	72.100	3.00	312559	524258
2463507	80.900	2.00	312559	524258
2463535	1,020.000	0.50	312506	524285
2463557	1,250.000	2.00	312506	524285
2463569	3,770.000	3.00	312506	524285
2463583	3,470.000	4.00	312506	524285
2463606	843.000	1.00	312506	524285
2463621	4,000.000	5.00	312506	524285
2463633	197.000	0.70	312369	524122
2463645	520.000	1.70	312369	524122
2463661	40.100	2.70	312369	524122
2463681	111.000	5.00	312369	524122
2463698	50.300	4.00	312369	524122
2463728	62.700	3.00	312566	524241
2463753	42.200	4.00	312566	524241
2463782	40.600	2.00	312566	524241
2463807	59.300	5.00	312566	524241
2463845	43.000	1.00	312566	524241
2463883	60.400	1.40	312535	524178
2463919	59.600	5.00	312535	524178
2463945	47.000	0.40	312535	524178
2463959	54.400	2.40	312535	524178
2463971	52.600	3.40	312535	524178
2464048	3,440.000	-	312489	524190
2492106	72.700	0.30	312493	524355
2492206	11.800	5.00	312493	524355
2492220	42.800	3.50	312493	524355
2492298	61.800	1.00	312493	524355
2492319	17.900	5.00	312458	524365
2492333	54.500	1.40	312458	524365
2492354	57.600	2.40	312458	524365
2492368	34.700	3.40	312458	524365
2492419	61.200	2.30	312530	524373
2492448	46.100	4.00	312530	524373
2492468	56.100	0.30	312530	524373
2492520	31.900	5.00	312530	524373



Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2492568	67.500	4.40	312562	524341
2492603	38.900	5.20	312562	524341
2492634	132.000	0.30	312435	524301
2492687	338.000	3.00	312435	524301
2492708	54.400	1.00	312435	524301
2492748	69.500	1.40	312562	524341
2492807	2,310.000	3.20	312466	524297
2492820	426.000	5.00	312466	524297
2493183	2,390.000	2.60	312466	524297
2493206	52.100	5.00	312590	524196
2493231	29.300	3.50	312590	524196
2493261	22.200	2.00	312539	524317
2493286	83.900	3.00	312530	524373
2493444	1,300.000	0.40	312451	524312
2493480	322.000	2.00	312451	524312
2493499	132.000	3.00	312451	524312
2493529	25.900	4.50	312590	524196
2493555	51.200	3.60	312562	524341
2493581	61.900	2.40	312562	524341
2493996	21.400	1.50	312493	524355
2494008	21.000	2.50	312493	524355
2494040	88.100	1.00	312539	524317
2494065	25.900	1.00	312555	524158
2494123	42.300	4.00	312555	524158
2494222	15.600	0.40	312555	524158
2494255	30.300	0.40	312458	524365
2494487	227.000	1.30	312530	524373
2494514	1,480.000	1.60	312466	524297
2494547	130.000	0.40	312539	524317
2494590	36.600	5.00	312435	524301
2494626	119.000	4.20	312435	524301
2498764	1,580.000	0.40	312466	524297
2498774	465.000	4.20	312466	524297
2498782	1,110.000	1.00	312466	524297
2498822	87.900	0.30	312562	524341
2498846	323.000	4.00	312539	524317
2498872	11.100	3.00	312539	524317
2498884	92.900	5.00	312539	524317
2498914	186.000	5.00	312451	524312
2498924	1,320.000	4.00	312451	524312

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2498940	495.000	1.00	312451	524312
2498991	10.600	1.50	312590	524196
2499029	59.800	0.50	312590	524196
2499039	72.500	2.50	312590	524196
2499060	37.900	2.00	312555	524158
2499074	6.950	3.00	312555	524158
2499084	10.700	5.00	312555	524158

***Groundwater sample list***

Sample Identifier	Total petroleum hydrocarbon (µg/l)	Easting	Northing
1853460	678	312390	524095
1853570	BDL	312513	524187
1853651	769	312454	524183
1854462	45	312466	524134

***Community well sample list***

Sample Identifier	Total petroleum hydrocarbon (µg/l)	Easting	Northing
1853329	BDL	312486	523926
1853400	BDL	312315	524184
1854179	not analyzed for TPH	312378	524077
2698049	BDL	312396	524050

**Guide to content**

The Site Fact Sheets present more detailed data from UNEP's environmental assessment of Ogoniland on a site-by-site basis. Note that all data is based on the analysis of samples taken during the fieldwork period. The period of most intensive fieldwork ran from April to December 2010. The final sampling visit was completed in January 2011.

Here is a guide to the terms and abbreviations used. Please refer to the Environmental Assessment of Ogoniland report for details of EGASPIN target and intervention values.

**Terminology**

Site number	Reference number allocated by UNEP to identify a study site
Area (ha)	Estimated surface area (in hectares) of a given study site
Well	Oil well, also referred to as a production well
Fugro well	New well installed by Fugro at UNEP's request to enable scientific sampling and monitoring
Community well	Wells belonging to communities which are used to collect water for drinking and sanitation needs
Contamination contour	Maps that display the geographical distribution of oil contamination concentrations in an analyzed receptor
Flare site	Indicates whether the burning of unwanted gas through a pipe (or flare) takes place at a given site
Flow station	Separation facilities (also called gathering centres) which separate natural gas and water from crude oil extracted from production wells
Incident number	Numbers as supplied from the SPDC oil spills database
Manifold	An arrangement of piping or valves designed to control, distribute and often monitor fluid flow

**Abbreviations**

BDL	Below Detection Limit
CL	Contaminated Land
EGASPIN	Environmental Guidelines and Standards for Petroleum Industries in Nigeria
GW	groundwater
LGA	Local Government Area
mbgs	metre/s below ground surface
NNPC	Nigerian National Petroleum Corporation
SPDC	Shell Petroleum Development Company of Nigeria
TPH	total petroleum hydrocarbons
UNEP	United Nations Environment Programme

**Explanatory Note**

1. The recommendations given are for initial risk reduction. Final clean up would need significant additional site specific engineering as well as consultation work.
2. Spill reported by SPDC has the date format YYYYMMDD
3. Assessment is done based on a screening of the measured value against a Nigerian or international standard
4. In the soil sample maps, the highest value has been cut-off to 2 times the intervention value. This was done to visually express the exceedences above intervention values. Actual values are given in the sample tables.
5. The values of soil contamination listed in the Soil Contamination Maps are average values of all samples taken at that sampling location