



**NORTH SOUTH HIGHWAY PROJECT -
JAMAICA**

Date: 14/07/14

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**ENVIRONMENTAL MONITORING
REPORT # 8 – SECTON 3**

Doc.
No

EMR- NSH – S3- 008



**中国交通建设
CHINA COMMUNICATIONS CONSTRUCTION**

**JAMAICA NORTH SOUTH
HIGHWAY COMPANY LTD.**

CONTRACTOR:



**中国港湾工程有限责任公司
CHINA HARBOUR ENGINEERING COMPANY LTD.**

PROJECT:

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JAMAICA (Moneague to Ocho Rios)**

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1.0 PRELUDE

This Environmental Monitoring Report was prepared in fulfillment of specific condition # 27 of NEPA permit # 2012 – 06017 – EP00109. Over the monitoring period, the different elements of the said permit and other pertinent environmental project's document were used to guide the systematic collection of data during construction operations.


Although not limited to, the below enumerated environmental aspects form the scope of this report:

- ❖ Dust Control
- ❖ Noise abatement and Control
- ❖ Solid Waste Disposal and Sanitation
- ❖ Waste Water Treatment and Disposal
- ❖ Water Quality Protection and Preservation
- ❖ Material Storage
- ❖ Erosion and Storm Water Control
- ❖ Archaeological Protection and Preservation, and
- ❖ Flora and Fauna Protection and Preservation

1.1 Construction Activities

A number of major construction activities were observed to be executed in this section. Among these activities, apart from the operation of a campsite and a concrete mixing and batching plant, are as follows:

- Site Clearance
- Earthworks (cut and fill)
- Retaining wall construction
- Construction of CPS drain pipes
- Drilling/excavation of bridge footings for overpass

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- Box culverts construction etc.

1.2 Breaches/Aberrations and Corrective Actions

The breaches/aberrations that were identified/observed (*see item 3.0 for summary of breaches*) were immediately communicated to the construction team for corrective actions to be taken

By and large, four (4) health, four (4) safety and twelve (12) environmental breaches were evident over this monitoring period.

An Environmental Notification form was used to record and communicate these beaches to the construction team.

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2.0 MONITORING PARAMETERS

2.1 SOLID WASTE DISPOSAL AND SANITATION

2.1.1 *Monitoring Locations*

The following locations were monitored for littering and proper disposal of all category of solid waste – campsite and all areas where workers were present.


2.1.2 *Monitoring frequency*

Monitoring was done on a daily basis by CHEC's Environmental Engineer.

2.1.3 *Mitigation Measures Implemented*

The following mitigation measures were observed to be implemented:

- Acceptable solid waste receptacle continued to be present at campsite base, Lydford. However, construction generated solid waste was stored separately from commercial generated solid waste.
- Suitable solid waste containers, made of metal and boards, were placed at the concrete batching plant site for the storage of garbage. Garbage was subsequently taken to main campsite where it was picked up for disposal by NSWMA.
- Solid waste container was present at some major construction sites.
- Disused oil filters and air filters continued to be discriminatingly stored in separate board box.
- Solid waste was periodically collected by NSWMA.
- Construction team was regularly reminded that the burning of solid waste has been prohibited.
- Only specific locations were used for the disposal of grubbed materials.
- Disused tyres were stored separately at the batching plant location.
- Efforts were made to correct solid waste breaches.

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- There was no dumping of construction generated garbage in any natural storm water drain.
- No lead acid batteries were in storage.
- Efforts were made to correct solid waste breaches.

2.1.4 Impact(s)/Breach (es)

The following solid waste breaches were observed:

- Few major construction sites were without suitable solid waste container.
- Area around refused bay at campsite was in need of sanitization (*see figure 1*).
- Refuse bay (campsite) was breeding a lot of flies due to unbagged garbage.

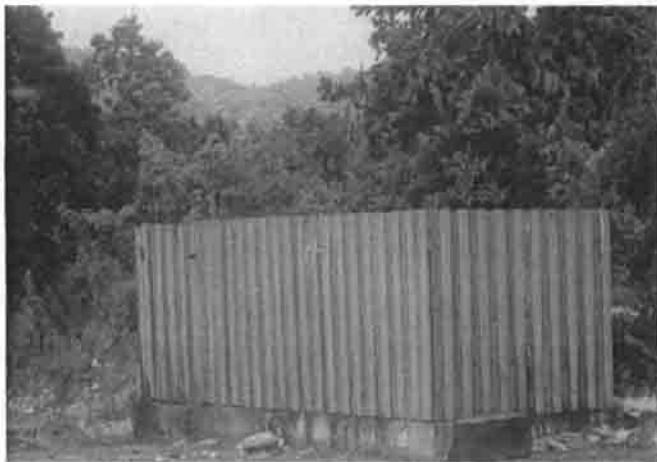



Figure 1: Showing refuse bay at Golden Grove Campsite where garbage was kept in on unhealthy conditions.

2.1.5 Remediation/Corrective Measure(s)

The following suggestions were made to construction team:

- Clean up area around refuse bay and sanitized with bleach solution
- Place garbage into plastic bag prior to be stored into refuse bay
- Increase garbage collection for disposal

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2.1.6 Follow-up Action(s)

- Up to end of monitoring period, none of the above suggestions made to the construction team was acted up on.
- Further follow up will be done.

2.1.7 Recommendation(s)

- All major site locations must be equipped with a suitable solid waste receptacle at all times during the course of construction.
- All used tyres must be stockpiled until enough tyres are present to be transported by a dump truck to the nearest municipal dump site, which is in close proximity to Moneague.

2.2 SEWAGE AND WASTE WATER TREATMENT AND DISPOSAL

2.2.1 Monitoring Locations


Campsite, Batching Plant, and along the road alignment.

2.2.2 Monitoring Frequency

Daily by CHEC's Environmental Engineer

2.2.3 Mitigation Measures Implemented

- Black system was functional at the campsite location without any significant breach of the system.
- Black water system include: septic tank, reed bed, and tile field.
- Grey water system include: grease trap, sand filter bed, and soak away pit.
Waste water locations were properly labeled.
- A waste water system - comprises of a septic tank, reed bed and drain field - has been constructed at the Lydford based concrete mixing and batching plant. No licence is required for this system as flow discharge is below NEPA discharge limit.

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- Portable toilet was provided at most major construction site.
- Toilets continued to be provided, emptied and cleaned - twice weekly - by M & M Sewers with location in Run-away Bay, St. Ann.
- During tool box talks, workers were reminded to make use of the toilet provided for them.

2.2.4 Impact(s)/Breach (es)


- Clogged grey water system – grease trap and sand filter bed.
- Untreated grey water entering environment.
- Effluent level in reed bed was very low and was unable to support the growth of reed plants.
- No analysis of sewage effluent was being done as per NEPA licence.
- Debris in reed beds

2.2.5 Remediation (s)/Corrective Measure(s)

- Grease trap and sand filter bed were cleaned
- Debris was removed from reed beds, subsequent to issuance of field note to construction team.

2.2.6 Recommendation(s)

- Grey water system should be maintained on a weekly basis to avoid clogging of the system with grease/oil.
- The reed bed should be charged with water and the height of the outlet pipe in the testing manhole increase so as to increase the effluent height in the reed bed.
- As per NEPA Licence # 2013 – 06017 – EL00086C, specific condition # 4, monitoring shall be undertaken at least twice per month for the following parameters: BOD, TSS, Total Nitrogen, Phosphates, COD, pH, Faecal Coliform, and Residual Chlorine.

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2.2.7 Follow-up

- The grey water system was being maintained on a weekly basis

2.3 SURFACE WATER QUALITY

2.3.1 Monitoring Locations

- Rivers, gullies, and streams

2.3.2 Monitoring Frequency


- Daily/ Monthly by CHEC's Environmental Engineer

2.3.3 Mitigation Measures Implemented

- Shoot drains were being built along embankments to direct storm water run-off from high way.
- Sand bags were placed at K 65 + 305 and K 61 + 500 to reduce the sediments load of storm water run-off at these locations (see figure 2).
- No work was being done adjacent to any river, stream, or rivulet



Figure 2: Showing sand bags placed at K 61 + 500 to prevent erosion of marly earth material into adjacent drain and onto the public thoroughfare.

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2.3.4 Analytical Results

- No analyses of surface water quality were done as there was no need to do so.

2.3.5 Impact(s)/Breach (es)

- None

2.3.6 Remediation/Corrective Measure(s)

- None

2.3.7 Follow-up Action(s)

- None

2. 4 SINKHOLE PROTECTION AND PRESERVATION

2.4.1 Monitoring Locations

Along the alignment where clearing and grubbing was done.

2.4.2 Monitoring Method and Frequency


Field walks were done prior to construction and during construction operations by CHEC's Environmental Engineer and the HSE Engineer of the construction team.

2.4.3 Mitigation Measure(s) implemented

- None of the nine (9) sinkholes that were mapped in the Water Resources Management Plan were affected by the high way construction.
- Construction workers were briefed, during environmental talks, on the important of sink holes and caverns, so on identification of such an immediate call should be made to CHEC's Environmental Engineer.

2.4.4 Impact(s) Breach (es)

- None

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2.4.5 Remediation/Corrective Measure(s)

- None

2.4.6 Follow-up Action(s)

- None

2.5 AIR QUALITY/DUST NUISANCE

2.5.1 Monitoring Locations


- Golden Grove Roundabout, Beulah Park (behind Golden Grove Primary School), entrance to Steer Town Academy School, and the populated areas of Steer Town, and Steerfield.

2.5.2 Monitoring Frequency and Method

- Twice monthly and subsequent to dust nuisance complaints.
- A mobile air quality sampling machine was used to measure the amount of particulate matter up to PM₅₀ in the ambient air.
- A testing time of 15 minutes was used for each measurement taken.
- Measurements received were compared with NEPA ambient Air Quality Standard for total particulate matters.

2.5.3 Mitigation Measures Implemented

- Air quality measurement for PM was done in populated areas of the aforementioned communities.
- Frequent wetting was done to suppress/control fugitive dust particles along access roads, Steer Town truck road, Golden Grove Round – a – bout, Lydford etc.
- Load of dump trucks, using the public thoroughfare, was observed to be covered with tarpaulin.


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- Oftentimes, dust mask was issued to workers that were working in dust generating area.

2.5.4 Air Quality Results

Table 1: Dust Monitoring Results and Associated Parameters

Location	Date and Time	Temperature (°C)	Relative Humidity (%)	Particulate Matter (ug/ m ³)/Remarks
Golden Grove to Orange Park Round about	10/6/14@12:42 pm	38.0	48.0	107.4 (moderate wind)
	26/6/14@3:43 pm	37.5	50.6	26.1 (moderate wind)
Behind Golden Grove Primary School, opposite Lydford Batching Plant	11/6/14 @1:04 pm	40.6	38.5	80.2 (windy day)
	30/6/14 @2:47 pm	33.8	48.6	31.7 (sunny and windy)
Steerfield, Light pole # 497688 (K59 +780)	13/6/14@ 3: 21 pm	38.8	27.3	72.0 (No construction activity was in sight)
	26/6/14@ 2:53 pm	41.5	42.7	2.3 (No construction activity was insight)
In front of Steer Town Academy	13/6/14@2:53 pm	33.4	62.8	41.5 (strong wind, no construction work was being done)
	26/6/14 @ 2:17 pm	38.1	53.9	318.9 (moderate wind, no construction work nearby; however, several vehicles passes during monito)
Moneague – light pole 202144	13/6/14@3:55 pm	40.0	39.1	35.4 (moderate wind, construction work was being done on hill overlooking houses)
Lydford Housing Development , light pole # 031250	30/6/14 @ 3: 02 pm	38.6	42.7	173.3 (sunny and windy day, construction operation was about 500m away)

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2.5.5 Impact(s)/Breach (es)

- Dust complaints from residents of Johnson Town, Lydford, Steer Town etc.
- Dust complaints from workers
- Access roads frequently got dusty.
- Wetting was inadequate in a number of areas, including Johnson Town, Lydford, Golden Grove round-a-bout, Steer Town etc.
- Leaves of trees defaced with dust particles – Johnson Town, Lydford etc. – see figure 3.




Figure 3: Dust particles from construction sites covering leaves of trees in the Johnson Town area due to inadequate wetting.

2.5.6 Remediation/Corrective Measure(s) and Recommendation(s)

- Construction was instructed to increase the frequency of wetting in all dust generated areas.

2.5.7 Follow-up Action(s)

- Frequency of wetting was indeed increase in some of the affected areas.

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2.6 NOISE LEVEL/VIBRATION

2.6.1 Monitoring Locations


Employee's normal work station and at all affected boundaries of the road reservation.

2.6.2 Monitoring Frequency and Method Used

At any given time during construction activity and subsequent to the receipt of noise nuisance complaint. A sound level meter set at fast response was used to collect noise measurements about 50 m from boundary of road reservation with affected property.

2.6.3 Mitigation Measures Implemented


- Noise level readings were collected at various locations close to the road alignment (*see table 2*).
- Silencer or muffler was fitted on to the exhaust lines of gas or oil equipment.
- Electrical generators, in used, were fitted with silencers.
- Workers who were exposed to uncontrollable noise level were issued with ear plugs.

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2.6.4 Noise Level Data

LOCATION	VALUE (db)	DATE
Johnson Town – west of round- about	67.9	3/6/14
	63.2	10/6/14
Golden Grove Primary School and Junior High – east of main road	57.8	3/6/14
	57.5	10/6/14
Davis Town – south of housing scheme at K 61 + 560	56.9	3/6/14
	57.5	10/6/14
Steer Town Primary – at the entrance gate	66.5	3/6/14
	64.3	10/6/14
Steer Town Academy – at the entrance gate	65.7	3/6/14
	65.8	10/6/14
Steerfield – near community centre	63.8	3/6/14
	65.6	10/6/14
Moneague Square – in front of pedestrian crossing	64.5	3/6/14
	65.3	10/6/14
Moneague College – west of walkers wood main road	56.7	3/6/14
	58.4	10/6/14
Chalky Hill	58.8	3/6/14
	56.5	10/6/14
Phoenix Park – houses north-east of construction at K 47	64.5	3/6/14
	65.3	10/6/14
Lydford Housing Scheme – entrance to main road	58.7	3/6/14
	56.8	10/6/14

Table 2: Noise Measurement collected on June 3rd and 10th, respectively, at different locations

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2.6.5 Analysis of Data

- Noise readings were below NEPA standard of 70 db for property adjacent to road alignment.

2.6.6 Remediation/Corrective Measures

- None

2.7 HYDROCARBON STORAGE AND OIL SPILLAGE

2.7.1 General

- New and used lubricating oil continued to be stored in metal drums at the Lydford site. Approximately 35 drums (55 gallons) of used oil were observed in storage.
- Equipment and dump trucks were refueled by a refueling truck.

2.7.2 Monitoring Locations


- Campsite, Batching Pant (Lydford), and Construction Sites.
- Construction Equipment – trucks, excavators, front end loader et al.

2.7.3 Monitoring Frequency

- Daily

2.7.4 Mitigation Measures Implemented

- Drums containing new oil and used oil continued to be stored within a concrete berm on an impermeable surface.
- Oil storage area was properly labeled.
- Refueling of equipment on construction site was careful watched.
- Dump trucks and equipment were frequently inspected for major oil leaks.
- Fuel storage tanks were equipped with spillage berm/bund area.
- Height of bund walls was increased based on NEPA's request.
- Suitable fire extinguisher was present at fuel oil and lubricating oil storage area.

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2.7.5 Impacts/Breaches

- No reconciliatory record was kept for used oil in storage
- No fuel monitoring device was equipped to fuel storage tanks as per NEPA permit.
- Aperture/opening in bund wall of diesel storage facility.

2.7.6 Remediation/Corrective Measures

- Construction team was instructed to correct above breaches.

2.7.7 Follow-up

- Fuel monitoring device was still being sourced.
- Aperture in bund wall was removed.

2.8 STORAGE AND DISPOSAL OF HAZARDOUS SUBSTANCES

2.8.1 General

- Only substances of hydrocarbon origin such as diesel and lubricating oil, which can be considered as hazardous, were observed to be in storage.

2.8.2 Monitoring Locations


- Campsite, Batching Plant, and Construction Sites.

2.8.3 Monitoring Frequency

- Daily

2.8.4 Mitigation Measures Implemented

- Diesel and lubricating oil were stored in secondary containment areas.
- Fuel storage and dispensing facility was monitored on a daily basis.
- No disposal of disused oil had yet taken placed.

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2.8.5 Impact(s)/Breach (es)

- None was necessary

2.8.6 Remediation/Corrective Measures

- None was necessary

2.8.7 Follow-up Action(s)

- None was necessary

2.9 STORAGE OF CONSTRUCTION MATERIALS AND SPOILS AND DISPOSAL OF WASTE MATERIALS AND SPOILS

2.9.1 Monitoring Locations

- Campsite, road side, open lots, construction sides, besides water ways etc.

2.9.2 Monitoring Frequency

- Daily

2.9.3 Mitigation Measure(s)


- Only spoil disposal sites along the alignment were being used.
- Dumping of spoils along road sides and on open lots was prohibited.
- Only spoils and excavated materials were dumped at spoil disposal sites, not construction or office or kitchen generated solid waste.

2.9.4 Impacts/Breach (es)

- None

2.9.5 Remediation/Corrective Measure(s)

- None was necessary

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2.9.7 Follow-up Action(s)

- Spoil sites were inspected regularly.

2. 10 FAUNA AND FLORA PROTECTION AND PRESERVATION

2.10 .1 Monitoring Locations

- Within the construction zone and on adjacent properties.

2.10.2 Monitoring Frequency

- Daily during construction activities

2.10.3 Mitigation Measures Implemented


- Clearing and grubbing were done only within the highway foot print.
- Field walk was done to identify any caves in those areas that were cleared. No cave, cavern, where rat bats would live, was discovered.
- Workers continued to be instructed not to destroy any plants outside the high way foot print.
- Workers continued to be informed not to cut down any tree with girth greater than 20 cm without the consent of CHEC's Environmental Engineer.
- Workers continued to be informed to immediately inform CHEC's Environmental Engineer on seeing any unusual plants or animals during construction operations.

2.10.4 Impact(s)/Breach (es)

- Dust particles defacing the leaves of trees in a number of areas adjacent to the road alignment.

2.10.5 Remediation/Corrective Measure(s)

- None

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2.10.6 Follow-up Action(s)

- None was necessary.

2.11 ARCHAEOLOGICAL AND HERITAGE PROTECTION AND PRESERVATION

2.11.1 Monitoring Locations

- Construction Sites, Phoenix Great House, Sugar Works Ruin and Aqueduct.

2.11.2 Monitoring Frequency

- Daily

2.11.3 Mitigation Measures Implemented/General

- Workers continued to be reminded to secure and inform CHEC's Environmental Engineer of any unusual objects seen in the soil during construction operations.
- Supervisors continued to be reminded to stop construction operation on the discovery of any unusual objects spotted in the soil during excavation.
- Phoenix Great House and the Sugar Work Ruin were observed to be still intact without any damage.
- Assessment work was being done to determine the impact of the alignment change on the remnants of the sugar works, aqueduct and water wheel in Mammee Bay, St. Ann. Assessment was being done by Jamaica National Heritage Trust (JNHT) (see figure 4).
- A total of fifteen (15) graves were relocated from different locations to facilitate the construction of the high way. All relevant permissions were received prior to the graves relocation, which was conducted by Mizpah Funeral Home.


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Figure 4: Showing old water wheel of old sugar work (Mammee Bay), a heritage site, which might be affected by the road construction.

2.11.4 Impact(s)/Breach (es)

- None

2.11.5 Remediation/Corrective Measure(s)

- None

2. 12 EROSION, EROSION CONTROL MEASURES, AND FLOODING

2.12.1 Monitoring Locations


- Throughout construction operations

2.12.2 Monitoring Frequency

- Daily

2.12.3 Mitigation Measure(s) Implemented

- Shoot drains continued to be constructed down filled embankments in the Golden Grove and Belmont area in order to prevent erosion of the road embankments by storm water run-off.
- Benching of embankments, as an erosion protection measure, was observed where cutting was necessary to bring elevation to design level (see figure 5).

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- CPS drain pipe continued to be construction at specific location in accordance to the approved drainage plan (see figure 6).



Figure 5: Showing excavator cutting bench near Phoenix Park, St. Ann.



Figure 6: CPS drain pipe being installed at a low point along the alignment.

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2.12.5 Impacts/Breach (es)

- None

2.12.6 Remediation/Corrective Measure(s)

- None

2.12.7 Follow-up

- None

2. 13 PERMITS AND LICENCES AND STATE AGENCIES'S VISIT

2.13.1 Monitoring Locations

- Campsite, Construction Sites etc.


2.13.2 Monitoring Frequency

- Daily

2.13.3 Permits and Licences

At the end of this monitoring period, the following permits/ licences have been received:

1. NEPA Permit for construction of campsite – Golden Grove, St. Ann.
2. NEPA permit for fuel oil storage facility – Lydford Batching Plant
3. NEPA permit for construction and operation of concrete batching plant – Lydford.
4. Permits to construct grey and black water treatment and disposal facilities – campsite location – Campsite, Golden Grove.
5. Permits to operate grey and black water treatment and disposal facilities – campsite location - Campsite, Golden Grove
6. Licences to dispose grey and black water treatment and disposal facilities – Campsite, Golden Grove.
7. Planning and building permit for construction of campsite facilities – St. Ann Parish Council.

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8. Planning and building permit for construction of concrete mixing and batching plant – St. Ann Parish Council.
9. Fire safety certificate for campsite and batching plant, respectively.

2.13.4 Visit by NEPA/State Agencies

The following visits were received during this monitoring period:

1. Ministry of Health, Public Health Division, St. Ann's Bay – June 4th and June 19th, 2014
2. NEPA Enforcement Officers - June 5th, 2014

2.13.5 Results of Inspections/Visits

❖ Ministry of Health

- Medications in the First Aid Room were only labeled in Chinese; they should also be labeled in English.
- Garbage bin in First Aid Room had no cover.
- No accident injury surveillance record
- Debris in reed bed
- Waste water pipe needed to be re-routed through septic tank and should not enter reed bed directly.
- Storm water drains containing debris (*see figure 7*).
- Closure notice was issued for closure of kitchen # 1 at the Golden Grove Campsite due to unhygienic conditions - June 19th, 2014.

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Figure 7: Showing one of the storm water drains on the campsite partially blocked by plants and debris.


❖ NEPA

- Four(4) warning notices were issued as follows:
 - i) Notice # 7987: No overflow prevention device attached to fuel oil storage (*specific condition # 15 of permit # 2013 – 06017 – EP00304.*
 - ii) Notice # 7985: No flow measuring device attached to waste water system (*specific condition # 14 of permit # 2013 – 06017 – EL00086B.*
 - iii) Notice # 7988: No dust mask provided for workers at concrete batching plant- Lydford (*specific condition # 10 of permit # 2013 – 06017 – EP00303.*

N.B. One of the warning notices (# 7986) was a repetition of item # 2

2.13.6 Response to Inspection Results

1. All the Ministry of Health breaches observed on June 4th and 19th were subsequently corrected.
2. Dust mask was subsequently issued to affected workers.
3. Flow meter and audible signal were still being sourced.

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2.14 QUARRYING AND BLASTING OPERATIONS

2.14.1 General

- No quarrying operation was executed over this monitoring period. However, blasting was done as follows: at K 47 + 800, K 50 + 800 and K49 + 700 on June 16th and 25th, 2014.

2.14.2 Monitoring Locations

- 800 m radius from blasting sites.

2.14.3 Monitoring Frequency

- Before, during and after blasting


2.14.4 Mitigation Measures Implemented

- Blasting permit was obtained from Mines and Geology Division: permit # 3872.
- Pre-blasting surveys were done.
- The communities within an 800 m radius were notified prior to the actual blasting.
- Police was present during the blasting operations.
- Chemicals to be used in the blasting were properly secured.



- Large boulders that were precariously perched, threatening the house of Mr. Graham, at K 47 + 800 were removed prior to blasting (see figure 8).

Figure 8: Showing boulders precariously perched above house (inset) at K 47 + 800 during the pre- blasting survey.

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2.14.5 Impact(s)/Breach (es)

- Large stone got propelled from blasting site damaging windscreen of truck and injured driver.

2.15.6 Remediation/Corrective Measure(s)

In the future, all persons and equipment must be evacuated at least 500m from the blast site.

2.14.3 Follow-up Action(s)

- None

2. 15 HEALTH, SAFETY AND TRAFFIC MANAGEMENT

2.15.1 Monitoring Locations

- Campsite, construction sites, and points where construction sites interface with the public thoroughfares and the general public such as all egress and ingress points.


2.15.2 Monitoring Frequency

- Daily

2.15.3 Safety and Traffic Management Measures Implemented

The following measures to enhance safety of workers and the public were observed to be implemented:

- Induction training and tool box talks were being conducted, by the construction team HSE officers (local and Chinese).
- Safety and warning signs were erected where they were necessary, especially at all points where the highway interfaced with the public thoroughfare.
- Signs along roadways were monitored to ensure they were kept in good order.

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- Safety signs were placed all over the grounds of the Concrete Batching and Mixing Plant.
- Workers were issued with the relevant PPE, including hard hats, hard boots, reflective vest etc.
- Communities were informed of pending activities, including blasting.
- Sheer drops were properly cordoned-off with decorated tapes or ribbons.
- Hazardous areas were highlighted using barriers, caution tapes etc.
- Suitable fire extinguishers continued to be present at all buildings and refueling area.
- Flag personnel were observed to be present at critical areas to monitor the flow of traffic.
- A site nurse has now been employed.

2.15.4 Impact(s)/Breach (es) - health and safety

- On June 19th, 2014, a number of workers began to work over very deep holes, being constructed for bridge footings, without wearing any harness – Lydford Interchange.
- Workers working at height without harness (see figure 9).
- Few workers without hard boots
- Some affected workers were without dust mask.
- Stagnant water in container breed mosquitoes and producing a foul odour (see figure 10).
- Unlicensed fuel truck belonging to construction team using public road (see figure 11).



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Figure 9: *Workers at height without wearing any harness at box culvert construction site at about K 56 +.*



Figure 10: *Stagnant water, a breeding site for mosquitoes.*



Figure 11: *Unlicensed fuel truck seen on the Chalky Hill truck road.*

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2.15.5 Remediation/Corrective Measure(s)

- Workers were instructed to put on harness, to which they complied.
- Workers without hard boots were immediately removed from site.
- Dust mask was issued to affected workers.
- Construction team was admonished on the issue of allowing unlicensed vehicles to be using the public thoroughfare.
- Stagnant water was removed from containment area.

2.15.6 Accidents/Incidents

- Only one (1) accident or incident was recorded or reported for this period. See table 1 for detail.

Table 3: Showing details of accidents.

Date of Incident/Accident	Name of Victim	Nature of Incident/Accident and Injury/Damage	Cause of Incident/Accident		
			Unsafe Act	Unsafe Condition	Act of God
2/6/2014	Alshane Douglas	Cut to right leg by stone that got propelled by blasting at K 53 + 600	No	Yes	No



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Table 4: Summary of Data on Accidents/Incidents

	Cumulative		Cumulative
	Previous months	This Month	To Date
Fatal Accidents	0	0	0
Lost Time Accidents (Leave days)	6	1	7
Restricted Work Case	0	0	0
Medical Treatment	6	1	7
First Aid Cases	3	0	3
Non Medical & Non- First Aid Cases	3	0	3
Incidents/Accidents:	12	1	13

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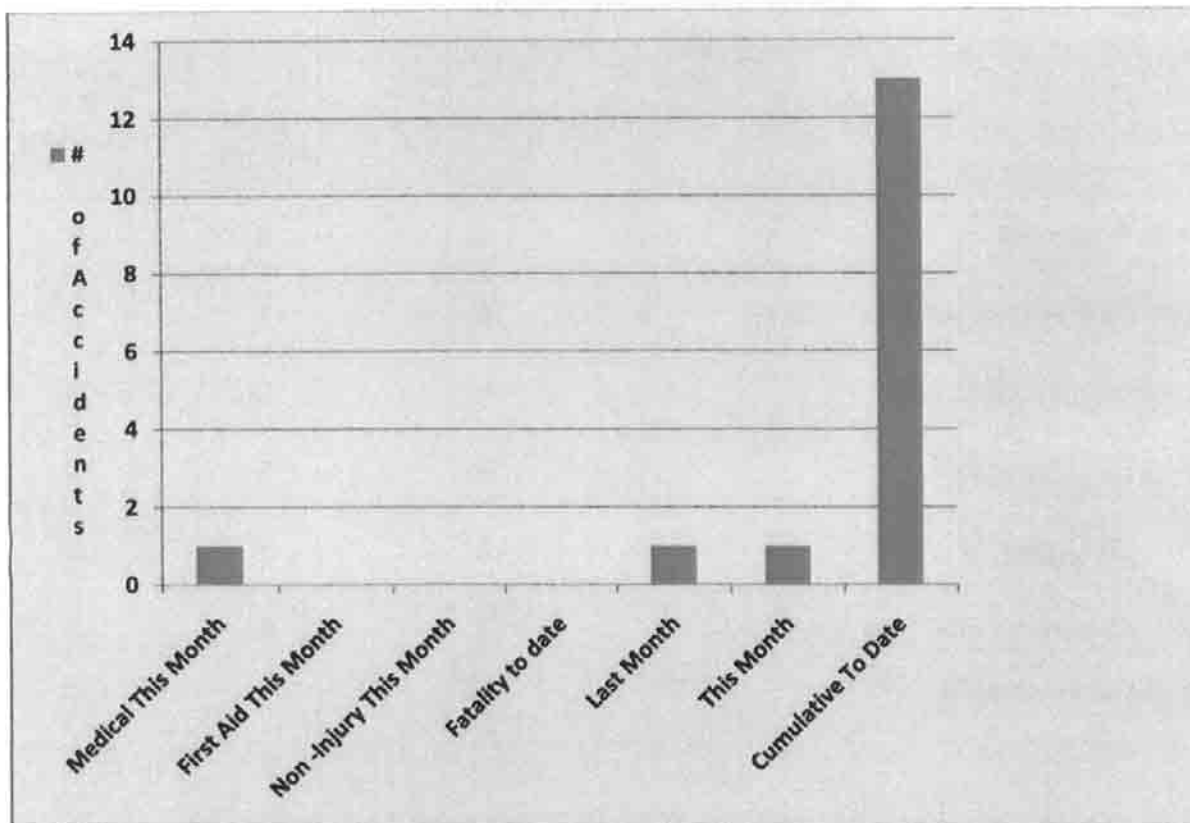



Figure 12. Graphical Representation of Accidents/Accidents

2.14.7 Recommendation(s)

- All accidents must be investigated, recorded and reported.
- The construction team should at all times make the working environment safe for all workers.
- Workers must be at all times attired in their prescribed safety gears prior to be engaged in any work related activity.

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3.0 SUMMARY OF IMPACTS/ BREACHES

Health Breach


1. Unhygienic conditions of Kitchen # 1 leading to closure order issued by Ministry of Health (*item 2.15.4*).
2. Mediations in First Aid Room not properly labeled (*item 2.13.5*).
3. No accident injury surveillance record (*item 2.13.5*).
4. Stagnant water breeding mosquitoes

Safety Breaches

1. Workers working without harness at height and above very deep holes (*item 2.15.4*).
2. No dust mask was being issued to some affected workers (*item 2.15.4*).
3. Unlicensed truck using public thoroughfare (*item 2.15.4*).
4. One (1) accident was reported (*2.15.6*).

Environment Breaches:

1. Some major sites were still without suitable solid waste container (*item 2.1.4*).
2. Refuse bay needed to be sanitized (*item 2.1.4*).
3. Mal-functioning grey water system (Golden Grove Campsite) – *item 2.2.4*
4. Reed bed not functioning satisfactory (*item 2.2.4*).
5. Debris littering reed beds (*item 2.2.4*).
6. No reconciliatory record for used oil storage (*item 2.7.5*).
7. No analysis report for sewage effluent (*item 2.2.4*).

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8. No monitoring device attached to fuel storage tanks as per NEPA permit (*item 2.7.5*).
9. Dust complaints from residents (*item 2.2.5*).
10. Inadequate wetting of dust generated areas (*item 2.5.5*).
11. Aperture in bund wall of fuel storage facility (*item 2.7.5*).
12. Fuel safety compliance signs not attached to fuel storage tanks.

4.0 Conclusion

The construction team needs to pay much attention to the correction of recurring breaches such as inadequacy in the watering of dust generated areas, non-provision of dust mask to affected works and proper garbage storage and disposal throughout the project's scope.

Meanwhile, the general hygiene of the campsite including the toilets and food preparation and serving areas must be sustained in good order at all times.

With respect to the safety of workers, supervisors and safety officers must be more vigilant, ensuring that workers are equipped in their relevant PPE prior to be engaged in any construction related activity.