

# **ADDENDUM TO THE 2012 FINAL REPORT OF THE ENVIRONMENTAL IMPACT ASSESSMENT:**

## **Coral Springs Residential Development**

April 3, 2013



***Prepared for:***

National Environment and Planning Agency  
10 Caledonia Avenue  
Kingston 5

***Prepared by:***

Environmental Solutions Ltd.  
89 Hope Road  
Kingston 6



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## **1.0 INTRODUCTION**

### **1.1 Purpose**

Gore Developments Limited proposes to construct a residential development at Coral Springs in the parish of Trelawny. After a consultation meeting with the Development Assistance Centre (DAC) (October, 2011), an EIA (environmental impact assessment) was completed (July 2012) following TORs approved by NEPA (February 2012).

Environmental Solutions Ltd. (ESL) was contracted by Gore Developments Ltd. (GDL) to carry out the EIA (between 2011 and 2012) as part of the permitting requirements stipulated by the National Environment and Planning Agency (NEPA) in respect of the proposed development. As per NEPA guidelines, a Public Hearing was facilitated by the EIA Team in September 2012 to present the findings of the EIA. This report addresses the comments from the Public Hearing submitted by NEPA.

### **1.2 Background**

In 2008 Gore Developments Limited (GDL) purchased 169 acres (68 ha) of land in the Coral Springs property from the Redevelopment Foundation. The project site is separated from the southern Dry Valley property by the North Coast Highway. The coastal property of White Bay borders Coral Springs to the north. Both the eastern and western boundaries of the project site encompass forested private property. The Coral Spring Mountain – Spring Protected Area is located to the west of the site.

The subject property was originally subdivided in 1964 and was slated for a 380 lot housing development, each of a minimum of 700 m<sup>2</sup> (8,000 ft<sup>2</sup>). However, the majority of the property was never developed. A total of 39 landowners were able to legally obtain property titles for their lots which most have now completed building on, while the others are empty lots. The remainder of the property was taken over by the Redevelopment Foundation.

GDL proposes to establish a residential development of 543 units in the Dry Limestone Forests surrounding the existing housing estate at Coral Springs. Of the 543 residential lots, 401 lots will be built by GDL to feature a single family, detached two-bedroom dwelling in the flatter lands on the west and north. The remaining 142 lots will be service lots to be developed by each lot owner and are located on the two major hills on the eastern section of the property. The steep escarpment of these two hills will not be disturbed but retained in their natural state. Lands have been allocated in the development plan for a Basic School, Commercial Centre including a gas station, sewage treatment facility, recreational area and natural green areas (Figure 1.2).





Figure 1.2: Coral Springs subdivision layout

## 2.0 SITE DRAINAGE

### 2.1 Existing Depression Storage

As discussed in the EIA Report (ESL, 2012), the project site is a dry limestone forest on hilly terrain with 65% of the property draining into an existing central depression. This depression contains standing water up to approximately 13 m AMSL. The remaining 35% of the site drains northward overland. Overall the depression drains approximately 311 Hectares (35.4 ha of which is part of the project site) which represents the Dry Valley Sub-Catchment Area. This Catchment area has been divided into four sub-catchments; NE - 50.5 ha, SE 139 ha, SW- 67 ha and NW - 54.3 ha. The largest contributing area comes from Dry Valley south of the Highway.

### 2.2 Proposed Modification for Depression Storage

The original drainage proposal as discussed in the EIA Report (and Drainage Report) was to limit the impact to the depression area by increasing the infiltration and storage potential outside of the normal pond levels (13.5 m contour line). This design was considered “not making the pre-development 100yr flood conditions worse” was proposed to be done by re-grading the area and replacing the soil under the playfield to reduce the flood elevations. However, subsequent to the conduct of the Public Hearing the National Works Agency (NWA) has requested that the concept be changed to “alleviate the flooding of the existing residents for the post-development 100yr flood”. The NWA confirms that the depression area was primarily a drainage discharge area in earlier years but due to land based activities has now become filled in with sediment.

Additional geotechnical sampling performed in the depression in February 2013 shows ~6 m of clay in the pond area above the free draining material of the sinkhole. It is now proposed that modifications be done in the area between the pond, the drain and the playfield to create detention storage, and a sediment trap (Figure 2.2a) to create an area of increased percolation around the pond/depression.

The re-grading will be done by excavating between the 13.0 m contour and the 14.0 contour to remove the hard brown clay. The area will then be filled with compacted gravel and crushed limestone to 11.0 m to create additional storage. A sediment trap and recharge area will essentially be created (Figure 2.2a). The area below the 15 m line, south of the sinkhole, will also be re-graded to facilitate the play field; though less extensively than the sediment trap area.

Re-grading and removal of the clay layer in the park location will reduce flood levels in the 100yr storm by approximately from 18.08 m to 15.48 m (Table 2.2). This is expected to alleviate the threat to existing properties as the lowest floor level is 15.83 m. Figure 2.2b and c below show the difference in the 100 year flood plain with and without the proposed drainage mitigation measure of creating a sediment trap and storage area around the depression.



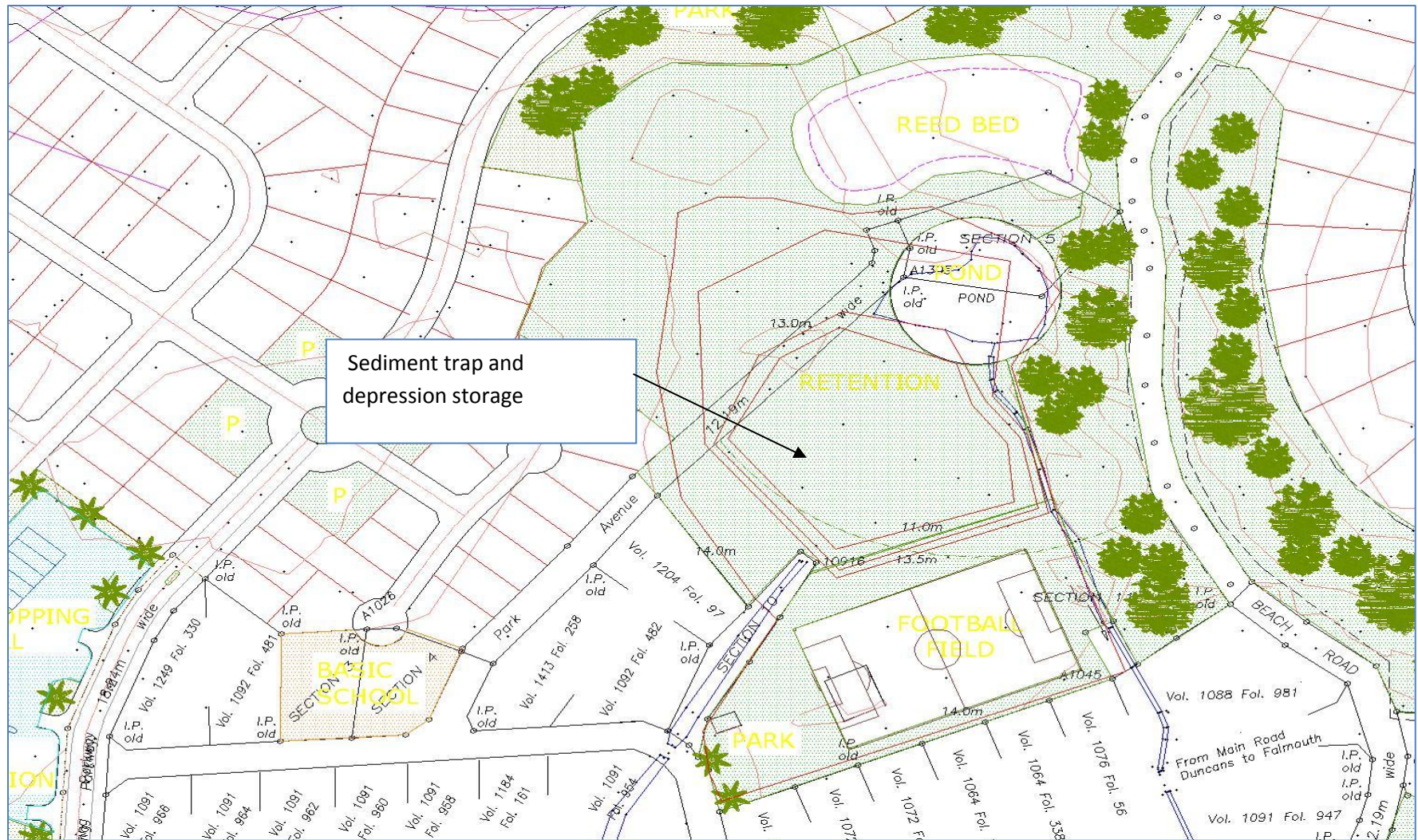


Figure 2.2a: Contours after re-grading below the 15 m line (FCS Consultants Ltd, 2013)

**Table 2.2: Expected water surface elevations with and without mitigation**

Storm Return Period	Post-development Water Surface Elevation: no mitigation	Post-development Water Surface Elevation: with mitigation (grading)
25 yr	17.04 m	14.234 m
50 yr	17.57 m	14.91 m
100 yr	18.08 m	15.48 m

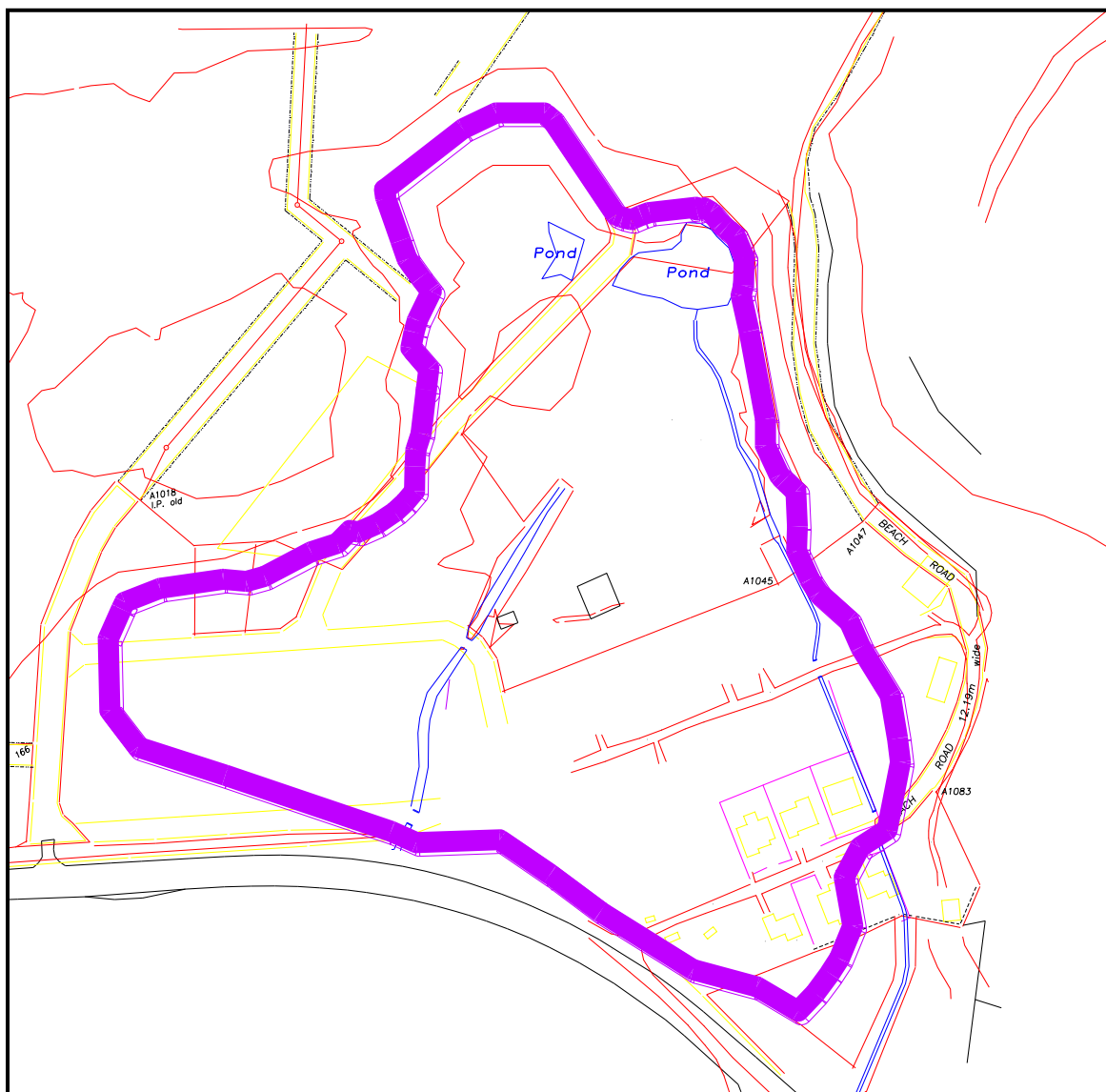


Figure 2.2b: Demarcation of post-development 100 year flood elevation with no mitigation (FCS Consultants Ltd, 2013)





Figure 2.2c: Demarcation of post-development 100 year flood elevation with mitigation (re-grading) (FCS Consultants Ltd, 2013)

### 3.0 RESPONSE TO NEPA COMMENTS

Captioned from NEPA:

“The National Environment and Planning Agency (NEPA) has reviewed the captioned Environmental Impact Assessment Report and hereby submit the following comments for your action.”

No	GENERAL COMMENTS
1	<p><b>NEPA Comments</b></p> <ul style="list-style-type: none"> <li>The EIA did not provide adequate detail about the Coral Spring/Mountain Spring Protected Area that adjoins the western boundary of the proposed development or the likely impact that the development may have on the protected area. The western boundary of the housing development is directly adjacent to the eastern boundary of the Coral Spring/Mountain Spring Protected Area and it is possible that there may be an encroachment on the protected area by the western section of the proposed housing development. The EIA should therefore seek to: <ul style="list-style-type: none"> <li>examine in greater detail the impact of the proposed housing project on the adjacent protected area, particularly in the context of issues such as the “Edge Vegetation Effect” of the proposed development on this sensitive area. Similarly, assessments including but limited to the following should be conducted: <ul style="list-style-type: none"> <li>the impact of the proposed project on the wildlife, specifically factors such as long-term noise pollution, light pollution and physical disturbance</li> <li>possible impact of chlorinated waste water on the ecologically important <i>salinas</i> and fresh water springs in the protected area via percolation. This infiltration may affect the <i>salinas</i> and the springs thereby affecting the ecosystem services that they provide.</li> </ul> </li> <li>identify practical measures to address this encroachment on the protected area. Measures such as the establishment of a buffer between the proposed development and the protected area may be considered.</li> </ul> </li> </ul>
2	<p><b>ESL Response</b></p> <p>All the published material and actual observations reveal that much of the protected area particularly in its eastern section is already highly degraded. It is not expected that the proposed development, including its own protected forested areas, will lead to further degradation of this part of the protected area. Furthermore it is to be noted that the western boundary of the project is bounded by a stone wall which separates it from the protected area. This stone wall has existed since at least British colonial</p>

3	NEPA Comments	<p>times when the project site was an agricultural estate. The development will not proceed beyond the stone wall.</p> <ul style="list-style-type: none"><li>A more detailed description of the climate of the area and the site's micro climate is required. Mean annual rainfall was presented for Trelawny, however it is not clear how relevant this information is for the site particularly as it regards the understanding of the hydrology of the wider landscape.</li></ul>
4	ESL Response	<p>Please note that there are no rainfall data for the project site and the Duncan's data collected about 2 miles from the project site, is considered highly typical for the area. This data has been used in all hydrological models (please see Drainage Reports of 2012 and 2013). To provide micro-climate data for each project site is an unreasonable expectation.</p>
FLORA FAUNA ASSESSMENT		
5	NEPA Comments	<ul style="list-style-type: none"><li>While a comprehensive biological survey appears to be evident based on the extensive species lists for various groups of flora and fauna provided, please note the following findings:<ul style="list-style-type: none"><li>There is no mention of rare or endangered species or the impacts of the development on these species e.g. the endangered Yellow-billed Parrot (<i>Amazona collaria</i>) or explanation of how this species utilizes the habitat (whether or not it lives there, in what numbers or whether or not it exploits the area for food)</li><li>The Plain Pigeon (<i>Patagioenas inornata</i>) is an extremely rare bird and is known to utilize the area however no mention was made of this species.</li></ul></li></ul>
6	ESL Response	<p>No rare or endangered species were encountered during the assessments. This is not to say that such species do not exist on the site but they were not seen nor were they listed among the literature in the area. Neither of the two bird species mentioned above were observed during the bird survey.</p>
7	NEPA Comment	<ul style="list-style-type: none"><li>No historical records of the avifauna were provided as the bird survey was only conducted during February. Bird counts were only done over a two day period in February which does not give an indication of bird abundance and distribution which varies throughout the year. More counts should have been done, preferable at intervals throughout the year. The same comment is applicable to the survey for the other fauna. (<i>Refer to Bird Count Methodology; page 25: 4.4.2</i>)</li></ul>
8	ESL Response	<p>The bird survey undertaken for Coral Springs indicates a similar avifauna to nearby development sites for which EIAs have been approved by NEPA. In such circumstances an EIA can only be expected to report on what is observed at the site or what may be markedly different from other sites. There is absolutely no indication that the Coral Springs site is any different from those already approved by NEPA.</p>



9	NEPA Comments	<p>d. The presence of "Rat bats" (<i>Chiroptera</i> sp.) along with the recognition of bat-occupied caves in the wider landscape (e.g., bat caves noted, p. 80 of the EIA for Florence Hall (2009); bat cave noted by residents of Coopers Pen) warranted the deployment of proper bat surveys to:</p> <ul style="list-style-type: none"> <li>• provide a list of species utilizing the site</li> <li>• notation on foraging guilds;</li> <li>• notation on each species' forest dependence;</li> <li>• notation on species' roost preferences;</li> <li>• map of species detection locations and Nocturnal Activity Index for each species.</li> </ul>
10	ESL Response	<p>More information is therefore required for this section</p> <p>Our response re the avifauna holds for the Bats as well. The observation of one Bat on the site cannot be justification for the conduct of an entire Bat survey. An EIA by its very nature is an assessment, not a scientific survey. If NEPA has Bat information relevant to the Coral Springs site ESL would gladly include it in its assessment.</p>
11	NEPA Comments	<ul style="list-style-type: none"> <li>• The EIA should include mitigation measures to reduce the possible long term impact of the development on plant species such as the creation of a nursery for the relocation of rare and endangered/endemic plants and animals.</li> </ul>
12	ESL Response	<p>The EIA spoke to tree flagging for preservation of large trees. Endemics should also be flagged and removed to the green areas that will remain undisturbed. GDL's experience with managing rare or endangered species is well established.</p>
13	NEPA Comments	<ul style="list-style-type: none"> <li>• The TOR requested the submission of a habitat map for the site which was not provided in the EIA submitted.</li> </ul>
14	ESL Response	<p>The Land Cover Map provided on page 35 shows the four main habitats at the site and serves the purpose of a habitat map for those familiar with the vegetation types.</p>
TRAFFIC CONCERNS		
15	NEPA Comments	<ul style="list-style-type: none"> <li>• Based on the document and plans submitted there is one entrance/exit to the adjacent North Coast Highway and it is located at the bottom of ("Spring Hill") to the east and not far from a high speed bend to the west. This should be assessed in light of the potential safety features which may be undermined and a revised egress and ingress considered. It is therefore recommended that the relevant discussions are had with the Local Parish Council and the National Works Agency.</li> </ul>

16	<b>ESL Response</b>	The NWA were contacted in the early planning and design stages of the project. A second proposed entrance/exit was deemed unacceptable from the NWA's point of view due to the line of sight. No other feasible option for ingress/egress exists. The best location has been chosen as per the plan.
<b>SEWAGE CONCERNS</b>		
17	<b>NEPA Comments</b>	<ul style="list-style-type: none"> <li>Based on the topography of the site particularly in those areas adjacent to the natural pond/sinkhole, the possibility of the flooding of the reed beds situated in this area is a concern. This possibility should therefore be further investigated and any measures to address same proposed. It is also recommended that the reed bed located adjacent to the highway be relocated away from existing dwelling homes.</li> </ul>
18	<b>ESL Response</b>	The Drainage Report and reed bed locations show clearly that even in a 100 year flood, the reed beds will not be inundated.
19	<b>NEPA Comments</b>	<ul style="list-style-type: none"> <li>The proposal to discharge all the treated sewage effluent into the existing sinkhole should be assessed in more detail and an alternative solution explored given the fact that 65% of the runoff from the site plus runoff from the Dry Valley sub-watershed will also be channeled into this sinkhole/pond.</li> </ul>
20	<b>ESL Response</b>	<ul style="list-style-type: none"> <li>The Drainage Report shows that the depression area as designed will have more than sufficient capacity to receive runoff and wastewater effluent. Furthermore the quality of the waste water will not be very different to the natural runoff. Disposal into the sinkhole is the only viable option for effluent runoff at this site.</li> </ul>
<b>CUMULATIVE IMPACTS/CONCERNS</b>		
21	<b>NEPA Comments</b>	<ul style="list-style-type: none"> <li>The EIA should examine in more details the cumulative impact of the Coral Spring Development on the Dry Valley sub watershed and the potential development of that area on the proposed project and vice versa. This is necessary as this area is directly linked to the proposed site by means of the sinkhole/pond.</li> </ul>
22	<b>ESL Response</b>	The Drainage Report has addressed the matter of total runoff from the adjoining watershed. It is impossible to evaluate what further development in the watershed may have on the overall drainage system. That exercise will have to be undertaken by any developer wishing to locate a new development in the watershed.
<b>MAJOR CONCERNS</b>		
23	<b>NEPA Comments</b>	<b>HYDROLOGY/FLOODING/DRAINAGE</b>

		<ul style="list-style-type: none"> <li>The proposed modification to mitigate flooding is to excavate hard brown clay above the standing water elevation and fill it with compacted gravel or crushed limestone then landscape and use as a park. This is projected to reduce flood levels by up to 0.78m. The EIA study however does not clearly indicate whether or not this would be sufficient to fully counteract the flooding problem. More clarification is therefore needed about this and the entire drainage and sewerage system to ensure that the existing residents will not be at a disadvantage as a consequence of the proposed drainage modifications.</li> </ul>
24	ESL Response	See Drainage Reports of 2012 and 2013.
25	NEPA Comments	<ul style="list-style-type: none"> <li>There is no mention of the effect of large scale vegetation clearance and the expected increase in runoff that this will result in particularly as it concerns the issue of flooding. The existing residents currently suffer from flooding after significant storm events and the increased run-off may have the possibility of exacerbating this problem. The report on page 56, under title 'Flooding', indicates that areas may remain flooded for weeks to months and that flood waters can reach onto the verandahs of existing residents adjacent to the sinkhole and remain for up to two (2) days. These are serious concerns and the EIA and related studies must demonstrate that the modifications to the site and the introduction of a development of this magnitude will not negatively impact the existing residents or exacerbate the prevailing conditions.</li> </ul>
26	ESL Response	<ul style="list-style-type: none"> <li>The Drainage reports cover these issues in detail, including present and projected flows. Phased clearance of vegetation is also included in the EIA as a mitigation measure to prevent large expanses of exposed surfaces.</li> </ul>
27	NEPA Comments	<ul style="list-style-type: none"> <li>The EIA should identify and provide an indication of previous examples where the proposals to modify the sinkhole/pond in the manner stated in the EIA has been done successfully.</li> </ul>
28	ESL Response	<ul style="list-style-type: none"> <li>Sinkhole modification to improve drainage is an established engineering practice. Typically in karst areas, the areas around sinkholes are often cut and filled to provide a buffer zone outside of the sinkhole rim. In some jurisdictions, e.g. Knox County in Tennessee, USA, and the regulatory authority has clear definitions for development in sinkholes areas; for instance grading is allowed around a sinkhole to improve at least the 100 year flood elevations. The practice is not widespread in Jamaica although in bauxite mined out areas as in Manchester, sinkholes have been opened up to improve drainage.</li> </ul>
29	NEPA Comments	<ul style="list-style-type: none"> <li>The Sinkhole Evaluation Report must examine in detail the hydraulic connectivity of the sinkhole at Coral Spring to the adjacent salinas, springs and wetlands within the Coral Spring/Mountain Spring Protected Area and other adjacent areas. A full understanding of the sub-surface geological network and the linkages between this sinkhole and the surrounding watershed is critical in understanding and assessing the proposed drainage solution for this site.</li> </ul>
30	ESL Response	<ul style="list-style-type: none"> <li>The evaluation of the hydraulic connectivity between the sinkhole and the adjacent salinas, springs and wetlands within Coral</li> </ul>



		<p>Springs is a considerable hydrogeological undertaking and based on cost and length of time GDL had to weigh the most important factors to make a decision. As such the sinkhole evaluation considered a plugged sinkhole scenario, i.e. zero outflow. The location of the sinkhole is critical as it is considered a base level sinkhole, meaning it is the only outlet sinkhole for a polje and is normally located in the epiphreatic zone. A polje is a large, flat-floored enclosed depression in karst terrains. At Coral Spring the area drained by the sinkhole includes the Dry Valley area. The springs in the area are largely ephemeral with the exception of the single un-named spring that flows constantly to the sinkhole. The ephemeral springs are due largely to percolating groundwater during heavy rains and an elevated groundwater table after persistent and heavy rains. Discussions with WRA also indicate the very unlikely connection between the Coral Spring sinkhole with the Salinas.</p>
31	NEPA Comments	<ul style="list-style-type: none"> <li>In assessing the drainage model which was done to predict the expected pre and post development flood levels, it was realized that though ground water was discussed as being present after rainfall periods, ground water and ground water upwelling was not considered in making the predictions for the 100 yr flood elevation levels. This omission is critical and must be considered in any predictions for this area especially with the existing Coral Spring Settlement which currently experiences flooding problems. This is also relevant for the location of infrastructure and some segments of the sewage system (reed beds) and the playing/football field.</li> </ul>
32	ESL Response	<ul style="list-style-type: none"> <li>Given the location of this base level sinkhole, groundwater up-welling is not considered a contributory element to the issues of flooding that have been experienced in the past. Note that the storm water settles due to the existing clay and silt that is plugging the sinkhole which eventually percolates to the free draining material. The settlement is not due to upwelling. The design engineer and Drainage Reports confirm that all infrastructures have been located outside of the 100yr flood elevations.</li> </ul>
33	NEPA Comments	<ul style="list-style-type: none"> <li>The drainage and sinkhole studies should also demonstrate that the removal of the clay layer to improve infiltration of storm water will not result in the upwelling of ground water during periods of heavy rainfall.</li> </ul>
34	ESL Response	<ul style="list-style-type: none"> <li>Upwelling of groundwater is not considered a causative factor for flooding at the location as there are no significant differential pressures to drive such upwelling. See also response above.</li> </ul>
35	NEPA Comments	<ul style="list-style-type: none"> <li>Based on information from residents of the existing Coral Spring Settlement, the areas surrounding the sinkhole including the existing homes have been impacted from flooding several times in the past nonetheless not much historical data/information was provided in the EIA regarding the historical flood records. This issue was also raised at the public presentation of the findings of the EIA.</li> </ul>
36	ESL Response	<ul style="list-style-type: none"> <li>Documentary evidence was sparse and only anecdotal information was recorded and presented in the sinkhole evaluation. The development proposed will increase run-off but the proposed modifications project that the new 100 year flood-level will</li> </ul>

37	NEPA Comments	<p>ensure that the lowest existing houses are not flooded. See Drainage Report 2013.</p> <ul style="list-style-type: none"> <li>The potential for flooding of the northern coastal highway in the vicinity of the proposed development from any blockage of the sinkhole or from ground water upwelling should also be examined.</li> </ul>
38	ESL Response	<ul style="list-style-type: none"> <li>Drainage of the development and adjacent watershed will not depend on the integrity of the sinkhole but on the entire improved drainage depression area. See Drainage Report 2013.</li> </ul>
ADDITIONAL COMMENTS		
39	NEPA Comments	<ul style="list-style-type: none"> <li>The EIA indicated that the existing Coral Spring Development is supplied by a spring and that NWC has confirmed potable water availability for this project. Confirmation is needed whether NWC or the spring will supply the water for the project.</li> </ul>
40	ESL Response	<ul style="list-style-type: none"> <li>NWC has confirmed supply of water from their system.</li> </ul>
41	NEPA Comments	<p><b>Impact of Sinkhole on Flooding</b></p> <ul style="list-style-type: none"> <li>The proposal to house a recreational area within the boundaries of the 100yr flood event or to have any recreational activities near the sinkhole should be reconsidered. There is also a contradiction between excavating the clay above the 13.3m contour and establishing a no construction zone below the 14m level. Clarity is required as this could have implications.</li> <li>The EIA should identify and explore additional ways and means for the retention and disposal of the storm water to mitigate the flood risk.</li> </ul>
42	ESL Response	<ul style="list-style-type: none"> <li>It is a well established practice to include open recreational areas as a part of a 100 year flood field and there are numerous examples in Jamaica. We anticipate that this will not be different for the Coral Springs development. See also 2013 Drainage Report.</li> </ul>
43	NEPA Comments	<p><b>Potential for Undisclosed Caves and Caverns</b></p> <ul style="list-style-type: none"> <li>In light of statements in the EIA about the possibility of the existence of cavernous rocks, a geophysical survey should be completed to complement the geotechnical study to confirm if there are indeed caverns and caves in the development area that could affect construction and pose a possible risk for collapse. This study should be done before any excavation works start on the sinkhole should an approval be granted.</li> </ul>
44	ESL Response	<ul style="list-style-type: none"> <li>Following two geotechnical surveys on the site, the geotechnical engineer (NHL Engineering Ltd) is of the opinion that while</li> </ul>

	<p>cavernous rocks may be possible, the bedrock is predominantly hard rock with very few if any cavities of concern. It is indicated that given the relative light weight of any structures that may be erected on the site (one to three storey buildings) that there are no major concerns. The suggestion is that construction practices should make allowance for filling and special foundation designs for the rare possibility of significant cavities found on the site during construction.</p>
<p><b>45 NEPA Comments</b></p>	<p><b>Contamination of Ground water by existing Sewage from Coral Spring</b></p> <ul style="list-style-type: none"> <li>• Clear plans should be shown as to how the developers intend to integrate the existing sewage systems into the proposed central sewage treatment system in order to bring the site in compliance with established standards. This is important based on the poor water quality results included in the EIA and the explanations given.</li> </ul>
<p><b>46 ESL Response</b></p>	<ul style="list-style-type: none"> <li>• To satisfy this request, the developer will provide a main and lift station so that existing residents whose lots are above the 100 year flood elevations, who wish to do so, may connect into the sewage system. The 100 yr flood elevation has been adjusted based on the further analysis that was required by NWA (FCS Consulting, 2013).</li> </ul>



## **REFERENCES**

ESL. 2012. Final Report: Environmental impact assessment for Coral Springs Residential Development.

FCS Consultants. 2012. Proposed Residential Development Coral Springs, Trelawny: Drainage design engineering report FCS # 1124/76/C.

FCS Consultants. 2013. Proposed Residential Development Coral Springs, Trelawny: Drainage design engineering report FCS # 1124/76/C Revision #1.

## APPENDIX 1 – NEPA COMMENTS ON EIA

Received by email dated 19 November 2012

### COMMENTS ON ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED HOUSING DEVELOPMENT AT CORAL SPRINGS TRELAWNY BY GORE DEVELOPMENTS LIMITED

The National Environment and Planning Agency (NEPA) has reviewed the captioned Environmental Impact Assessment Report and hereby submit the following comments for your action.

#### GENERAL COMMENTS

- The EIA did not provide adequate detail about the Coral Spring/Mountain Spring Protected Area that adjoins the western boundary of the proposed development or the likely impact that the development may have on the protected area. The western boundary of the housing development is directly adjacent to the eastern boundary of the Coral Spring/Mountain Spring Protected Area and it is possible that there may be an encroachment on the protected area by the western section of the proposed housing development. The EIA should therefore seek to:
  - examine in greater detail the impact of the proposed housing project on the adjacent protected area, particularly in the context of issues such as the “Edge Vegetation Effect” of the proposed development on this sensitive area. Similarly, assessments including but limited to the following should be conducted:
    - the impact of the proposed project on the wildlife, specifically factors such as long-term noise pollution, light pollution and physical disturbance
    - possible impact of chlorinated waste water on the ecologically important *salinas* and fresh water springs in the protected area via percolation. This infiltration may affect the *salinas* and the springs thereby affecting the ecosystem services that they provide.
  - identify practical measures to address this encroachment on the protected area. Measures such as the establishment of a buffer between the proposed development and the protected area may be considered.
- A more detailed description of the climate of the area and the site’s micro climate is required. Mean annual rainfall was presented for Trelawny, however it is not clear how relevant this information is for the site particularly as it regards the understanding of the hydrology of the wider landscape.

#### FLORA FAUNA ASSESSMENT

- While a comprehensive biological survey appears to be evident based on the extensive species lists for various groups of flora and fauna provided, please note the following findings:
  - c. There is no mention of rare or endangered species or the impacts of the development on these species e.g. the endangered Yellow-billed Parrot (*Amazona collaria*) or explanation of how this species utilizes the habitat (whether or not it lives there, in what numbers or whether or not it exploits the area for food)

- d. The Plain Pigeon (*Patagioenas inornata*) is an extremely rare bird and is known to utilize the area however no mention was made of this species.
  - e. No historical records of the avifauna were provided as the bird survey was only conducted during February. Bird counts were only done over a two day period in February which does not give an indication of bird abundance and distribution which varies throughout the year. More counts should have been done, preferable at intervals throughout the year. The same comment is applicable to the survey for the other fauna. (Refer to Bird Count Methodology; page 25: 4.4.2)
  - f. The presence of “Rat bats” (*Chiroptera* sp.) along with the recognition of bat-occupied caves in the wider landscape (e.g., bat caves noted, p. 80 of the EIA for Florence Hall (2009); bat cave noted by residents of Coopers Pen) warranted the deployment of proper bat surveys to:
    - provide a list of species utilizing the site
    - notation on foraging guilds;
    - notation on each species’ forest dependence;
    - notation on species’ roost preferences;
    - map of species detection locations and Nocturnal Activity Index for each species.More information is therefore required for this section
- The EIA should include mitigation measures to reduce the possible long term impact of the development on plant species such as the creation of a nursery for the relocation of rare and endangered/endemic plants and animals.
  - The TOR requested the submission of a habitat map for the site which was not provided in the EIA submitted.

## TRAFFIC CONCERNS

- Based on the document and plans submitted there is one entrance/exit to the adjacent North Coast Highway and it is located at the bottom of (“Spring Hill”) to the east and not far from a high speed bend to the west. This should be assessed in light of the potential safety features which may be undermined and a revised egress and ingress considered. It is therefore recommended that the relevant discussions are had with the Local Parish Council and the National Works Agency.

## SEWAGE CONCERNS

- Based on the topography of the site particularly in those areas adjacent to the natural pond/sinkhole, the possibility of the flooding of the reed beds situated in this area is a concern. This possibility should therefore be further investigated and any measures to address same proposed. It is also recommended that the reed bed located adjacent to the highway be relocated away from existing dwelling homes.
- The proposal to discharge all the treated sewage effluent into the existing sinkhole should be assessed in more detail and an alternative solution explored given the fact that 65% of the runoff from the site plus runoff from the Dry Valley sub-watershed will also be channelled into this sinkhole/pond.

## **CUMULATIVE IMPACTS/CONCERNS**

- The EIA should examine in more details the cumulative impact of the Coral Spring Development on the Dry Valley sub watershed and the potential development of that area on the proposed project and vice versa. This is necessary as this area is directly linked to the proposed site by means of the sinkhole/pond.

## **MAJOR CONCERNS**

### **HYDROLOGY/FLOODING/DRAINAGE**

- The proposed modification to mitigate flooding is to excavate hard brown clay above the standing water elevation and fill it with compacted gravel or crushed limestone then landscape and use as a park. This is projected to reduce flood levels by up to 0.78m. The EIA study however does not clearly indicate whether or not this would be sufficient to fully counteract the flooding problem. More clarification is therefore needed about this and the entire drainage and sewerage system to ensure that the existing residents will not be at a disadvantage as a consequence of the proposed drainage modifications.
- There is no mention of the effect of large scale vegetation clearance and the expected increase in runoff that this will result in particularly as it concerns the issue of flooding. The existing residents currently suffer from flooding after significant storm events and the increased run-off may have the possibility of exacerbating this problem. The report on page 56, under title 'Flooding', indicates that areas may remain flooded for weeks to months and that flood waters can reach onto the verandahs of existing residents adjacent to the sinkhole and remain for up to two (2) days. These are serious concerns and the EIA and related studies must demonstrate that the modifications to the site and the introduction of a development of this magnitude will not negatively impact the existing residents or exacerbate the prevailing conditions.
- The EIA should identify and provide an indication of previous examples where the proposals to modify the sinkhole/pond in the manner stated in the EIA has been done successfully.
- The Sinkhole Evaluation Report must examine in detail the hydraulic connectivity of the sinkhole at Coral Spring to the adjacent salinas, springs and wetlands within the Coral Spring/Mountain Spring Protected Area and other adjacent areas. A full understanding of the sub-surface geological network and the linkages between this sinkhole and the surrounding watershed is critical in understanding and assessing the proposed drainage solution for this site.
- In assessing the drainage model which was done to predict the expected pre and post development flood levels, it was realised that though ground water was discussed as being present after rainfall periods, ground water and ground water upwelling was not considered in making the predictions for the 100 yr flood elevation levels. This omission is critical and must be considered in any predictions for this area especially with the existing Coral Spring Settlement which currently experiences flooding problems. This is also relevant for the location of infrastructure and some segments of the sewage system (reed beds) and the playing/football field.
- The drainage and sinkhole studies should also demonstrate that the removal of the clay layer to improve infiltration of storm water will not result in the upwelling of ground water during periods of heavy rainfall.
- Based on information from residents of the existing Coral Spring Settlement, the areas surrounding the sinkhole including the existing homes have been impacted from flooding several times in the past nonetheless not much historical data/information was provided in the EIA regarding the historical flood records. This issue was also raised at the public presentation of the findings of the EIA.



- The potential for flooding of the northern coastal highway in the vicinity of the proposed development from any blockage of the sinkhole or from ground water upwelling should also be examined.

**Received by email dated 27 November 2012**

**ADDITIONAL COMMENTS ON EIA FOR CORAL SPRINGS HOUSING DEVELOPMENT -TRELAWNY**

**Potable Water Supply**

- The EIA indicated that the existing Coral Spring Development is supplied by a spring and that NWC has confirmed potable water availability for this project. Confirmation is needed whether NWC or the spring will supply the water for the project.

**Impact of Sinkhole on Flooding**

- The proposal to house a recreational area within the boundaries of the 100yr flood event or to have any recreational activities near the sinkhole should be reconsidered. There is also a contradiction between excavating the clay above the 13.3m contour and establishing a no construction zone below the 14m level. Clarity is required as this could have implications.
- The EIA should identify and explore additional ways and means for the retention and disposal of the storm water to mitigate the flood risk.

**Potential for Undisclosed Caves and Caverns**

- In light of statements in the EIA about the possibility of the existence of cavernous rocks, a geophysical survey should be completed to complement the geotechnical study to confirm if there are indeed caverns and caves in the development area that could affect construction and pose a possible risk for collapse. This study should be done before any excavation works start on the sinkhole should an approval be granted.
- 

**Contamination of Ground water by existing Sewage from Coral Spring**

- Clear plans should be shown as to how the developers intend to integrate the existing sewage systems into the proposed central sewage treatment system in order to bring the site in compliance with established standards. This is important based on the poor water quality results included in the EIA and the explanations given.

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**NATIONAL ENVIRONMENT & PLANNING AGENCY**

10 & 11 Caledonia Avenue, Kingston 5, Jamaica W.I. Tel: (876) 754-7540/3 Fax: (876) 754-7595-6 Tollfree: 1-888-991-5005  
E-mail: [ceo@nepa.gov.jm](mailto:ceo@nepa.gov.jm), Website: <http://www.nepa.gov.jm>

10 DEC 2012

Reference Number: 2012-07017-EP00101

5 December 2012

Mr. Christopher Gore  
Managing Director  
Gore Developments Limited  
2C Braemar Avenue  
Kingston 10

Dear Mr. Gore,

**Re: Environmental Permit Application for the Proposed Housing Development at Coral Spring, Trelawny**

Please be advised that the Environmental Impact Assessment submitted in support of the captioned application has been reviewed by the National Environment and Planning Agency (NEPA) and the reviewing agencies. Comments arising from the review have been sent to Environmental Solutions Limited and Gore Developments Limited via emails dated 28 November 2012 respectively. These comments have also been attached for ease of reference.

Several issues have been identified which will require further research and or clarification, however the main area of concern is the proposed solution to address the issue of drainage and the discharge of treated sewage effluent. The Agency requires more details on the proposal to modify an existing pond which drains into a major sinkhole. As proposed this sinkhole is slated to receive over 65% of the post development runoff and the entire discharge of treated sewage effluent generated from the sewage treatment plant. The sinkhole currently receives runoff from the Dry Valley Watershed and discharge from existing springs. In consideration of the amount of runoff to be channelled to the sinkhole, both current and proposed, this information is deemed important and the Agency requires that it be satisfactorily addressed. This is of particular importance in light of the potential flooding of the existing Coral Spring settlement and adjacent properties including the Coral Spring Protected Area and the Dry Valley Watershed.

Given the magnitude of the potential risks involved, the National Environment and Planning Agency is willing to facilitate a meeting with the key stakeholders to discuss the issues raised, the findings and the proposed solution. If you are interested please indicate in writing your request for same.

Your prompt response is anticipated and should you require any clarification or additional information please feel free to contact the undersigned at 754-7540 ext. 2162 or email [abedasse@nepa.gov.jm](mailto:abedasse@nepa.gov.jm) or Mr. Errol Morris at 754-7540 ext 2169 the Agency at 754-7540 or email [emorris@nepa.gov.jm](mailto:emorris@nepa.gov.jm).

Sincerely,  
National Environment & Planning Agency

*Aisha Bedasse*  
Aisha Bedasse  
Acting Manager, Applications Processing Branch  
for Chief Executive Officer/Government Town Planner

/em

Copied: Environmental Solutions Limited

Any reply or subsequent reference to this communication should be addressed to the Chief Executive Officer, to the attention of the officer dealing with the matter, and the reference quoted where applicable.

*Managing and protecting Jamaica's land, wood and water*