# STATES OF JERSEY

# INTEGRATED WASTE FACILITIES

## Jersey Energy from Waste Plant

Review of La Collette Site

**December 2005**

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|---|---|---|---|---|---|---|
| ISSUE NUMBER | 1 | | | | | |
| DATE | 09/12/2005 | | | | | |
| AUTHOR | MAP | | | | | |
| CHECKED | BJN | | | | | |

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## 1.0 Introduction

The States of Jersey proposes to construct a new Energy from Waste (EfW) Plant on the island. One of the sites being considered for the plant is at La Collette, St. Helier, Jersey. The proposed site is the La Collette phase II reclamation area to the south east of the existing Jersey Electricity Company La Collette Power Station.

Jacobs Babtie/Fichtner has been appointed as Technical Advisor to the States of Jersey. Part of this brief is to review the proposed La Collette site and report on the following issues:

- Attend site to familiarise and assess the suitability of the site for the construction of the EfW plant.
- Review of the geotechnical information provided to date and identify ground risks for the site.
- Review of civil, structural and architectural works and identify major cost implications specific to an EfW plant at the La Collette site.

Matthew Poole (Senior Civil Engineer) and Ali Koveily (Architect) of Jacobs Babtie visited the site on the 5th and 6th December 2005. The purpose of the visit was to view the site and meet with local planners, architect and client to discuss the project.

This review is limited to the information listed in Section 7.0 References. Many of the risks identified relate to ground conditions. To be able to quantify and categorise these risks further site ground investigation is required.

## 2. 0 Site Description

The site is located on the Jersey coastline directly to the east of the town of St Helier.

The site is a reasonably level area of reclaimed land from the coast and comprises imported fill behind a large rock fill embankment. The area proposed for the EfW plant is bordered to the north by the existing La Collette Power Station, to the west by an Oil Storage plant and the Connex bus depot. To the east and south is the shoreline. The site of the plant is being temporarily used as a Green Waste Reception area by the States of Jersey.

## 3.0 Basic Site Considerations for the Proposed EfW Plant

### 3.1 Site Topography

The site is reasonably level and is considered suitable for the proposed plant. There is a raised ash mound to the east of the site that should be avoided. It is proposed that the Ash Mound is maintained to provide some screening to the plant.

### 3.2 Plan Area

Based on the Proposed Outline Layout plan (ref 2) it is considered the site is of sufficient area to accommodate the EfW plant and ancillaries.

### 3.3 Lay-Down Area

The site has adequate area for construction phase lay down, although some of the existing operations such as the Green Waste Reception would have to be relocated. Refer fig 1 Appendix A.

### 3.4 Obstructions

There are no overhead obstructions to the proposed plant. There are underground buried cooling water culverts running from the existing power station condensers to the sea. The culverts run directly underneath the proposed footprint of the EfW plant.

### 3.5 Site Access

Access to the site is via existing roads to the reclamation area. The site is close to St Helier port, as most of the materials are to be imported to the island this is considered an advantage, although no assessment of the Port capacity has been made at this stage. It should be noted that there is a headroom and width restriction to the site at the overhead pipe crossing from the Oil Storage plant to the Power Station. Refer to fig 2 appendix A.

## 4.0 Geotechnical Review

Babtie/Fichtner JV has reviewed the information provided by the client listed in section 7.0.

### 4.1 Site History

The area is reclaimed land from the coast and comprises fill behind a large rockfill embankment. The fill is derived from inert material and includes excavated natural soils and rocks as well as building waste such as concrete, brick etc. The fill was tipped directly into the base of the site below high tide level. Subsequently, inundation occurred with the rising tide aiding consolidation of the material. There is no reference to specific grading of material or of any mechanical compaction being undertaken below inundation level or above inundation level.

### 4.2 Geology of the site

The made ground forming the reclaimed area reportedly overlies beach deposits although these deposits were not encountered during the ground investigation undertaken to date. The underlying bedrock comprises typically igneous rock of granite type with diorite occurring locally. Dykes of dolerite and lamprophyre occur in the dolerite and are prone to differential weathering compared with the harder granite mass.

### 4.3 Ground Investigation September 2005

Six rotary percussive boreholes (open holes) have been carried out on the site of the proposed new plant in September 2005. Four of the boreholes appear to be located in the proposed main plant area and two in the waste storage/shredding area. The ground level at each of the boreholes lies in the range 8.60 to 8.87m AOD compared with an indicated finished ground level of 10.0m AOD. The depth of the boreholes was between 3.0m and 7.0m and five boreholes were extended 1m into the underlying rock (BH 5 had a depth of 6m but did not prove the base of the fill). Due of the method of drilling no sampling or in situ testing was undertaken.

No water was encountered during drilling although standpipe piezometers were installed in three boreholes for subsequent monitoring. These indicate that groundwater level varies and is potentially influenced by the tidal cycle.

### 4.4 Comments on the Ground Investigation Information

The ground investigation provides depths to rockhead (and rock type) and information on groundwater conditions. Depth to rockhead appears to increase towards the north. There is no information on the nature of the made ground, the presence or otherwise of beach deposits or of the nature of the rock, in particular close to rockhead.

It is anticipated that the majority of foundations will require piling to rock, although the depth of the foundations relative to rockhead, and groundwater and the thickness of fill below foundation level will be of significance in determining the optimum foundation solution. It is possible that lightly loaded foundations and/or foundations that can tolerate potentially large total and differential settlements can be placed on or in the fill.

### 4.5 Recommended Further Ground Investigation Work

Further ground investigation is considered necessary to provide information for the following purposes and to understand the ground risks:

- Cable percussion boreholes to permit sampling (for laboratory testing) and in situ testing in the fill and prove rock to provide properties for the fill foundations and excavations.
- Extension of a number of the borings using rotary coring methods to obtain detailed information of the nature of the rock particularly close to rockhead.
- Trial pits to provide additional information regarding the nature of the fill.
- Groundwater monitoring.
- In situ testing for pavement design (e.g. CBR testing).
- If there is no evidence of control of the materials placed in the fill there may also be a need for contamination testing of the fill.

## 5.0 Civil, Structural and Architectural Risk Items

### 5.1 Ground Risks

The following items are considered to be risk items with possible cost implications relating to the ground conditions at the La Collette site:

- Unknown nature of the fill to the site.
- Unknown presence and nature of beach deposits.
- Incomplete rock head profile.
- Groundwater levels appear to vary between 2 and 5m AOD responding to the tide but in one hole appears to be consistent at 4m AoD through the tidal cycle. Some dewatering of excavations may be required. Underground basements and pits will need to be designed as water retaining.

### 5.2 Engineering Risks

The following engineering items are considered to be risk items with possible cost implications:

- Piling – the type, length and number of piles to be installed cannot be determined at this stage without further site investigation.
- Cooling Water Culverts. There are underground buried cooling water culverts running from the existing power station condensers to the sea. The culverts lie under the position of the proposed plant. The culverts are reinforced pre-cast concrete in construction. The culverts have 2 cells; each cell is approximately 2m high x 2m wide. The as-built details, load capacity, position and depth of the culverts should be confirmed to ensure that construction activities do not damage the culverts and that detailed design of the EfW incorporates them.
- Deep Excavations should be avoided where possible due to the rockhead levels close to the surface and the high costs of breaking out rock. Dewatering of excavations is also likely to be required.
- Ash Mound (Refer to fig 3 Appendix A). The mound is situated to the east of the power station and is approximately 5m high. The plant footprint should be fixed to avoid this area. Deep excavations could undermine the ash mound. The ash mound contains contaminated material.
- It is proposed to share some of the existing infrastructure and capacity at the adjacent La Collette Power Station including the stack, transformer, Turbine Generator table and Cooling Water system. This will have a significant impact on costs as a saving. These are major items of

plant and as such confirmation of their use should be confirmed as soon as possible to allow accurate costs to be established.

- The building superstructure and heavier items of plant are likely to be piled. Ground slabs may be ground bearing or suspended depending on the capacity of the underlying fill to the site. Suspended slabs are far more expensive to construct as they are piled with supporting ground beams.

- The plant will be located approximately 25m from the sea. The building will be situated in an aggressive marine environment, and maybe subjected to occasional saline spray from the sea during storms. The cladding system for the plant will need to be appropriate for this saline environment and the building use. Suitable cladding systems are manufactured from stainless steel and coated aluminium. Cladding systems of this specification are typically 25% - 30% more expensive than standard cladding systems used.

- Concrete used for buried structures such as foundations and bunkers would need to be constructed from a higher grade of concrete than normally required due to the aggressive saline ground conditions.

- Wind loading for structural design will be higher than for an inland site due to the exposed coastal position of the La Collette site. This will result in a slight increase in steelwork and concrete quantities.

For a summary of the risks and their levels refer to the Risk Register in Appendix B. The risks are potential costs or saving that can be reasonably expected specific to La Collette site when compared to building a similar EfW plant on a clear green field site.

### 5.3 Recommended Further Investigation Works.

It is recommended in addition to the ground investigation (section 4.5) that the following site surveys are carried out to establish where any obstructions are and to allow accurate positioning of the plant during the design stage.

- Detailed topographical survey of the site, including a full survey of the ash mound area.
- Survey of the existing sea water culverts.
- Survey of services in the site area.

## 6.0 Conclusion

A number of risks relative to the proposed EfW at the La Collette site have been identified. Some of the risks are clearly identifiable; others relating to ground conditions are difficult to define without further investigation. Adequate site investigation and sampling to assess these risks has not yet been completed.

Measures should be taken to accurately establish if the risk exists or can be reduced to an acceptable level to ensure that costs for the project are identified early and controlled. As such it is recommended that further site investigation is undertaken prior to the tender stage of the project.

## 7.0 References

The following documents were issued to Jacobs Babtie by Fichtner on 17th November 2005. The review has been based on this information and the site visit.

Drawings

1. 725 – 006 rev A2 La Collette Jersey, Proposed Outline Elevations
2. 725 – 006 rev A2 La Collette Jersey, Proposed Outline Plan
3. 10180/100 La Collette Site Boundaries and Borehole Positions

Documents

4. 2005 Borehole Records La Collette Proposed EfW Plant
5. Proposed Energy from Waste Plant St Helier, Jersey Preliminary Ground Investigation Report No 0852, Oct 2005
6. La Collette Site Service Records

Site Photographs

7. 2003 Aerial Site Photographs
8. 1974 Aerial Photographs.
9. Reclamation Phase II photographs 1995.

**Appendix A**

**Photographs**

Fig 1 – La Collette Green Waste Reception Area

Fig 2 Pipe Bridge at the entrance to site.

Fig 3 View on La Collette with Ash mound to the left of the stack.


Fig 4 View on south elevation of La Collette Power Station

Fig 5 View across the La Collette reclamation area.

Fig 6 View on La Collette from St Clement side.

**Appendix B**

**Risk Register**