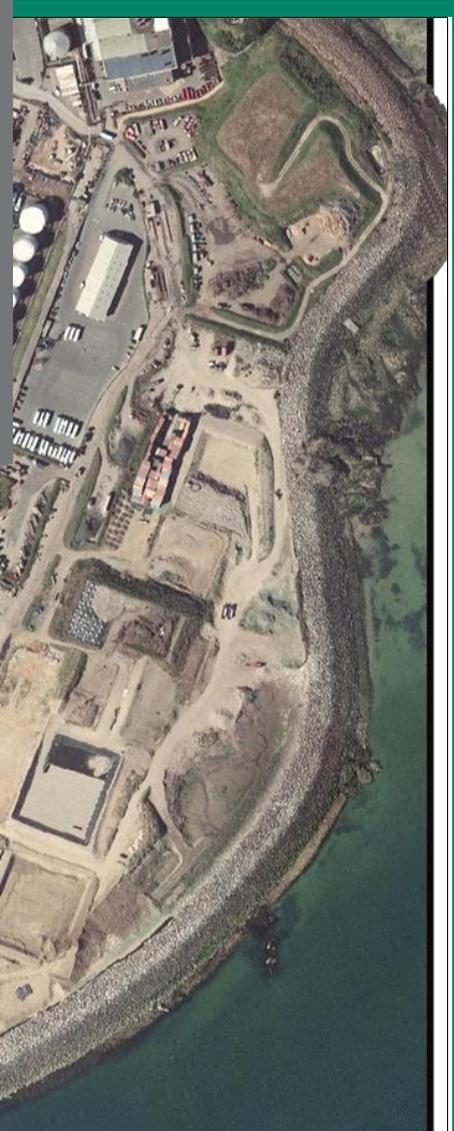


Planning, Environment & Design

States of Jersey Transport and Technical Services La Collette Waste Management Facility

Operational Water Quality Monitoring Plan

November 2011



CAPITA SYMONDS

Quality Management

Job No	CS/049696	Doc No.	CS049696-07-01 Monitoring Plan
Project	La Collette Waste Management Facility – Operational Water Quality Monitoring Plan		
Location	La Collette Waste Management Facility, St. Helier, Jersey		
Document Ref	Version 1 FINAL		
File reference	F:\ZENV\Projects\CS049696 La Collette Headland Stage 3\B.Work_Tasks\03 WATER QUALITY\04_Reports\Operational Water Quality Monitoring Plan\La Collette_Operational Water Quality monitoring plan_FINAL.doc		
Date	30 November 2011		
Prepared by	Claire Howarth Principal Hydrogeologist	Signature (for file)	
Checked by	Dr. Rob Hares Associate Director	Signature (for file)	
Authorised by	David Mason Associate Director	Signature (for file)	

Contents	1. Introduction	1
	1.1 Background	1
	1.2 Scope of Report	1
	1.3 Disclaimer	2
	2. Water Quality Determinands & Laboratory Analysis	3
	2.1 In-Situ Water Quality Parameters	3
	2.2 Laboratory Water Quality Determinands & Detection Limits	3
	3. Monitoring Locations	5
	4. Sampling Methodology	8
	4.1 Introduction	8
	4.2 Ash Cells	8
	4.3 Groundwater	8
	4.4 Waste Springs & Sea Water	9
	4.5 Quality Assurance	10
	5. Data Review and Reporting	11
5.1 Data Review	11	
5.2 Reporting	13	

Figures	Figure 1	Operational Monitoring Locations.	
----------------	----------	-----------------------------------	--

Tables	Table 2.1	Laboratory analysis summary.	4
	Table 3.1	Ash cell leachate monitoring locations	5
	Table 3.2	Groundwater monitoring locations	6
	Table 3.3	Waste spring monitoring locations	6
	Table 3.4	Sea water monitoring locations	7
	Table 5.1	La Collette water quality standards	12

Appendices	Appendix A	Figures	
-------------------	------------	---------	--

	Figure 1	Operational Monitoring Locations	
--	----------	----------------------------------	--

1. Introduction

1.1 BACKGROUND

- 1.1.1 The La Collette Waste Management Facility (hereafter referred to as the 'WMF', the boundary of which is shown in Figure 1) currently operates under a deemed waste management licence. Since 1995 the WMF has received a mixed waste stream¹ with inert materials deposited behind the sea wall up to a level between the Mean High Water Spring (MHWS) level (approximately 10.96 m ACD²) and the top of the sea wall (14 – 15 m ACD), and ash placed in lined cells above the spring line.
- 1.1.2 Since 2003 an aggregate recycling facility has been incorporated into the inert process, removing suitable granular material as secondary aggregate product for construction re-use and some metals inclusions for scrap recovery from the waste stream prior to disposal. Other activities on-site include green waste composting, the temporary processing of bio-remediated soils and storage of street sweepings on top of lined cells.
- 1.1.3 To gather scientific evidence on baseline water quality (in support of planning / waste management licence applications), and to ascertain if there are any significant impacts of WMF operations on water quality within the adjacent South East Jersey Coast Ramsar area, monthly sampling at 42 locations (18 ash cells, 7 boreholes, 5 springs issuing from inert waste material underlying the ash cells, and 12 low tide seawater locations within the Ramsar beyond the sea wall) were undertaken between March and August 2011.
- 1.1.4 In addition to in-situ water quality parameter testing, laboratory analysis was undertaken on each sample for up to 75 chemicals (including heavy metals, nutrients, and organic hydrocarbons), chosen as representative of potential contaminants that may be associated with historic or current activities at the WMF and surrounding area.
- 1.1.5 The results of the baseline water quality characterisation survey are reported in *La Collette Waste Management Facility. Baseline Water Quality Review* (Capita Symonds, November 2011), and are considered to represent an effective spring / summer dataset, sufficient to rationalise (in terms of sampling locations and determinand analysis) future monitoring requirements during the WMF's operational period. Baseline results also provide data for comparison to new monitoring information gathered in the future.

1.2 SCOPE OF REPORT

- 1.2.1 The purpose of this report is to outline the proposed operational water quality monitoring plan for La Collette WMF (to be implemented by Transport and Technical Services (TTS) department personnel or other designated parties as appropriate). This document is a stand-alone report that will be used to inform any subsequent Waste Management Licence or planning application.

¹ 5-8% ash (assumed to be municipal solid waste incinerator residues), 91% inert (including gypsum plasterboard), and 1-3% glass.

² Admiralty Chart Datum

- 1.2.2 This plan is intended to be a live document, reviewed on an annual basis and updated / amended as appropriate (informed by the results of ongoing water quality monitoring and sampling practicalities).
- 1.2.3 Section 2 outlines water quality determinands and in-situ parameters to be monitored, during operations. Section 3 details monitoring locations to be sampled, whilst Section 4 provides information on sampling methodology and quality assurance procedures. Review of monitoring data, and details of reporting, are finally outlined in Section 5.
- 1.3 DISCLAIMER
 - 1.3.1 This report is for the use of States of Jersey Transport and Technical Services Department only and should not be relied upon by other parties unless advised by Capita Symonds Ltd in writing.

2. Water Quality Determinands & Laboratory Analysis

2.1 IN-SITU WATER QUALITY PARAMETERS

2.1.1 At the time of sample collection, the following in-situ water quality parameters will be recorded:

- pH (unitless).
- Temperature (degrees centigrade).
- Redox (mV).
- Electrical Conductivity ($\mu\text{S}/\text{cm}$).
- Dissolved Oxygen (% and mg/l).
- Salinity (unitless).
- Total Dissolved Solids (mg/l)

2.2 LABORATORY WATER QUALITY DETERMINANDS & DETECTION LIMITS

2.2.1 Water quality samples collected during operational monitoring will be tested for a selection of laboratory determinands. Details of determinands, testing frequency and laboratory detection limit requirements³ are outlined in Table 2.1 below.

2.2.2 Depending upon initial salinity measurements of water samples submitted, the analytical laboratory may determine that some waters may need to be analysed as saline (whilst others are analysed as non-saline).

³ Defined as being the same as baseline water quality detection limits and less than the respective water quality standard applied for screening purposes (see Section 5 for discussion).

Table 2.1: Laboratory Analysis Summary

Suite	Determinands	Measurement Units	Detection Limit	Analytical Frequency
Inorganics	Nitrate	mg/l	0.3	3 monthly
	Ammoniacal-N	mg/l	0.021 ⁴	
	Chemical Oxygen Demand	mg/l	7	
	Total Suspended Solids	mg/l	2	
	Total Dissolved Solids	mg/l	5	
	Chloride	mg/l	2	
	Sulphate	mg/l	2	
	pH	pH units	1	
Metals	Arsenic	µg/l	0.1	3 monthly
	Cadmium	µg/l	0.1	
	Chromium	µg/l	0.2	
	Copper	µg/l	0.9	
	Iron (total)	mg/l	0.02	
	Manganese	mg/l	0.04	
	Lead	µg/l	0.02	
	Mercury	µg/l	0.01	
	Nickel	µg/l	0.15	
	Vanadium	µg/l	0.2	
	Zinc	µg/l	0.4	
Organics	Total Petroleum Hydrocarbons (TPH) - speciated	µg/l	10	6 monthly
	Polyaromatic Hydrocarbons (PAH) - speciated	µg/l	0.1	

⁴ Note: Baseline detection limit was 0.2 mg/l which is higher than the water quality standard of 0.021 mg/l. As such the water quality standard as the preferred detection limit is recorded.

3. Monitoring Locations

3.1.1 Proposed operational sampling locations (providing locations can be accessed safely) are shown on Figure 1. These comprise focused sampling from:

- Ash cells (both within Northern Mound and in southern working area).
- Groundwater monitoring wells (monitored as a pathway).
- Springs issuing from the inert waste underlying the ash cells (representing a snapshot of the wider influence of the waste on water quality, in contrast to the point location nature of the boreholes).
- Low tide sea water samples.

3.1.2 Tables 3.1 to 3.4 below provide details of each sampling location and justification for incorporation into the operational monitoring plan.

Table 3.1: Ash Cell Leachate Monitoring Locations

Monitoring Point Reference	Ash Cell No.	Ash Cell Level	Justification for Inclusion
DT3	3	Low	Historic ash cell in east of Northern Mound
DT6	6	Low	Historic ash cell in Northern Mound. Elevated Ammoniacal-N, metals, some PAH noted during baseline monitoring.
DT16S	16	Low	Elevated As, Ni, Ammoniacal-N & PAH noted during baseline monitoring.
DT22	22	Low	Ramsar proximity & elevated Ammoniacal-N / metals noted during baseline monitoring.
DT25S	25	Low	Ramsar proximity & elevated Ammoniacal-N, metals, phenols & some PAHs noted during baseline monitoring.
DT27N	27	Low	Ramsar proximity & elevated Ammoniacal-N, metals, phenols & some PAHs noted during baseline monitoring.
DT31N	31	Mid	Elevated metals, phenols & some PAHs noted during baseline monitoring period.
DT32N	32	Low	Proximity to edge of site

Table 3.2: Groundwater Monitoring Locations

Monitoring Point Reference	Depth (m bgl)	Installation details	Geology	Justification for Inclusion
BH2R	11.5	20 mm piezometer. Tip: 11.5m bgl Filter pack: 9 - 11.7m bgl	Waste	Proximity to edge of site.
BH3s	9.5	20 mm piezometer. Tip: 9.5m bgl Filter pack: 1.2-9.5m bgl	Waste	Proximity to Ramsar, and downgradient from Ash Cells 24 and 31.
BH3d	12.85	20 mm piezometer. Tip: 12.85m bgl Filter pack: 10.5 - 13.9m bgl	Natural channel deposits	
BH5	7.0	50 mm well. Screen: 5 - 7m bgl	Waste	North East corner of site, plus elevated metals & PAHs noted during baseline monitoring.
BH6 (20mm)	9.35	20mm piezometer. Tip: 9.35m bgl Filter pack: 8.7 - 10.56m bgl	Waste	Elevated levels of PAHs noted during baseline monitoring.
BH6 (50mm)	7.7	50 mm well. Screen: 5.7 – 7.7m bgl	Waste	
BH7	8.0	50 mm well. Screen: 1 – 8m bgl	Waste	Proximity to green composting area and new ash cells.

Table 3.3: Waste Spring Monitoring Locations

Monitoring Point Reference	Justification for Inclusion
LAG3	Input to Western Lagoon and elevated concentrations noted during baseline monitoring period.
LAG4	Input to Western Lagoon, and proximity to green composting and aggregate recycling areas, if safe to access given extending waste head and depth of mud in area.
LAG5	Input to Eastern Lagoon.

Table 3.4: Sea Water Monitoring Locations

Monitoring Point Reference	Justification for Inclusion
SW1	Local natural baseline monitoring point.
SW2	South west of LAG3.
SW8	South East of BH2R.
SW12	East of LAG5.
SW14	South east of BH5.
EFWSW16	Energy from Waste plant outfall.
SW18	South east of Northern Mound.
SW20	East of Northern Mound.

- 3.1.3 As further monitoring data is collected, or additional boreholes drilled for engineering design purposes, there may be a requirement for additional sampling locations to be added (or the exclusion of initial locations selected for operational monitoring). As such the definition of monitoring locations should be reviewed on a regular basis (as a minimum annually).

4. Sampling Methodology

4.1 INTRODUCTION

4.1.1 Methodologies for the sampling of ash cell leachate, groundwater, waste springs and sea water are outlined below. Due to health and safety / practical consideration at the time of monitoring, such methodologies may have to be amended on-site. Any amendments should be recorded as part of any monitoring field notes taken by TTS monitoring personnel.

4.1.2 Water samples will be collected on a quarterly basis, with laboratory analysis for inorganics and metals undertaken quarterly (and organic hydrocarbons six monthly).

4.2 ASH CELLS

4.2.1 Given the ash cells (and hence the dip tubes) are located above the water table, and as such disconnected from the tidal cycle, the timing of sampling is not considered to be critical and purging of stagnant water is not required. As such the following tasks should be undertaken:

1. Take water level reading in dip tube, recording data in metres below top of dip tube together with approximate time of sampling.
2. Connect retrieval cord to disposable bailer and place down dip tube and allow to fill.
3. Withdraw bailer from dip tube and pour leachate sample into a dedicated bucket and measure and record in-situ water quality parameters.
4. Place the bailer back down the dip tube, repeatedly filling and withdrawing it in order to fill the sample bottles, ensuring that sample does not over-spill, that any preservatives that may be present within the bottles are not emptied and that as much air as possible is excluded from the sample.
5. Label bottle with site name, monitoring point reference and sample date.
6. Rinse in-situ water quality probes with de-ionised water.
7. Store sample at 4 °C, and dispatch to laboratory (with completed chain of custody forms) within 24 hours of sampling.

4.3 GROUNDWATER

4.3.1 Given that the site is effectively purged during every tidal cycle, and as such the likelihood of a borehole containing stagnant water of a quality not representative of the surrounding environment is low, it was established⁵ that a 20 minute purge time is sufficient to allow in-situ water quality parameters to stabilize prior to collecting a groundwater sample.

4.3.2 To ensure sufficient water was available groundwater samples should be collected on the declining high tide and the following tasks undertaken.

1. Take a water level reading in monitoring well, recording data in metres below top of casing together with approximate time of sampling.

⁵ For discussion see *La Collette Waste Management Facility: Baseline Water Quality Review* (Capita Symonds, November 2011).

2. Connect dedicated tubing to pump and place down monitoring well. Place opposite end of tubing into bucket. Pump for 20 minutes, recording volume of groundwater abstracted and in-situ water quality parameters at 5start and end of purging.
3. Place tubing in empty sample bottle (ensuring any preservatives that may be present within the bottles are not emptied), or alternatively via a funnel / filter paper into bottle if laboratory have directed for samples to be filtered on-site.
4. Pump groundwater sample into bottles, ensuring that sample does not over-spill and that as much air as possible is excluded from the sample.
5. Label bottle with site name, monitoring point reference and sample date.
6. Detach and remove tubing (disposing together with nitrile gloves in strong bin liners at a suitable disposal point to prevent cross-contamination of samples between monitoring points).
7. Rinse in-situ water quality probes with de-ionised water over bucket, and dispose of bucket contents to ground within the WMF or foul sewer. No abstracted groundwater should be disposed to either sea water or lagoons within the site.
8. Store sample at 4 °C, and dispatch to laboratory (with completed chain of custody forms) within 24 hours of sampling.

4.4 WASTE SPRINGS & SEA WATER

4.4.1 Given the tidal nature of the site, surface water samples (including springs issuing from the inert waste (LAG) and sea water beyond the sea wall (SW)) should be collected at low tide or on a falling tide if access at low tide is not possible or unsafe. Not only is this for health and safety reasons, but also to capture waters at the final time of exit from the Site with the least amount of potential dilution. As such the following tasks should be undertaken:

1. Secure a soil sampling pot (or other vessel of similar size) to a length of rope.
2. Hold the pot under the waste spring, or sea water issuing from the sea wall, whilst holding on to the end of the rope. Draw out a sample of surface water.
3. Measure and record in-situ water quality parameters, together with time of sampling.
4. Pour sample into empty bottle (ensuring any preservatives that may be present within the bottles are not emptied), or alternatively via a funnel / filter paper into bottle if laboratory have directed for samples to be filtered on-site.
5. Ensure that sample does not over-spill and that as much air as possible is excluded from the filled bottle.
6. Label bottle with site name, monitoring point reference and sample date.
7. Return any excess sampled water to lagoons / sea water as appropriate. Rinse sampling vessel and in-situ water quality probes with de-ionised water to prevent cross-contamination between monitoring points.
8. Store sample at 4 °C, and dispatch to laboratory (with completed chain of custody forms) within 24 hours of sampling.

4.5 QUALITY ASSURANCE

- 4.5.1 For quality assurance (QA) purposes duplicate⁶ and blank samples (containing mineral water, labeled as QA2) should be sent to the appointed laboratory for analysis on an annual basis. Sample duplicates are used to quantify any errors that may arise from random variations in the sampling and analytical process. Blank samples are used to detect any systematic and random gains over an entire analytical suite during the course of the laboratory analysis process.
- 4.5.2 Comparison of analytical results for the duplicate and blank samples should be made. If results are within appropriate statistical limits of each other, sampling protocols and laboratory analysis may be deemed to be being undertaken appropriately.
- 4.5.3 If significant differences in either duplicate or blank samples are noted, the collection and processing of QA samples should be undertaken during the subsequent monitoring round. This information should then be reviewed to ascertain whether previous analysis was an isolated incident or indicative of a trend in sampling / analysis that may require review.

⁶ Two samples taken from the same monitoring point at the same time, but with one sample labelled as QA1.

5. Data Review and Reporting

5.1 DATA REVIEW

- 5.1.1 In-situ water quality monitoring results and laboratory analytical results for each monitoring round will be incorporated into the La Collette WMF water quality spreadsheets (building upon those developed during the baseline water quality monitoring period).
- 5.1.2 Recorded Ammoniacal Nitrogen concentrations should be converted to 'Unionised Ammonium' concentrations - calculated from measured Ammoniacal-N concentration (mg/l) multiplied by molecular weight ratio of $\text{NH}_3:\text{N}$ (17/14) for comparison to the appropriate water quality standard.
- 5.1.3 Quarterly data should be briefly reviewed as follows:
- Against previous water quality monitoring data for the sample location point to identify any potential trends or significant changes from previous monitoring rounds.
 - Against natural baseline water quality results recorded at SW1.
 - Compare average concentrations against defined water quality standards (see paragraph 5.1.7 below).
- 5.1.4 If a significant change in water quality concentrations, when compared to historic information for a monitoring point, is noted then such results should be initially checked with the laboratory for any quality assurance issues (e.g. typographic or analytical errors).
- 5.1.5 If the results are considered to be correct, then depending upon the monitoring location and the scale of increase it may be considered appropriate to repeat the sampling of that location within a month of the original sampling.
- 5.1.6 If the increase or monitoring location are not considered to be significant (at that time), then monitoring will continue quarterly with careful attention paid to subsequent analytical results to identify any change in significance.
- 5.1.7 It is proposed that quarterly rolling averages of baseline / operational monitoring data be reviewed against baseline monitoring data, and water quality standards detailed in Table 5.1. At the receptor monitoring points (i.e. seawater sampling locations) water quality standards may be applied as screening criteria. Elsewhere (e.g. waste springs and groundwater) comparison to water quality standards is used for guidance only, continually informing our knowledge of WMF water quality and interactions with the wider water environment beyond.

Table 5.1: La Collette Water Quality Standards

Determinand	Units	Quality Standard ^a
Inorganic contaminants		
SO ₄	mg/l	250 ^b
Cl	mg/l	250 ^b
Nitrate as NO ₃	mg/l	50 ^b
un-ionised Ammonia (NH ₃ -N)	mg/l	0.021
Metals		
As	µg/l	25 (AA)
Cd	µg/l	2.5 (AA)
Cr	µg/l	15 (AA)
Cu	µg/l	5 (AA)
Fe	mg/l	1 (AA)
Hg	µg/l	0.3 (AA)
Mn	mg/l	0.5 ^c
Ni	µg/l	30 (AA)
Pb	µg/l	25 (AA)
Zn	µg/l	40 (AA)
Organic hydrocarbons		
Benzene	µg/l	30 (AA) 300 (MAC)
Toluene	µg/l	40 (AA) 400 (MAC)
Ethylbenzene	µg/l	30
Xylene	µg/l	30 (AA) 300 (MAC)
Mineral oils	µg/l	600 ^d
Phenol	µg/l	30
Napthalene	µg/l	5 (AA) 200 (MAC)
Benzo-a-pyrene	µg/l	0.03
Anthracene	µg/l	0.02
PAH (sum of 4 individual species) ^e	µg/l	0.1 ^b

^a UK Environmental Quality Standards (marine) unless stated otherwise: AA = annual average; MAC = maximum admissible concentration

^b UK Drinking Water Standard

^c WHO drinking water standard

^d Groundwater intervention value. Annex A of 2009 Soil Remediation Circular: *Target values, soil remediation intervention values and indicative levels for serious contamination.*

^e Sum of Benzo-b-fluoranthene, Benzo-k-fluoranthene, Benzo-ghi-perylene, and Indeno-123cd-pyrene

5.2 REPORTING

- 5.2.1 Spreadsheets of in-situ water quality readings and laboratory analytical results, updated after each monitoring round, will be forwarded to the Environmental Protection department quarterly, with a short data review report submitted on a six monthly basis. A more detailed annual review of operational monitoring data, in comparison to the results reported during the baseline water quality monitoring survey, will be compiled and submitted to Environmental Protection.
- 5.2.2 In addition an annual review of the operational monitoring plan will be undertaken, in the context of the results of water quality monitoring during the course of the year, and amended (e.g. to incorporate additional monitoring points, vary the determinand list) as appropriate.

Appendix A Figures

Capita Symonds Ltd

Capita Symonds House
Wood Street
East Grinstead
West Sussex RH19 1UU

Tel +44 (0)1342 327161
Fax +44 (0)1342 315 927

www.capitasymonds.com



Legend

- La Collette waste management licence boundary
- Ash Cell
- Screened borehole (groundwater sampling point)
- Low tide surface water sampling point (if safe to sample at this location, and obvious water discharge to be sampled)
- Ash Cell Dip tube

Figure 1: Operational Monitoring Locations

Drawn by: CLH	Checked by: RH	Passed by: GNR
Date: Nov 2011	Scale: n/a	Issue: FINAL

Filepath: F:\ZENV\Projects\CS049696 La Collette Headland Stage 3\B.Work_Tasks\03 WATER QUALITY\04_Reports\Operational Water Quality Monitoring Plan\Figure 1

La Collette Water Quality Monitoring

CAPITA SYMONDS

CaCella Symonds House, Wood Street,
East Grinstead, West Sussex, RH19 1UU
Tel: +44 (0)1342 327161
Fax: +44 (0)1342 315927