WEELEY CREMATORIUM

A report into the feasibility of installing mercury/dioxin abatement equipment and new cremators

On behalf of Tendring District Council

Submitted by
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WEELEY CREMATORIUM – feasibility study

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SECTION 1. INTRODUCTION & BACKGROUND

1.1 Objectives

In April 2012 Ramsay Project Management were commissioned by Tendring District Council to provide additional background information and a provisional cost schedule to update Weeley Crematorium in order to improve public facilities, to review costs relating to the replacement of the existing cremators and to consider the future installation of accompanying mercury abatement equipment.

This report forms an addendum to the original feasibility study Ramsay Project Management undertook for Tendring District Council published in October 2010 (Ref RPM/TeDC/WC/004)

This report therefore covers the following :

1. An assessment of the options available to Tendring District Council to fully comply with Government Directive PG 5/2 (04) – the abatement of mercury, dioxin and hydrogen chloride atmospheric emissions.
2. An assessment of the existing cremators for future replacement
3. An assessment of the options to extend the left side of the crematorium, (which currently contains the crematory, administration and public meeting rooms) to locate the abatement equipment and as a by product of this, improve accommodation and use of space or to provide a separate building in which to house the additional equipment.
4. A breakdown of estimated costs for the project.
5. A recommendation on the additional services & expertise required for completion of the project.

A more detailed description of the allocation of space to the various public and operational functions within the crematorium is shown in more detail in Ramsay Project Managements original feasibility report.

This report therefore concentrates on the crematory and office aspects of the building rather than the public areas (apart from the flower tribute area situated adjacent to the exit to the chapel)

SECTION 2. THE CURRENT SITUATION AT WEELEY CREMATORIUM

2.1 Overview

An approximate total of 1600 cremations take place each year at Weeley Crematorium.

The crematory is currently accessed from the outside through a narrow (single) door at the rear of the crematory. The existing cremators were installed by completely demolishing the rear of the building in order to provide a large enough aperture through which to install the two new cremators. The rear wall was then rebuilt to include a single storey extension containing the crematorium technicians desk and a small ante-room containing ash processing equipment and a processed ash remains store.

The rear crematory wall backs onto the scattered remains areas which extends close to the back of the building, giving little practical scope to directly build out from the back of

the main building to form an enlarged crematory and/or an access yard for services and storage.

In addition there is a triangular brick screen (shown below) which currently separates the operational from the memorialisation aspect of the crematorium, which will require removing whichever option is chosen, and reinstated after the works have finished, as required.

Showing the position of the restricted access into the crematory (single door situated behind brick screen) and small high-level windows.

Tendring District Council currently operates two single-ended Evans 300/2 cremators at the facility. These were installed approximately 15 years ago and are currently unabated. **Both cremators are now approaching the end of their working lives and are of a 25 year old design which is not energy efficient when compared to modern alternatives.**

One possible option could be for Tendring District Council to continue to rebuild the existing cremators in situ for as long as is reasonably possible. As stated above, the current equipment is approaching the end of its effective working life. Should the decision be made to simply retain the existing cremators, this would have the following implications :

- Increased risk of malfunction and therefore breakdown. This could result in problems cremating within an acceptable timescale for the public and will increase risk of overtime as only 1 cremator will be left operating if a breakdown occurs. Currently as there is no cold storage provision at Weeley, storage of coffins post-service would present problems. Excess coffins could be sent to the

nearest crematorium (Colchester) but this would take time and cost money (likely to effectively be a complete loss of income for those services affected plus additional transportation costs).

- Because of the restricted space in the crematory any rebuilding would need to take place immediately next to the remaining operating cremator for the 6 weeks required to install new linings resulting in access and health & safety related difficulties.
- The current cremators are estimated to be 30-40% less energy efficient than those modern units which would replace them. Based on the figures supplied for the original feasibility study, this would result in a saving difference of £10-15,000 "lost" per annum between the two.
- Not installing accompanying abatement equipment is likely to cost Tending DC an estimated £40,000 per annum in CAMEO levys. Fitting abatement equipment is estimated to generate circa £30,000 per annum in income. The abatement equipment will also work most efficiently by fitting new cremators alongside it simultaneously. These figures may differ slightly if a local solution is agreed, but the quantum is unlikely to be significantly different from that stated.
- Fitting new cremators will also mean that the full refractory will not need to be replaced for a further 5 years (at a "saving" of £70,000) instead of in 2 years time.

The crematory itself is made up of two buildings. The main area housing all the cremators and combustion fans is covered by a pitched roof, which in turn supports the main flue for both cremators which connect directly into the main brick chimney from below.

The second single storey part of the building contains the receiving room, ash processing equipment, electrical & gas supply inlets and the cremator technicians computer. This part was added at the same time as the existing cremators were installed.

There is no separate combustion fan room as the fans are mounted above in the existing cremators in the roof void to save space.

There is also no separate control room with the main monitors being situated directly against the side wall of the crematory, alongside the two existing cremators. This is not considered to be ideal in a modern working environment as there is no space for the operators to sit down when monitoring the progress of cremations and there is a danger of the installation being effected by dust and atmospheric debris due to the proximity of the cremators.

Heating in the crematorium is via a 20 year old gas-fired boiler situated in an adjacent room off a corridor and between the main chapel and the crematory, serving the whole site. This boiler is not a modern energy efficient, gas condensing type and if replaced would give the crematorium to also use a plate heat exchanger attached to an abatement system to improve energy efficiency and produce further costs savings. The option to replace this boiler has not been shown in the revised project costings shown later in this report, but depending on exact requirements is estimated to cost circa £40,000.

2.2 Flower Tribute area

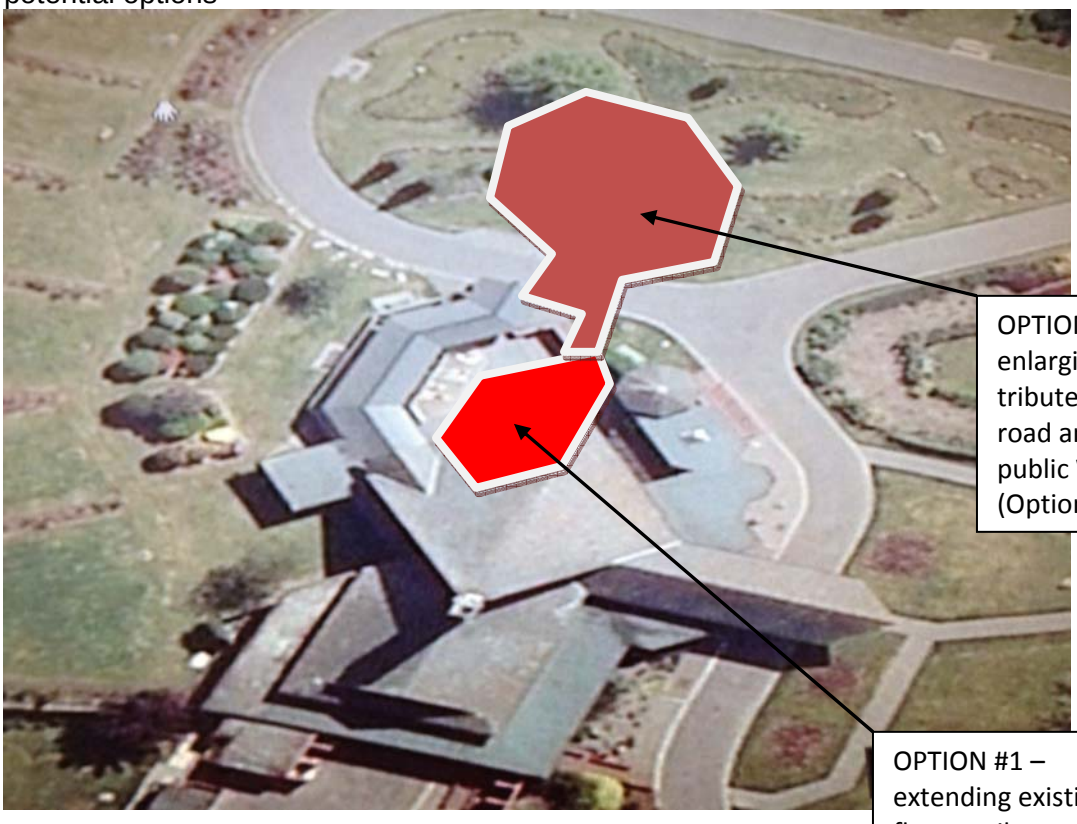
Currently this area is a half-exposed, semi-roofed structure immediately outside of the main chapel window as the congregation exits at the end of a service.

The covered section of the existing flower tribute area is confined and can act as a wind tunnel. In additional if the congregation is considerable, not only are the mourners exposed to any inclement weather on one side but also the congregation spills into the "outside" portion of the structure which is immediately adjacent to the main chapel window. Although there is a half-height brick wall between the two, the sound transmission between the existing mourners and the next incoming congregation can be considerable and highly disruptive.

The proposal is therefore to consider various options to modify and / or extend the existing infrastructure in one of the following three ways :

- Option #1 – enlarge the existing flower tribute area largely within the existing footprint (changing the roofline to effectively make the existing outside portion part of the covered space. The whole assembly would also be enlarged slightly across the width of the adjacent roadway.
- Option #2 – enlarge the existing flower tribute area retaining the existing walkway but extending it across the adjacent roadway and finishing in a substantially enlarged flower tribute area where the heather beds are at present (tiled to match the existing roof and in an angular shape to match with the existing overall design of the crematorium buildings – see aerial photograph below)
- Option #3 – as option #2 above but with the addition of a single male, female and disabled WC block in the "hexagonal area"

The photograph below illustrates the position and space taken by each of the three potential options



If either Option 2 or 3 was chosen, this would have significant impact on the landscaping in the area across the road as shown (which would have to be undertaken with the agreement of the families with memorials in the vicinity), which would also require re-routing or managing to ensure there was no danger to the existing mourners from passing hearses, although such a solution would resolve many of the problems with the existing layout.

SECTION 3. Specific areas of consideration at Weeley Crematorium

This report considers two specific options depending on whether Tendring District Council (TDC) wishes simply to replace the existing cremators with new equivalent (and more energy efficient) cremators or whether it wishes to install accompanying mercury abatement equipment to comply with PG 5/2 (12), or at least provide the provision for installing this equipment at a later day.

In order to provide the latter it will be necessary to demolish and extend the existing office space due to the scattered ashes restrictions at the rear of the site.

3.1 Site access

Because of the extremely restricted access to the rear and the requirement to expand the services part of the main building, there are a number of areas which should be considered.

When the support beam in the crematory was installed as part of the most recent works (coinciding with the installation of the existing cremators) the beam height was set too low at 2100mm to easily allow the future installation of complete cremators under it which requires a minimum height of 2400mm). If replacement cremators are therefore installed as a near-complete unit (to greatly reduce the time between demolition and commissioning to ensure continuity of service) the existing support beam will need to be removed and then repositioned higher in the future.

In addition because of the proximity of the crematory to the ash-scattering / memorialisation area at the rear, an improved access route at the rear of the building to the side service yard will also require to be constructed - whichever expansion option is chosen

3.2 Position of cremators vs abatement within the crematory – existing

The current 2 no. single-ended cremators are paired together in the main crematory.

The flues for both cremators are situated above and enter separately directly into the main brick flue within the pitched roof void roof.

Also present above is the combustion air flue fan which feeds both cremators via a vent in the gable end wall, as previously described.

3.3 Position of the abatement equipment in the crematory – future

The final position of the abatement system will depend on a number of factors –

- Which cremator / abatement option is finally chosen (via OJEU / TDC's procurement procedures)
- How large the expansion of the new crematory area will be and how this dovetails with the new size and orientation of the office space, reception, public meeting rooms, bearers room and ash collection facility and the construction of a rear service yard.
- Future proofing the facility to ensure the straightforward replacement of cremators and abatement equipment in the future without the necessity for major construction works to take place.
- The sequencing to facilitate the installation of the equipment in a way which keeps the crematorium running during the development / construction works and,
- The extent of the car park, service area and access to the rear woodland area

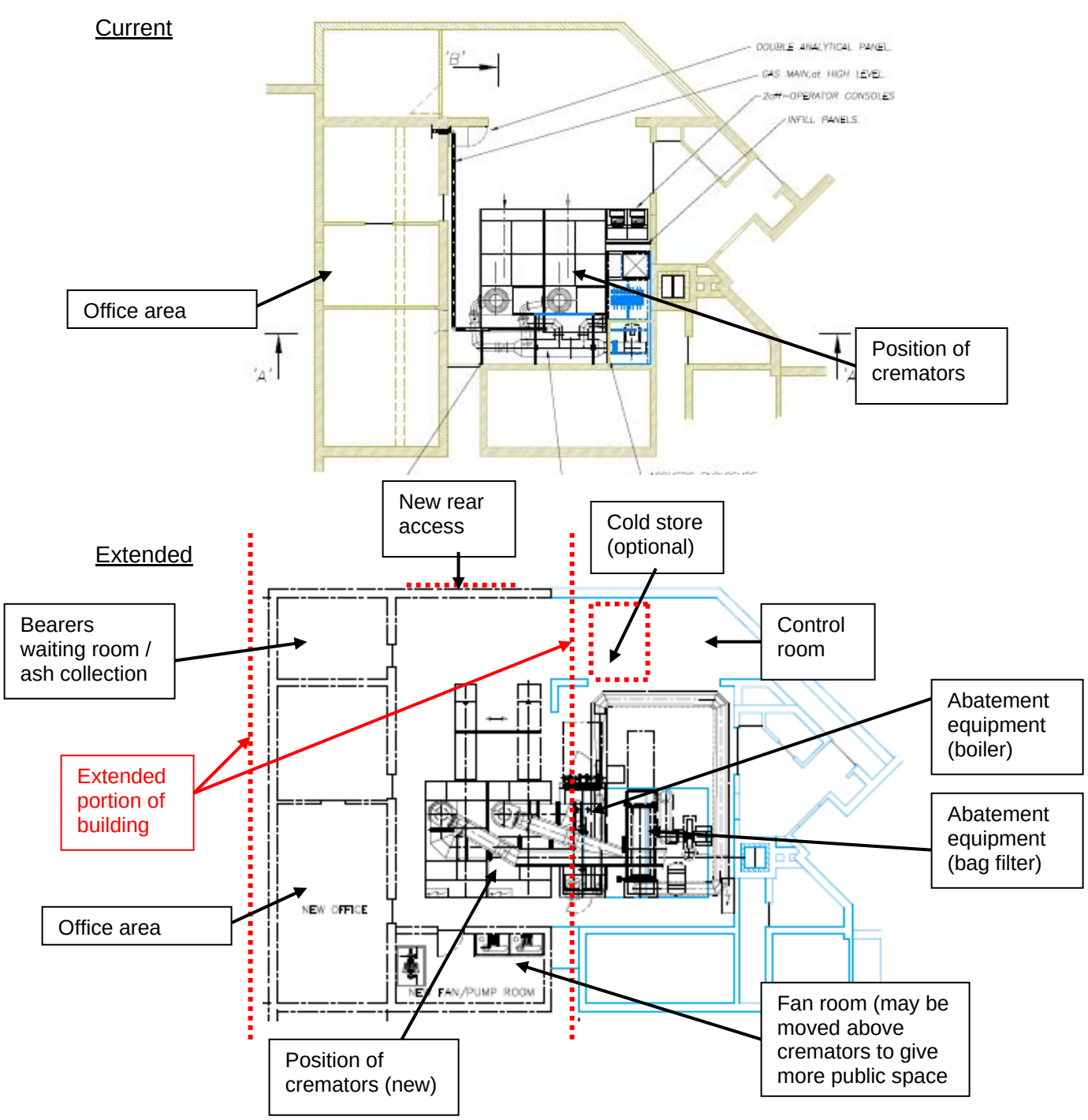
Three possible options were considered, as follows :

1. Retain or replace the existing cremators in the same position on a like-for-like basis

2. Install new cremators alongside the current units using the space taken up by the current cremators for the mercury abatement equipment (either at the same time or at a later date) once they are demolished and removed.

3. Construct a separate crematory extension building on the land to the rear NW corner next to the memorial gardens in which to install the new mercury abatement equipment.

Option 2 would aim to extend the crematory by utilising some of the space taken up by the existing offices in order to create sufficient additional space in which to house new cremators. The space currently taken up by the existing cremators would be used to house the accompanying mercury abatement equipment (either at the same time or at a later date). This would also require the existing office and reception area to be reconfigured.



Option 3 was rejected because costs would be considerably greater than that of Option 2 described above because the new building would require separate services and would extend the distance over which the connecting flues would need to run from the cremators to the abatement equipment and then back again to the base of the main chimney stack before emitting into the atmosphere. More powerful (and therefore costly and more energy hungry) fans would also be required to drive the cremator emissions across a much greater distance. At approx £4000 per meter for the refractory lined flue, it is estimated that this element alone would add £80,000 to the overall cost (plus the flue would need to be protected between the two buildings).

Whichever option is chosen, the extended space option also allows for the following :

- Safe storage of the unused reagent (generally in 10-15kg “buckets” and contained on a pallet) and the containers containing the spent reagent (300ltr drums) is critical. The location of these must be such that easy collection can take place for drop off and up to 4 drums at a time for cost effective collection.

- Provision for the installation of a cold store (for up to 6 coffins) would allow both cost and energy efficient “production” and would give additional flexibility in the case of a pandemic arising.

- Because of the limited access to the site (especially in the immediate vicinity of the crematorium) the scope for using a large mobile boom crane is limited. As the photographs below show, the ideal way to bring new cremators to site is in a near-complete state which improves quality and greatly reduces the installation down-time.

- Considerable care and detailed planning would be required when installing cremators in one area of the crematory, whilst maintaining a good level of service to the public by switching all cremations to the two new machines and in order to ensure the highest levels of health & safety. Because of the complexity of such arrangements and the restricted space within the crematory this work ideally needs to be scheduled when there is a higher likelihood of better weather.

- Building a discrete service yard in the largely unused and quiet area to the rear of the crematorium would dramatically improve future access for vehicles (for the supply and collection of reagent, emissions testing and other deliveries), provide a position for the placement of an externally mounted standby generator (if required) and provide much needed formal staff and undertaker car parking space away from the general public / mourners. This would not be available in Option 3.

- Relocating the staff into nearby permanent Portacabin style buildings linked to the expanded crematory with a new walkway was considered but rejected as the standard of accommodation and, more considerably, the public provision would be significantly reduced and would then require additional energy, water and sewage services to be provided away from the site and no improvements in energy usage.

3.4 Energy provision

A full assessment of the electrical and gas supplies to the site will be required by a qualified M&E engineer.

It is likely that the gas supply pressure will be sufficient although the capacity of the electrical supply may be insufficient to cope with the increased loads required to drive the abatement machinery. It is understood that a preliminary study undertaken by TDC suggested that the existing supply would be able to cope with the increased load required, although RPM has no documentary evidence to support this, and it would need to be verified anyway.

There is also no stand-by generator at the crematorium to be activated in the event of a power outage. Such a generator would be diesel-fuelled and would switch on automatically if installed. The cost of having such a contingency is estimated to be £35k and positioned in the rear service yard

SECTION 4 : Cost options

4.1 Crematory

The following has been prepared with the kind assistance of Rose Builders Ltd based at Lawford, Essex and it should be noted that the sums stated are provisional, correct at the time of writing this report and subject to final agreement and a full survey being conducted on the site.

Option 1

- Establish site compound and erect fencing to segregate the site and protect existing trees, memorials etc
- Demolish existing rear brick screen
- Remove the whole of the rear of the crematory to form an access.
- Construct hard surface access route to crematory
- Various internal structural engineering, demolition and facilitation works
- Form a temporary roof structure
- Reinstate walls and rear of structure, rainwater goods and generally make good

Provisional cost = £85,000

Option 2

As Option 1 plus;

- Extend building to accommodate new cremators and to provide space for mercury abatement equipment including new/amended drainage, windows and doors and internal structural works
- New offices and new, more appropriate public reception and meeting facilities.
- Extended and raised roofline
- New floor slab to support new cremators
- Upgraded electrical and amended gas services provision

Provisional cost = £242,000 (plus option 1 above – total of £327k)

4.2 Cremators and abatement equipment

- 2 no. replacement cremators = £290,000
- Demolition of existing cremators = £ 35,000
- "Double" mercury abatement system = £550,000

The prices above are quoted as at May 2012 and are subject to tender. These are likely to increase significantly in the coming years, if a decision is delayed.

NB : It is estimated that market costs have increased by up to 30% in the past 3-4 years.

4.3 Flower tribute area

As has been previously described the existing Flower Tribute area, immediately adjacent to the exit from the main chapel has considerable limitations, both in terms of size and weather protection to mourners. As per the previously described options, the costs are estimated to be as follows :

- Option 1 – extend and cover over completely the existing area = £47,000
- Option 2 – extend away from the building and construct a new larger fully covered flower tribute area = £76,000
- Option 3 – as Option 2 with the addition of updated and compliant WC facilities = £110,000

Option 3 would also allow the existing toilet block (see photograph overleaf) to be converted & returned to its former use to provide funeral directors with the much needed respite provision which is not available elsewhere at the crematorium. Alternatively this provision could be built in to an extended crematory (in arguably a better position also)

Showing existing public WC facilities (next to the flower tribute area)

4.4 CAMEO income (or cost)

If the site is fully abated then Weeley crematorium would qualify for additional income via the national CAMEO scheme run by the FBCA.

For a crematorium undertaking 1600 cremations per annum the potential **income** from the scheme could be as much as **£25-30k per annum** based on latest estimates (although this will diminish over time).

However for a site which has not abated, the levy **charged** by CAMEO is likely to be **£40,000** – and this would apply for each and every year that the facility was not abated.

It is understood that a local abated cremation burden-sharing arrangement is being considered by TDC as a regional solution, although final costs and income levels have not yet been confirmed. This may result in a minor reduction of both income and cost levy.

SECTION 5 – PROJECT TIMESCALE

The overall timescale will depend on a number of factors and post-survey, the exact nature of the civil works required. It is estimated that contractors would be on site (although not necessarily continuously) for approx 6 – 7 months.

The currently quoted delivery period for cremators and abatement equipment is now approx 6 months from time of order, with a further installation period of between 4-6 months on site (depending on which manufacturer is finally chosen, the method of supply and the schedule of that companies installation teams).

It is RPM's strong recommendation to plan all activity to ensure that all external work is carried out during Spring/ Summer/Autumn months. This has the twin benefits of likely better weather and coinciding with the period of lowest average number of cremations.

SECTION 6. CONCLUSION

It is Ramsay Project Managements view that the existing cremators should be replaced as they are now 15 years old and are approaching the end of their working lives. This would also result in improved energy use and therefore reduced energy bills.

Although in theory the cremators could be constantly rebuilt, given the compact nature of the crematory, further problems would be created in the future when they did finally breakdown and were beyond economic recovery when the abatement equipment would need to be disconnected and amended to suit the installation of new machines, with the attendant major disruption and considerable additional construction costs.

Of the options previously described, it is also RPMs view that the crematory (and thence the offices) should be enlarged. This would have a number of advantages as the existing public and staff operational facilities would be upgraded (as they are not adequate or of a modern standard at present), the new equipment would be installed without unduly disrupting the existing services and there would be provision to install accompanying mercury abatement equipment (either immediately or in the future).

If the abatement equipment was installed as part of the initial installation, the overall cost would be less, the disruption would be reduced (as there would be no second visit), the crematorium would comply with the latest emissions legislation (PG 5/2 (12)) and the crematorium would benefit from additional income from the CAMEO scheme.

Without undertaking this work – which is likely to be required by 2020 anyway – the crematorium will have to pay the CAMEO or local abatement levy estimated to be circa £40,000 – a difference of between £65-70,000 between an abated and unabated installation for every year the situation remains as at present.

SECTION 7 – FINAL RECOMMENDATIONS

In summary the recommended costs are as follows :

Cost summary (estimated at 2012 prices)

Cremators (2 no.) including demolition of existing	£325k
Mercury abatement inc emissions test / demolition	£550k
Crematory civil building works (inc preliminaries)	£327k
Temporary offices / meeting rooms (24 weeks)	£ 25k
Flower tribute area Option 3 (maximum)	£110k
Contingency @ 15% of project (excl OEM)	£ 60k
Professional fees @ 7.5% of overall project	£100k
Total estimated cost (excl VAT)	£1497k

(This could initially be reduced to £947k if the building was built as stated but the mercury abatement equipment was installed at a later date. It should be noted however that the final cost will increase further to accommodate a second installation period)

Additional options

Installing new emergency generator (as per Section 3.4)	£ 35k
Cold store	£ 10k

SECTION 8 NEXT STEPS

1. Agree if existing cremators should be replaced (recommended)
2. Agree if the new cremators should be situated in a different location to the existing 2 no. units (recommended)
3. Agree whether the site should be abated and to what degree (100% recommended).
4. Agree options (cold store, control room, generator etc)
5. Agree what additional crematory /office space should be created (recommended)
6. Agree route of entry and phasing of new equipment into the crematory
7. Agree if rear “yard” should be created (recommended)
8. Agree preferred timescales
9. Agree overall budget
10. Agree method of funding
11. Agree structure of project team / external resources required
12. Full survey (building, structural, M&E, energy etc)
13. Produce building specification
14. Produce cremator / abatement specification
15. Agree contract form
16. Advertise in OJEU (cremators) and local tender / Construction Line for the contractors
17. Construction phase (builder / cremator manufacturer)
18. Commissioning & training

END

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This report has been produced for

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