



Cemetery Development Services

Burial Site Feasibility Report Taylor Wimpey Oxfordshire

Proposed Thame Cemetery Site

18th October 2019



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1 Introduction and Site Location

Cemetery Development Services (CDS) have been requested by Taylor Wimpey Oxfordshire, on request of Thame Town Council, to assess the feasibility of the design of the proposed cemetery development, which is due to be constructed as part of an agreed S106 arrangement.

The proposed new cemetery site is situated to the east of Thame Park Road, Thame, OX9 3PJ, and will be accessed by an existing entrance off the main road, which has already been constructed. The total site area is calculated as being approximately 0.35ha, in line with the S106 requirements.



Figure 1. OS map of the site (boundary indicated in red)

Figure 2. Aerial Image of the site (boundary indicated in red)

2 Background

CDS were requested by Taylor Wimpey Oxfordshire to assess the feasibility of developing a cemetery in line with the S106 arrangements, on a parcel of land highlighted in Figure 1 and 1a above.

The section 106 requirements set for the proposed cemetery development are:

- Total site area to measure 0.35ha, with the burial plots sited on a 0.25ha parcel;
- Burial depth of 1.82m for single plots, and 2.1m for double plots;
- Burial plots to generally measure 3m x 1.52m. This allows for 200 spaces to be provided on a 0.25ha area.
- 10 car parking spaces and vehicular access
- Toilets and shelter
- Seating areas.
- Surfaced pedestrian access.

A T2 Groundwater Risk Assessment Report has been undertaken by GEG in 2015, which highlighted that the site is generally considered to be suitable to be developed into a cemetery. The report however does not include the EA nomograph which calculates the overall risk classification of the site. The report also only contains two trial pits on the proposed cemetery site, as the site investigation works were designed for the housing development as a whole. This provides very limited information on the soils as found, which restricts the ability to determine any potential soil variability or groundwater issues on the proposed site.

An initial concept design was also included for the development of the site which was set out to meet the S106 criteria. This design is however not considered to be a workable layout and has limitations for the future use of the site. The design has no considerations as to how funeral hearses would enter and turn in the car park, no allowance for a detention basin to deal with surface water drainage and the required 10m stand off to the ditch to the west had also not been allowed for. In addition, no allowance had been made for a memorial garden area or for cremated remain interments, which whilst not stipulated on the S106, would give the Council a broader range of services to offer to the public and increase future revenue from the site.

CDS have therefore undertaken additional assessment and analysis relating to the T2 Groundwater Risk assessment and have also provided a re-designed site layout based on the requirements set out below. In addition, CDS has provided a high level assessment of the potential future income from the site based on the revised burial layout designs.

3 Groundwater Risk Assessment

A T2 Groundwater Risk Assessment Report has been undertaken by GEG in 2015, which has highlighted that the site is considered suitable to be developed into a cemetery. We have referred back to the report produced by GEG and provided the additional information set out below regarding the risk scoring assessment and nomograph for the proposed development.

We would note however that the T2 assessment report only contained two trial pits in the cemetery area itself, which provides very limited information on the soils as found and restricts the ability to determine any soil variability on the site.

Assessment of General Hazards.

The potential of a number of pollutant pathways and the degree of associated risk assessed numerically on a 0-10 score with 10 being the highest risk, is shown in Table 1 below. From the resultant data, the final values are assessed against burial number and a determinant of risk calculated from EA flow charts and nomographs.

Table 1. Summary of pollution risk associated with the site

Risk	Assessment		Score
	(High, Moderate, Low)	Comment	
Burials per annum	Low	Unknown at this stage but anticipated to be around 10 - 20 per annum.	-
Drift / superficial data	Very High	There are no mapped superficial drift deposits shown on the subject site. A band of alluvium is situated just off site to the south, which connects into a former alluvial channel. If these soils are encountered on site, then shallow groundwater could be encountered. The absence of superficial deposits is considered to be a very high risk, as burial contaminants can migrate unmitigated down into the underlying bedrock.	9-10
Drift thickness	Very High	Drift deposits are absent on the subject site, the risk score is therefore considered to be very high. A band of alluvium is situated just off site to the south, which connects into a former alluvial channel. If these soils are encountered on site, then shallow groundwater could be encountered. The absence of superficial deposits is considered to be a very high risk, as burial contaminants can migrate unmitigated down into the underlying bedrock.	9-10
Depth to Water Table	Low	Some evidence of perched water strikes was observed in some trial pit locations, these are not considered to represent a groundwater strike. Given the negligible permeability of the underlying soils, we would not anticipate a mobile groundwater to be present beneath the site. Therefore, we have reduced the risk to low.	3-4
Flow mechanism	Very Low	The mapped geology of Gault Clay comprises a negligibly permeable clay-based soil, which is considered to have an intergranular flow mechanism.	1-2
Proximity to Wells or potable water source	Low	There are no known wells or groundwater abstractions points within 500m of the site.	3-4
Aquifer Type	Very Low	The site is mapped within an Unproductive bedrock strata, which does not produce any significant volumes of water supplying either surface water features or groundwater supplies.	1-2
Abstractions and SPZ	Very Low	The site is not situated within, or close to a groundwater source protection zone.	1-2

Proximity to water course/springs	Moderate	The nearest watercourse comprises the Cuttle Brook which is mapped approximately 80m south of the site. A drainage ditch is also mapped to the west of the site along the main road, which is believed to feed directly into the Cuttle Brook.	5-6
Proximity to land drains	Moderate	Land drains have been found across the site at depths of 0.35m bgl. These are considered by the EA to pose a potential risk due to migration of burial pollutants. However, the shallow depth of the land drains would mean that they are unlikely to pick up burial contaminants. As such we have reduced the risk score to moderate.	5-6
Met data	Moderate to High	Annual rainfall moderate to high	N/A
Proximity to housing	Low	Residential housing in close proximity of the site to the north.	N/A
SSSI	Low		N/A
Archaeology	Low	None observed but will require County Archaeologist assessment	N/A
		Total (Minimum to Maximum)	35-46

Table 1 is assessed using the groundwater vulnerability-ranking criteria in Table 2. The total score comes to 35-46 and is considered as a moderate risk. These data are then assessed against the burial rate of between 10 - 20 20 per annum on the groundwater risk nomograph p.37 of PP223. The final assessment of risk for this site according to the nomograph (Figure 2), would class it as being moderate risk.

Table 2. Groundwater risk ranking

Ranking	Very Low	Low	Moderate	High	Very High
	1-2	3-4	5-6	7-8	9-10
Drift Type	Clay	Silt	Silty sand	Sand/gravel	Absent
Drift Thickness	>5 m	>3-5 m	3 m	0-3 m	Absent
Depth to water Table	>25 m	11 – 25 m	10 m	5 – 9 m	<5m
Flow mechanism	Intergranular				Fissured
Proximity to wells					Within 250 m
Aquifer type	Non Aquifer		Minor aquifer		Major aquifer
Abstractions and SPZs	Outside Zone III	Within Zone III	Close boundary to Zone II	Within Zone II	Within Zone I

Ranking	Very Low	Low	Moderate	High	Very High
	1-2	3-4	5-6	7-8	9-10
Water courses and springs	>100m	>70m<100m	>50 <70 m	>30 <50 m	<30 m
Drains	>100 m	>40 <100 m	30 – 40 m	>10 <30 m	<10 m

3.1 Groundwater Risk Nomograph

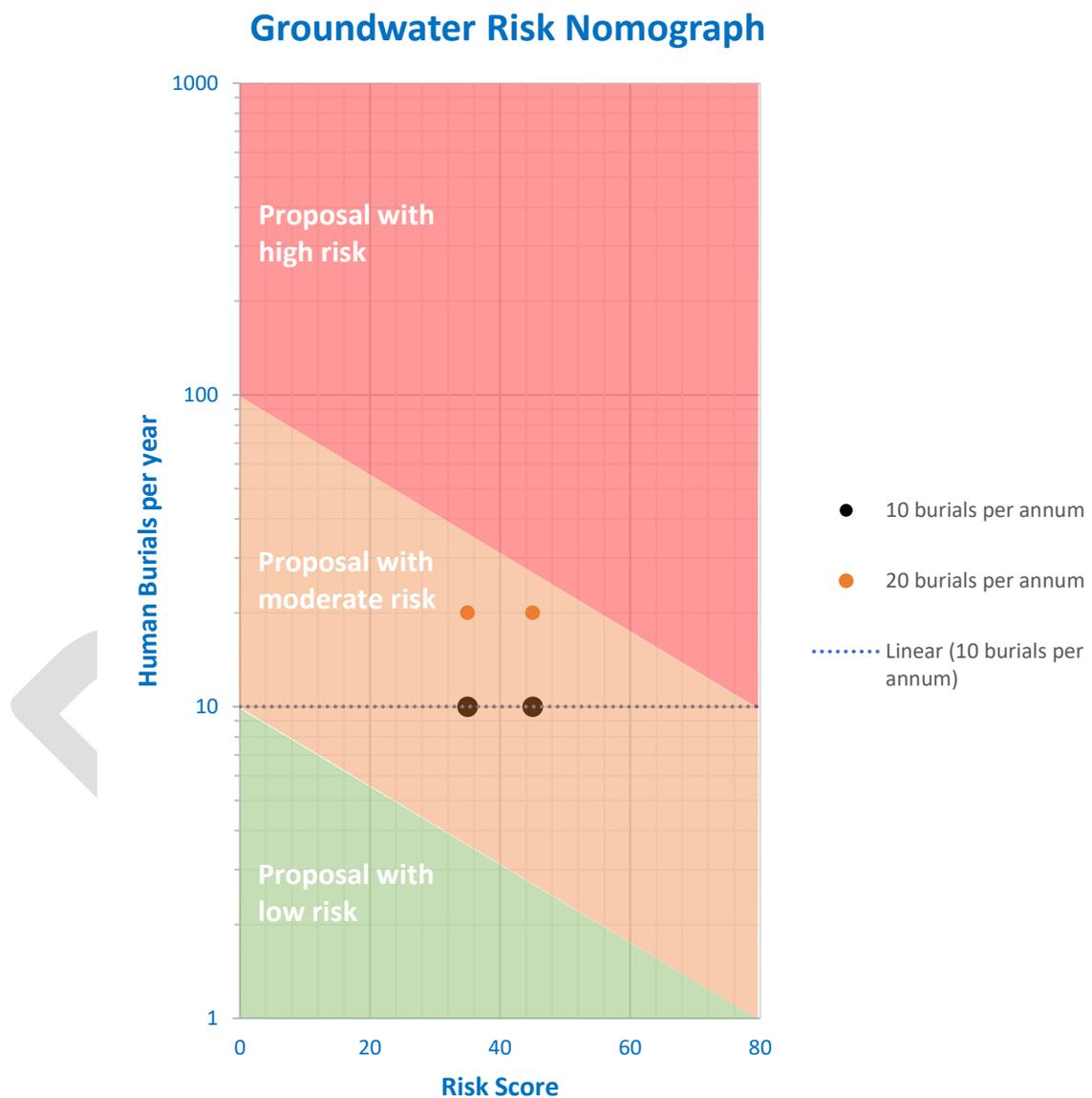


Figure 2. Groundwater Risk Nomograph

4 Environmental Conclusion

The site is considered to be moderate risk with the risk mainly attributed to the absence of superficial deposits on the subject site and the close proximity of land drains and surface water features. However, the negligible permeability of the bedrock (Gault Clay) coupled with a high cation exchange capacity of the soils, would mean that burial contaminants would not be likely to be able to migrate away from the source into the nearest receptor, which is the Cuttle Brook to the south. As such the site is not considered to pose a significant risk to the wider environment.

The clay loam topsoil is likely to be poorly drained in winter, and the surface of the site is likely to suffer from seasonal waterlogging due to the negligible permeability of the underlying geology, hence the presence of agricultural land drains. Some form of shallow surface water drainage system is likely to be required to manage flow over the site, due to the moderate slope and to help prevent seasonal waterlogging. This will require the formation of a detention basin, with an outfall to the ditch to the west.

Reopenings of graves could potentially be difficult in periods of wet weather, as perched water is likely to collect around the coffin and in the backfilled clay soils, as the degree of compaction is usually lower when these types of soils are used for backfilling. There may be a requirement to dewater excavations during a reopening, any perched water in the grave should be treated as greywater and will need to be managed and discharged accordingly.

5 Concept Design

The initial concept design, which was provided to us by our client, met the strict criteria set out in the S106 agreement as per the planning requirements. This design has been included for reference in Appendix A.

On review of the initial concept design, the following points have been raised which need to be addressed to ensure the site is fit for purpose and provides Thame Town Council with an easily manageable site which also offers a range of options to the public in terms of burial method.

- The design had not allowed for the required 10m buffer to the ditch along the western site boundary. This will be required in order to meet the statutory requirements set out by the Environment Agency.
- The design had not allowed for sufficient turning space for the funeral hearse and precession.
- The provision of a toilet block and shelter, whilst requested in the Section 106 agreement is not considered to be appropriate for the following reasons.
 - Toilets and shelters in cemetery sites are prone to and can encourage antisocial behaviour, with vandalism of such facilities common. As such, in our experience, and on feedback from numerous clients, facilities such as these are not considered to be appropriate on small cemetery sites.
 - The cost of cleaning, maintenance, servicing and repair of a shelter and toilet will fall upon the Local Authority to maintain.
 - The presence of a building/shelter reduces the available space on the site for burials, reducing the future income of the site, and the lifespan of the site.
- The design has not allowed for the provision of surface water drainage, which we feel will be important on this site. Surface water drains will need to be installed to managed surface water conditions across the site and discharge into a detention basin, which will use up some of the available burial space.

- The presence of land drains on site will need to be reviewed and addressed with the EA. These land drains may need to be removed prior to the development of the site.
- No allowance for bins or a waste collection area has been included.
- No allowance for a cremated remains area or memorial garden has been included.

5.1 Revised Designs

Based on the comments highlighted in the section above, CDS have provided revised designs for the site, which meets all of the requirements of the Section 106 arrangement. We have also provided an alternative design with the toilet/shelter block removed from the development, allowing for additional burial space and reducing the future maintenance costs of the site. These designs are attached in Appendix A for review.

The designs have been updated and revised to include:

- The required 10 standoff from the ditch to meet the statutory requirements.
- Allowance for a detention basin for future surface water drainage.
- Installation of concrete memorial header strips, making the site easier to maintain, and providing a fixed stable base for memorials.
- Revision of the car park area to allow a turning circle for the hearse.
- Provision of a waste collection area.
- Provision of a cremated remains section
- Provision of a memorial garden area.

In terms of burial numbers, based on the traditional burial spacing, which is common across UK burial sites, a total of 369 burial plots and 338 cremated remain plots has been allowed for, which is a significant increase on the required burials numbers (200) set out in the S106 agreement. This increase in burial numbers and addition of cremated remains interments, provides the Thame Town Council with greater income potential and longer lifespan. In addition, the design offers a choice between burials, ash interments and memorialisation to the public.

If the proposed shelter/toilet block was to be included, the burial numbers would remain the same, however the number of cremated remain plots would reduce, reducing the operational lifespan of the site and the potential income, whilst increasing the maintenance costs of the development.

6 Future Revenue

Burials fees for Thame Town Council could not be sourced, we have therefore used the 2019 burial fees and charges for Aylesbury Town Council as the closest and similar sized Town Council to determine the potential future income from the burial site. The key burial rates are set out below:

- Exclusive Right of Burial (99 years) – Adult Grave - £1023.00
- Exclusive Right – Cremated Remains (99 years) – Adult Plot - £415.00
- Interment Fee (Per Burial) – Adult - £561.00
- Interment of Cremated Remains – Single depth - £206.00

Based on the number of plots (369) and the cost for the exclusive right of an adult grave and two interments (£1023 + £561.00 + £561.00) the potential income from burial alone, exclude the memorialisation would be in the region of £800,000.00 exc VAT. The memorial fees could add an extra income of between £60,000.00 to £80,000.00.

Based on the number of cremated remains plots (338) and the cost for the exclusive right and associated interment of ashes (£415.00 + £206.00) the cost revenue cost for the cremated remains section of the site would be in the region of £200,000.00 exc VAT.

The total income of the site could be in the region of £1 million over the lifespan of the site.

If the toilets/shelter were to be included in the design, then approximately 50% of the cremated remains plots would be lost, reducing the future income of the site down by approximately £100,000.00.

7 Ongoing Site Maintenance

If the site were to be taken on by Thame Town Council, then the council will need to be aware that the following requirements, on top of the standard legal requirements for running a cemetery, will need to be met and requires budgeting for:

- Seasonal landscape maintenance of grass areas and hedgerows.
- Maintenance of paths and roads.
- Maintenance of drainage infrastructure.
- Cleaning and maintenance of toilets.
- Maintenance of shelter.
- Memorial Stability testing every five years.
- Clearance of waste from the site

8 Reporting Details

Report Author: Darryl Kelly MGeol FGS

Date: 18th October 2019

APPENDIX A
Cemetery Layout Designs



LEGEND

-  EXISTING TREES / VEGETATION
-  HEAVY STANDARD TREE
-  AMENITY GRASS SEEDING
-  ORNAMENTAL HEDGE PLANTING
-  TARMAC
-  SURFACED PEDESTRIAN ACCESS
-  BINS, RECYCLING AND WASTE
-  SEATING
-  WATER SUPPLY
-  DOUBLE MAINTENANCE GATE
-  GATE

Rev	Date	By	Description
B	03/08/17	CB	Amendments on Toilet & Shelter building and layout
A	04/04/17	CB	Amendment on Toilet & Shelter building

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Project Thame Site C

Title Burial Ground Landscape Proposals

Client Taylor Wimpey / CEG

Scale	1:250 @ A1	Drawn	CB
Date	March 2017	Checked	BS
Drawing No.	CSA/3303/100	Rev	B

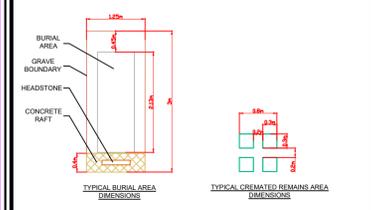


SCALE 1:200 @ A1



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- APPLICATION BOUNDARY
- XX
- TARMAC ROADWAY
- PATHWAYS
- HEDGING
- EXISTING TREES AND HEDGING
- PLANTING AREA
- 10m DITCH STANDOFF ZONE
- 10m DETENTION BASIN STANDOFF ZONE
- DETENTION BASIN
- FENCING
- REFUSE BIN
- CYCLE RACK
- BIN
- TAP
- BENCH
- BURIAL PLOT (369)
- CREMATED REMAINS PLOTS (338)



Rev	Date	Description	By
00	00.00.00	X	PC

CLIENT TAYLOR WIMPEY / CEG

PROJECT THAME CEMETERY SITE

TITLE GENERAL SITE LAYOUT



Building 51, Wrest Park
 Silsoe, Bedfordshire MK45 4HS
 Tel: 01525 864387
 Email: info@cem-dev.co.uk
 Web: www.cem-dev.co.uk

Drawn by: PC Approved by: JJS Drawing Status: DESIGN
 Scale 1:200 @ A1 Sheet 1 of 1 Date: OCT 2019

Drawing: CDS_TWY_THM_01 Rev: 00

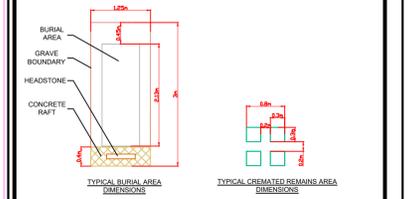


SCALE 1:200 @ A1



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- APPLICATION BOUNDARY
- XX
- TARMAC ROADWAY
- PATHWAYS
- HEDGING
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- FENCING
- REFUSE BIN
- CYCLE RACK
- BIN
- TAP
- BENCH
- BURIAL PLOT (369)
- CREMATED REMAINS PLOTS (338)



00	00.00.00	X		PC
Rev	Date	Description	By	

CLIENT TAYLOR WIMPEY / CEG
 PROJECT THAME CEMETERY SITE
 TITLE GENERAL SITE LAYOUT



Building 51, Wrest Park Silsoe, Bedfordshire MK45 4HS
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Drawn by: PC Approved by: JJS Drawing Status: DESIGN
 Scale 1:200 @ A1 Sheet 1 of 1 Date: OCT 2019

Drawing: CDS_TWY_THM_01 Rev: 00