

2 Consideration of Alternative Designs

2.1 Overview of Original Design

2.1.1.1 As discussed in **Section 1.1**, a feasibility study had been completed for the proposed Project in September 2012. The feasibility study had recommended a layout for both the platform for columbarium and the associated access roads, which had been adopted in the subsequent Project Profile for the application of Environmental Impact Assessment (EIA) Study Brief under the Environmental Impact Assessment Ordinance (EIAO). **Figure 2.1** shows the proposed platform layout and alignment of the access roads adopted in the original design and shown as Appendix A in the EIA Study Brief (ESB-271/2014) dated on 23 April 2014. Key elements of the original design at that time are summarised below:

Key Elements	Descriptions
Platform area	About 10 ha
Access roads	
<ul style="list-style-type: none"> • <i>At-Grade</i> • <i>Viaduct</i> • <i>Tunnel</i> 	<p>About 3280 m long</p> <p>6 viaducts, about 1000 m long in total^[2]</p> <p>About 120 m long^[3]</p>
Pedestrian link ^[1]	About 1000 m long (connecting to MTR Lo Wu Station)
Pick up point at MTR Sheung Shui station – Section of Choi Yuen Road between Po Shek Wu Road and Pak Wu Road ^[1]	Road widening works for a section of Choi Yuen Road and additional noise mitigation measures may be required

[1]: According to the current design, the construction of pedestrian link and pick-up/drop-off point at MTR Sheung Shui Station and Choi Yuen Road widening are no longer required. More details on the latest layout are discussed in **Section 3.1**.

[2]: According to the current design, only one of the viaducts (about 300m long) retained.

[3]: According to the current design, no tunnel is retained.

2.1.1.2 The environmental concerns of the original design during both the construction and operational phases include but are not limited to loss of woodland, loss of habitats, impacts on graves, loss of landscape resources (such as grassland and plantation), generation of surplus spoil requiring off-site disposal, etc. A summary of these concerns is given below:

Concerns	Possible Extent
Loss of woodland	About 2.0ha ^[1] in Figure 2.2
Loss of wet woodland (by slope works)	About 0.0017ha ^[1] in Figure 2.2
Loss of plantation area	About 2.2ha ^[1] in Figure 2.2
Loss of grassland	About 16.4ha ^[1] in Figure 2.2
Number of clan graves affected	4 in Figure 2.3
Off-site disposal of inert C&D Materials	706,000m ³
Visual impacts	Any noise mitigation measures near MTR Sheung Shui Station would have more visual intrusion on the neighbouring sensitive receptors

[1] Based on latest habitat maps (see **Section 9** for further details)

2.2 Public Consultation

2.2.1.1 Since the inception of this Project, the Project Proponent has been proactively liaising with stakeholders to collate any comments and views on the proposed facilities in Sha Ling. Up to the time of preparing this EIA Report, two North District Council Meetings (NDC) were conducted in 2012 and 2014. A summary of the key opinions collated from NDC and how the concerns are addressed are given in **Table 2.1a**. During the consultation with NDC on 9 October 2014, they had no objection on the proposed C&C facilities.

Table 2.1a Summary of key opinions from North District Council

Aspects	Potential concerns from District Council	Comments Addressed
Traffic	<p>(i) Potential traffic impact along the route of shuttle buses;</p> <p>(ii) Possible traffic congestion at Man Kam To Road;</p> <p>(iii) Need for adequate parking facilities;</p> <p>(iv) Capacity of East Rail and MTR Lo Wu Station; and</p>	<p>(i) Details on induced traffic near off-site pick-up and drop-off points and in the vicinity of the columbarium are discussed in Section 5.6.</p> <p>(ii) According to the original design, all the vehicles access the Project Site will be along north bound of Man Kam To Road via Jockey Club Road from MTR Sheung Shui Station. However, the latest pick-up and drop-off points are relocated to MTR Kwu Tung Station, MTR Fanling Station, existing Sheung Shui Landmark North Public Transport Interchange (PTI) and layby at Pak Wo Road near Flora Plaza. During normal days, there will only be small number of vehicles (about 70 veh/hr) accessing Sandy Ridge. During festive days, only franchised buses are allowed to access the Project Site and no private vehicles are allowed. The franchised buses will travel along two major routes: one via Liantang Highway/Lin Ma Hang Road westbound to Project Site; and another northbound via Jockey Club Road and Man Kam To Road, to the Project Site. Hence, the traffic congestion at Man Kam To Road is minimised.</p> <p>(iii) According to the Traffic Impact Assessment endorsed by the Transport Department, the minimum number of parking space is 59. The number of proposed private car parking space is 48 and that of coach parking space is 11. Moreover, only franchised buses are allowed to access Project Site during festive days. Therefore, it is considered parking facilities are adequate.</p> <p>(iv) The pedestrian link in the original design connecting MTR Lo Wu Station in Study Brief (ESB no. 271/2014) is no longer required. Instead, several off-site pick-up and drop-off points are proposed. Hence, the capacity of East Rail and MTR Lo Wu Station will not be affected significantly.</p>

Aspects	Potential concerns from District Council	Comments Addressed
	(v) Potential traffic issues outside MTR Sheung Shui Station	(v) According to the latest arrangement, road widening at MTR Sheung Shui Choi Yuen Road is no longer required. Instead, several off-site pick-up and drop-off points are proposed. Potential traffic issues outside MTR Sheung Shui Station are not anticipated.
Environmental	(i) Environmental impacts induced by traffic (e.g. noise, air quality, etc.)	(i) Operational road traffic impacts on air quality refer to Section 4 and noise refer to Section 5 .
Others	(i) Psychological concerns on the hearses on travelling day; and (ii) Need for appropriate arrangement for the affected graves	(i) The only access route to Project Site in the original design is along north bound of Man Kam To Road via Jockey Club Road from MTR Sheung Shui Station. According to the latest arrangement, there are two routes via Liantang Highway/Lin Ma Hang Road, and via Jockey Club Road. This would reduce the psychological concerns on the nearby residents. (ii) No clan graves are directly affected as shown in Figure 2.3 . The appropriate arrangement for the indirectly affected graves are discussed in Section 12.3 .

2.3 Environmental Considerations for Design Review

2.3.1.1 Environmental considerations have been an integral part of the overall review process to optimise the original design as described in **Section 2.1**. The prime objective of the review is to identify opportunities in avoiding and minimising environmental impacts at the outset of the design as much as practicable.

2.3.1.2 Since the original design would cause certain concerns on loss of woodland, impacts on graves, quantity of spoil disposal, it is considered prudent to adopt these as the environmental considerations in the design review. The layout of the original design (Option A) shown as Appendix A in the EIA Study Brief (ESB-271/2014) is shown in **Figure 2.1**, and the current design (Option B) is shown in **Figure 1.1** and **Figure 1.2**. The differences between the 2 options (Original design – Option A and current design – Option B) are shown in **Figure 2.2** and **Figure 2.3**. As discussed in the following sections, the review has examined various key design elements including the following:

- Platform configuration for the columbarium;
- Network of the access roads and pedestrian link; and
- Pick-up / drop-off points at MTR Stations.

2.3.1.3 A summary of the overall design changes of the current design over the original design is given in the table below:

Table 2.2 Design changes summary

	Design changes
Optimization of Platform Configuration	<ul style="list-style-type: none"> • Shift platform to avoid direct impacts on wet woodland and seasonal watercourses directly feeding the wet woodland. • Increase the separation distance between the western toe of the slope and the wet woodland by installing a retaining wall and a hammer head arrangement for the emergency access. • Redesign platform to avoid direct impacts on clan graves.
Optimization of Road Network and Pedestrian Link	<ul style="list-style-type: none"> • Upgrade the existing Sha Ling Road. The new road tunnel and five of the viaducts in Option A would not be required. • Original pedestrian link near MTR Lo Wu Station would not be required.
Arrangement for Pick-up / Drop-off at MTR Station	<ul style="list-style-type: none"> • Adopt multiple pick-up / drop-off locations at a number of MTR Stations. Major road improvement and excavation works would not be required. • Choi Yuen Road widening would not be required.

2.3.1.4 With the above environmental considerations, the project boundary of the current design has been significantly reduced in comparison to that in the Study Brief (ESB-271/2014) (as shown in **Figure 2.2a**). However, for assessment purpose, the assessment area for noise, air quality, ecology, etc. is conservatively based on the extent of project boundary in the Study Brief.

2.4 Optimization of Platform Configuration

2.4.1.1 The original platform (Option A) for the columbarium would encroach onto a total of 2.0ha of woodland (see **Figure 2.2b**). The original slope works would also encroach onto 0.0017ha of wet woodland. The woodland affected is located in close vicinity along the seasonal watercourses leading to the Conservation Area downstream to the north (Inset 1 of **Figure 2.2b**). The wet woodland is located to the north of the Project boundary, and is confined by the marsh area to the north and the woodland to the east and south, it is directly fed by 4 seasonal watercourses flowing from the valleys of Sandy Ridge. In order to reduce the extent of direct impact on those woodland and wet woodland as much as practicable, the shape of the platform has been critically examined by taking into account of the latest habitat maps (see **Section 9** on the ecological assessment and the approach to establish the latest habitat map).

2.4.1.2 The original platform (Option A) for the columbarium would also encroach onto a total of 4 seasonal watercourses that directly feed into the wet woodland, 16.4ha of grassland and 2.2ha of plantation. These two landscape resources were found both along the hillside and the area with planted trees and shrubs in close proximity to disturbed areas, such as cemeteries as well as along Sha Ling Road.

2.4.1.3 According to the latest ecological survey results, the seasonal watercourses and the woodland are located at the southern part of the platform and the habitats to the northern and north-eastern part of the platform are mainly grassland and plantation. The current design (Option B) has therefore taken this latest information into consideration by shifting part of the platform to the northeast where only grassland and plantation are located.

2.4.1.4 The current design (Option B) has been refined to avoid direct impact (i.e. encroachment) on the wet woodland which has a high ecological value. Other than direct impact, the minimisation of indirect impacts has also been considered by increasing the separation distance between the western toe of the slope and the wet woodland. This has been achieved by allowing for a maximum gradient of about 26 degrees for a slope suitable for subsequent plantation and installing a retaining wall of about 6m tall and 100m long at the toe. According to this current design, a separation of at least 5m from the wet woodland can be achieved. For the southern part of the slope which may still affect one of the seasonal watercourses feeding the wet woodland,

measures to reduce the slope extent has also been duly considered. In order to achieve this, a hammer head arrangement instead of the conventional roundabout configuration has been adopted for the end of the Emergency Vehicular Access (EVA). By adopting this, the extent of the slope has been shrink by approximately 10m and would totally avoid that seasonal watercourse feeding the wet woodland. By adopting the above strategies, the area of the slope to the immediate east of the wet woodland has been reduced by approximately 0.2ha (a total of at least 15m separation from wet woodland to the toe by adopting the maximum gradient design and hammer head arrangement). This design has also avoided encroachment to the 4 seasonal watercourses that directly feed into the wet woodland, which have moderate ecological value.

2.4.1.5 Other than seasonal watercourses, woodland and wet woodland areas, the current design (Option B) has also addressed the potential issues on graves. While the original design (Option A) would have direct impacts on a total of 4 clan graves within the boundary of the platform, the current design of the platform would avoid all clan graves by adjusting the boundary of the platform.

2.4.1.6 **Figure 2.2b** and **Figure 2.3** present the latest platform with respect to both woodland and clan graves. By adopting this design, the area of woodland directly affected would be reduced by 1.0ha from 2.0ha to 1.0ha. In addition, the 4 seasonal watercourses that directly feed into the wet woodland, the wet woodland and all clan graves would be avoided. The plantation affected would be the same at 2.2ha, and the grassland affected would be reduced by 6.0ha from 16.4ha to 10.4ha.

2.5 Optimization of Road Network

2.5.1.1 Other than the configuration of the platform for the columbarium, the need and alignment for the access roads and pedestrian link have also been reviewed critically.

2.5.1.2 Based on the latest traffic arrangements, the western access road in the original design is no longer required (Option A). In the base scheme developed in the feasibility study, the existing Sha Ling Road remains as a single carriageway with minimum improvement works to serve as an emergency access and a pedestrian route during festival periods, which will encroach on 0.06ha of woodland by the tunnel and viaduct (Inset 2 of **Figure 2.2b**).

2.5.1.3 Alternatively, in order to fully utilise the existing Sha Ling Road, the feasibility of using Sha Ling Road as a major access to the development has been explored. This can be achieved by upgrading existing Sha Ling Road (Option B), instead of constructing a new road tunnel and viaduct connecting to the western part of the columbarium. This alternative scheme will fulfil Transport Department's and Hong Kong Police Force's key requirements as listed below:

- One way traffic loop for the operation of shuttle buses during festival periods; and
- No conflicting points exists for vehicular / pedestrian traffic movements by separating the two systems during festival periods.

2.5.1.4 For the roundabout and road extension to MacIntosh Fort, these exist at the current Sha Ling Road. Therefore, to minimise the extent of site formation work, this section of road will be upgraded by road widening, instead of constructing a new road. Also the roundabout is necessary to be as turnaround facility for the vehicles.

2.5.1.5 For the internal road with a dead end aligned on the slope near to the east proposed open car park, these internal roads with a dead end are for the purpose of Emergency Vehicular Access (EVA) of the columbarium building. It is required to be provided as per design standard.

2.5.1.6 However, the access road alongside of existing Sha Ling Road would need to be slightly shifted to the east by a maximum of 15m to avoid the need for a large amount of cutting on the terrain and avoid additional waste from the cut-fill (Inset 2 of **Figure 2.2b**). The shifting would in encroachment of 0.006ha of woodland located to the east of Sha Ling Road (Inset 4 of **Figure 2.2b**).

2.5.1.7 From environmental perspective, the current design (Option B) would avoid approximately 0.05ha of woodland. Inset 2 of **Figure 2.2b** illustrates the location of this 0.05ha of woodland. Preliminary estimation suggests that this would also avoid cutting the existing terrain and an additional amount of 260,000m³ of spoil.

2.5.1.8 Therefore, the net effect would avoid approximately 0.05ha of woodland loss and avoid the generation of 260,000m³ of spoil.

2.6 Pedestrian Link

2.6.1.1 In the latest transport and traffic arrangement, the pedestrian link between MTR Lo Wu Station and platform for columbarium is no longer required (**Figure 2.1a**). The current design has maximised the possibility of using vehicular access via Man Kam To Road, and therefore the original pedestrian link is no longer required. This would reduce encroachment onto the woodland for an area of about 0.01ha.

2.7 Arrangement for Pick-up / Drop-off at MTR Stations

2.7.1.1 The original design recommends a major pick-up / drop-off location at MTR Sheung Shui Station during the festival seasons. The design at that time would require certain road improvement works such as widening and hence may require certain noise mitigation measures in the form of noise barrier and enclosures.

2.7.1.2 However, in order to optimise the transportation of the grave-sweepers to the proposed C&C Facilities at Sandy Ridge Cemetery during the festival periods from different areas within Hong Kong, the current design would adopt multiple pick-up / drop-off locations at a number of MTR Stations during the festival seasons. These off-site pick-up and drop-off points are located at MTR Kwu Tung Station, MTR Fanling Station, existing Sheung Shui Landmark North Public Transport Interchange (PTI) and layby at Pak Wo Road near Flora Plaza.

2.7.1.3 The proposed pick-up / drop-off points would be located in either existing PTI or bus laybys, and no major road improvement works (e.g. road widening) is required. No excavation works would be required and only street furniture such as railing, etc. would be installed. All the minor works would not increase the design capacity of the existing facilities. For MTR Kwu Tung Station (including the PTI and shuttle bus services area), it will be constructed under the Planning and Development Study on North East New Territories (NENT) Contract and will be available by 2026. According to the approved EIA report for North East New Territories New Development Areas (AEIAR-175/2013), the environmental impacts were included in their study and confirmed within acceptable limits.

2.8 Environmental Improvements of the Current Design

2.8.1.1 A summary of the overall environmental benefits of the current design over the original design is given in the table below:

Table 2.3 Environmental benefits summary

	Environmental benefits		
	EIA Study Brief layout (Option A)	Current layout (Option B)	Reduction in Impact
Loss of woodland	2.0ha	1.0ha	50%
Loss of wet woodland (by slope works)	0.0017ha	0ha (with at least 15m separation from wet woodland)	100%

	Environmental benefits		
	EIA Study Brief layout (Option A)	Current layout (Option B)	Reduction in Impact
Number of seasonal watercourses that directly feed into the wet woodland affected	4	0	100%
Loss of grassland	16.4ha	10.4ha	36%
Number of clan graves affected	4	0	100%
Total surplus inert C&D materials	706,000m ³	481,800m ³	32%
Impacts on pick-up/drop-off at MTR Stations	Any noise mitigation measures near MTR Sheung Shui Station would have more visual intrusion on the neighbouring sensitive receptors	<ul style="list-style-type: none"> As the road widening works for a section of Choi Yuen Road are not required, noise and air quality impacts from the construction and operation are not anticipated. The secondary impacts induced from provision of noise barrier are also avoided. No major road improvement works and no excavation works are required for the proposed pick-up / drop-off points. 	
General environmental impacts	-	<ul style="list-style-type: none"> As the platform and works area have been significantly reduced, the environmental impacts such as air quality, noise, waste management, ecological, landscape and visual impacts to the nearby sensitive receivers are anticipated to be significantly reduced. 	

2.9 Conclusion

2.9.1.1 This section summarises options considered for the design of columbarium, crematorium and related facilities at Sandy Ridge Cemetery. **Sections 4 – 12** present the environmental assessments for the current design (i.e. Option B) with respect to various environmental aspects. The need and extent for any mitigation measures are also identified and recommended.