

Civil Engineering and Development
Department

Agreement No. CE 18/2012 (CE)
**Development of Anderson Road
Quarry - Investigation**

EIA Executive Summary

227724-REP-042-03

Final 3 | June 2014

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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227724/E/0001	Location of Project
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227724/E/0003	Recommended Outline Development Plan

1 INTRODUCTION

1.1 Background

- 1.1.1** The Anderson Road Quarries have been in operation since 1956. In 1998, the Central and East Kowloon Development Statement proposed new housing developments at a platform site covering about 40 ha of Anderson Road Quarries (the upper quarry site, now called the Anderson Road Quarry site, ARQ) and at an area west of Anderson Road covering about 20 ha (the lower quarry site, now called the Development at Anderson Road, DAR).
- 1.1.2** The site formation works of the lower quarry site are now in progress under Contract No. CV/2007/03 ‘Development at Anderson Road – Site Formation and Associated Infrastructure Works’.
- 1.1.3** PlanD commissioned Arup on 27 January 2011 under Agreement No. CE 4/2010 (TP) to undertake a Planning Study on Future Land Use at Anderson Road Quarry (the Planning Study) to examine the future land use and explore the development potential of the upper quarry area. The recommendations and the Recommended Outline Development Plan (RODP) proposed under the Planning Study provided the basis for the development at the ARQ.
- 1.1.4** CEDD commissioned Arup on 26 October 2012 under Agreement No. CE 18/2012 (CE) ‘Development of Anderson Road Quarry – Investigation’ to undertake the engineering feasibility study of the development proposals at the Anderson Road Quarry site recommended in the Planning Study and the associated road improvement works and pedestrian connectivity to Kwun Tong Town Centre and nearby MTR stations.

1.2 Study Area

- 1.2.1** The Study Area, as delineated in **Figure 227724/E/0001**, is located on the south-western slopes of Tai Sheung Tok at the far north-eastern edge of urban East Kowloon, and lies close to the major population centre of Kwun Tong, Lam Tin and Sau Mau Ping. Specifically, the Study Area covers an area of approximately 86 hectares, which includes a platform area of approximately 40 hectares.

1.3 EIA Study Brief

- 1.3.1** In accordance with the requirements of Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO), a project profile (No. PP-465/2012) for the Development of Anderson Road Quarry (the Project) was submitted to the Director of Environmental Protection (the “DEP”) for application for an EIA Study Brief on 8 May 2012. Pursuant to Section 5(7)(a) of the EIAO, the DEP has issued a Study Brief (No.: ESB-247/2012 dated 19 June 2012) for the EIA study.
- 1.3.2** The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and associated works that will take place concurrently. This information will contribute to decisions by the Director on:

- (1) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;
- (2) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
- (3) the acceptability of residual impacts after the proposed mitigation measures are implemented.

1.4 Designated Projects

1.4.1 The engineering feasibility study of the Project is a designated project (DP) under item 1 of Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO), which specifies that “Engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100,000”.

1.4.2 On the other hand, the Project also includes the proposed cavern development in the Study Area and the road improvement works at junction of (J/O) Lin Tak Road and Sau Mau Ping Road, at J/O Clear Water Bay Road and Road L1 of DAR, as well as at the merging lane at New Clear Water Bay Road near Shun Lee Tsuen Road. These have been identified as DPs as per Schedule 2, Part I of the EIAO:

- (1) Proposed cavern development: *Item Q.2 – Underground rock caverns;*
- (2) Road improvement works: *Item A.1 – A road which is an expressway, trunk road, primary distributor road or district distributor road including new roads, and major extensions or improvements to existing road.*

1.4.3 The locations of these two Schedule 2 DPs are shown in **Figure 227724/E/0002**. The potential environmental impacts of these two Schedule 2 DPs have been reviewed, and concluded that no insurmountable environmental impacts arise from these two Schedule 2 DPs. Nevertheless, the detailed environmental implications of these two Schedule 2 DPs will be further investigated in separate EIAs under EIAO.

2 PROJECT DESCRIPTION

2.1 General Description of the Project

2.1.1 The Project comprises the development of ARQ and associated supporting infrastructure. Through the Planning Study, a Recommended Outline Development Plan (RODP) for the development of the ARQ has been developed with residential as the leading land use. The development plan, the associated infrastructure provisions and the major activities in the project scope are outlined below.

2.2 Need for the Project

2.2.1 In the Policy Address 2010/11, the Chief Executive expressed Government's intention to make land available for an average of 20,000 new private units per year in the next 10 years and 15,000 Public Rental Housing (PRH) units per year, together with a total of 5,000 "My Home Purchase Plan (MHPP)" units and 5,000 Home Ownership Scheme flats per year. In previous consultation with Kwun Tong and Sai Kung District Councils during the Planning Study, members agreed that residential developments should be provided at the Study Area to meet the need on housing. Since the Study Area consists of a development platform of approximately 40 ha in area and in close proximity to urban area in Kwun Tong, it has a high potential to fulfil the territorial housing demand and can also act as a solution space for accommodating district-wide Government, Institution or Community (G/IC) provision.

Predicted Future Environment without Project

2.2.2 Due to its use as a quarry site, ARQ is a highly disturbed environment where ecological value is considered to be minimal. Under the rehabilitation contract (No. GE/96/10), the landscape of the quarry will be rehabilitated through extensive tree and shrub planting on exposed rock face.

2.2.3 Without the proposed development, the planting established under the rehabilitation contract will, though gradually, begin to mature. Some habitats may be expected to increase in ecological value in future as a result of ecological succession, such as the maturation of shrubland into woodland.

2.2.4 However, without the proposed development, the Study Area will be left as an extensive vacant government land. The opportunity to fulfil the social needs of the local community and to enhance local economy through the creation of recreational space, tourist development and G/IC facilities in the Study Area will be lost. It will also be difficult to meet the housing demand within the urban area for which alternative sites with similar development potential is unlikely to be available in the vicinity.

2.3 Recommended Outline Development Plan and Consideration of Alternatives

2.3.1 Taking into account the comments received from community engagements under the Planning Study with careful and comprehensive consideration, and the findings of the engineering feasibility study under this Assignment, the RODP have been refined and finalized.

2.3.2 **Figure 227724/E/0003** presents the final RODP. A summary of the major planning parameters proposed in the final RODP is given in **Table 2.1** below:

Table 2.1: Major planning parameters of the final RODP

Planning Parameters	
Total Population	25,000
Private Housing Population (no. of flat)	7,530
Subsidised Housing Population (no. of flat)	1,880
Residential Mix (Private : Subsidised Housing) (based on target population or number of units)	80:20
Average Plot Ratio – Private Housing	4.2
Average Plot Ratio – Subsidised Housing	6.3

Consideration of Alternatives

2.3.3 During the course of the engineering feasibility study, the following considerations have been given such that the Project will be implemented in a more environmentally friendly manner:

- (a) Alignment of Road L4 has been revised to substantially reduce the amount of rock cutting required;
- (b) Tunneling method will be used as an alternative construction method for the access road leading to Po Lam Road to reduce excavation required, reduce area of woodland affected and to preserve the surrounding natural habitats;
- (c) Discussion had been made with the Geotechnical Engineering Office (GEO) and quarry operator on the additional rock excavation to be carried out under the current Contract of “Rehabilitation of Anderson Road Quarry”. With this arrangement, the bulk rock excavation activities will be completed before the population intake of DAR and thus the inherent construction nuisances to population in DAR could be kept at the minimum.
- (d) The two proposed drainage retention tanks will be combined into one. With this arrangement, the piece of land being reserved for one of the drainage retention tanks will be released and quantity of excavated spoil materials require offsite disposal will also be reduced; and
- (e) The sewer pipe from ARQ site will be connected to the terminal manhole at Po Lam Road with a refined alignment. The proposal has been discussed with DAR project office and agreed that part of the proposed works, which falls within DAR’s project boundary, will be undertaken by DAR to minimise the traffic disturbance in future.

2.4 Nature, Benefit, Scope and Implementation Programme of the Project

Nature of the Project

2.4.1 The Project comprises housing and infrastructure developments at ARQ with a Study Area of about 86 hectares (including a platform site of approximately 40 hectares). The planning of the developments within ARQ are broadly divided into four areas, namely

the Civic Core, Northern Community, Southern Community, and Recreation Network, and will provide a mix of housing types as well as basic infrastructure and community facilities for a target population of 25,000.

Benefits of the Project

2.4.2 The benefits of the Project, including environmental benefits, are broadly described below:

Land Use Planning

- (1) Provide around 40 ha platform as a solution space to meet housing demand in the urban area.
- (2) Provide an opportunity to create a green and sustainable environment that complements the land uses and urban environment of the surrounding area.

Socio-economic Aspect

- (1) Provide an opportunity to increase housing choices to accommodate younger population and different income level in order to introduce a more balanced demographic mix, enable socio-economic development and thereby build a harmonious community.
- (2) With its unique location, land form, land area and visual resources, the quarry may potentially serve as a new recreational/ leisure/ tourism destination for both local residents and visitors.
- (3) Tourism development will contribute to the development of local economy and provide employment opportunities and, at the same time, improves the amenities and environmental quality of the area.

Engineering

- (1) Provide an opportunity to utilising spaces within rock caverns and drop-cuts to release land resources in other areas, and using the rock face for recreational purposes.

Environmental Benefits

- (1) The Project will provide the opportunity to remove the existing quarry (i.e. a bare site) from the urban area and to enhance the existing landform of the Study Area through greening to create a green and liveable community.
- (2) The Project will greatly enhance the landscape and visual resources/amenity of the existing barren quarry by creation of new open space, green promenade, Quarry Park, and pedestrian corridors which are well connected within the ARQ development and to the adjacent districts.
- (3) The Project will adopt appropriate building and urban design control to create pleasant micro-climate conditions in the Study Area.
- (4) The urban design scheme of the Project encourages the use of public transportation to access the Study Area in order to reduce traffic burden and air/noise pollution.
- (5) The existing rock crushing plant, concrete batching plant and asphalt plant in the existing quarry site can be removed through the Project and there will be opportunity to clean up these potentially contaminated lands.

- (6) As the Project makes use of existing land, rather than carrying out reclamation works, it reduces the need to explore reclamation options which will alter natural waterfront and seawater resources.

Scope and Implementation Programme of the Project

2.4.3

The scope and tentative implementation programme of the Project are summarised in **Table 3.1** below. The construction of the ARQ development is anticipated to commence in 2016 for completion in 2026. It is anticipated that the development will be commissioned in phases, with half of the population intake expected in 2022 and the final population intake in 2026.

Table 3.1: Scope of project

Works Package	Works Components	Works Arrangement/ Time Line
Works Package 1	Site formation at the southern portion of the Study Area	These works components are included in the EIA/ mid 2016 – end 2018
	Internal roads at the southern portion of the Study Area	
	Access road for main external access via. Po Lam Road	
	Access road for supplementary external access via. DAR local road with associated bus bays and semi-enclosure noise barrier	
	Supporting infrastructure works, including two-way escalators and subways, for pedestrian connectivity between development of ARQ and DAR	
	Stormwater drainage systems at the southern portion of the Study Area	
	Sewerage systems at the southern portion of the Study Area	
	Water supply systems at the southern portion of the Study Area	
	Landscaping at the southern portion of the Study Area	
	Works Package 2	
Internal roads with associated public transport terminus at the northern portion of the Study Area		
Stormwater drainage systems at the northern portion of the Study Area		
Sewerage systems at the northern portion of the Study Area		
Water supply systems at the northern portion of the Study Area		
Landscaping at the northern portion of the Study Area		
Works Package 3	Drainage retention tank in the Study Area	This works component is included in the EIA/ mid 2016 – mid 2019
Works Package 4	Viewing platforms	This work component is included in the EIA/ early

Works Package	Works Components	Works Arrangement/ Time Line
		2018 – end 2020
Works Package 5	Salt and fresh water pumping stations in the Study Area	These works components are included in the EIA/ mid 2018 – end 2020
	Service reservoirs in the Study Area	
Works Package 6	Road improvement works at J/O Lin Tak Road and Sau Mau Ping Road, including road widening works at Lin Tak Road and a new vehicular bridge from Lin Tak Road to Sau Mau Ping Road	The environmental acceptability of these works components is addressed in this EIA whilst the detailed environmental implications of these works components will be further investigated in a separate EIA under the EIAO/ early 2017 – early 2022
	Bus-bus interchange (BBI) at TKO Tunnel Toll Plaza Area	
	Associated site formation works	
Works Package 7	Road improvement works at J/O Clear Water Bay Road and Road L1 constructed under DAR, including provision of u-turn facility.	The environmental acceptability of these works components is addressed in this EIA whilst the detailed environmental implications of these works components will be further investigated in a separate EIA under the EIAO/ early 2017 – early 2021
	Road improvement works at merging lane at New Clear Water Bay Road near Shun Lee Tsuen Road, including increase of merging length	
	Associated site formation works	
Works Package 8	Rock cavern development	The environmental acceptability of this works component is addressed in this EIA whilst the detailed environmental implications of these works components will be further investigated in a separate EIA under the EIAO/ early 2018 – end 2020

2.5 Construction Method

2.5.1 The preferred construction methods are presented below:

Site Formation Works

2.5.2 The Study Area will be a net fill intake site that will not generate net inert C&D material disposal to the public fill bank. Fill would be imported to the Study Area to fill the area to the site formation level. Appropriate sources of fill material would be identified in consultation with the Public Fill Committee and Environmental Protection Department. Public fill from the fill bank will be adopted as far as available. The trucks logistic route for public fill import will utilize the existing Anderson Road and/or DAR local roads.

2.5.3 In order to avoid secondary environmental impact, external disposal of the spoil material will be minimized as far as technically practicable and subject to works programme. The phasing programme of the site formation has been determined to cope with the population intake programme.

Road Networks of the Study Area

2.5.4 The construction of road networks (including internal roads and access roads) and the associated drainage systems, sewerage networks, water supply networks and utility construction will include earthwork, utilities laying and paving.

Landscaping Works of the Study Area

2.5.5 Landscaping works will be conducted after site formation works. As it will mainly involve planting and minor pedestrian facilities, environmental impact is not anticipated.

Drainage Retention Tank

2.5.6 The area of drainage retention tank will be about 6,600 m². The major construction works will include earthwork and concrete works for the tank and construction of associated facilities including air ventilation ducts, intake fan room and deodorization room and control room, maintenance access road etc.

Service Reservoirs

2.5.7 The area of fresh and salt water service reservoirs will be about 600 m² and 108 m² respectively. The major construction works will include earthwork, slopework, concrete works for service reservoir structure and construction of associated pipeworks and maintenance access road.

Viewing Platforms

2.5.8 The major construction activities for the viewing platforms will be platform erection works on existing rock slope.

Rock Cavern Development and Road Improvement Works

2.5.9 Construction methods for the two associated infrastructures i.e. the cavern development and the road improvement works are also given below. As mentioned in **Section 1.4**, the detailed environmental implications of these two Schedule 2 DPs will be further investigated in separate EIAs under EIAO.

Rock Cavern Development

- 2.5.10** The major construction activities for the rock cavern development will be excavation works on existing rock slope.

Road Improvement Works

- 2.5.11** The major construction activities for the road improvement measures, e.g. road widening works and provision of u-turn facility, will include slope works and paving. For the construction of vehicular bridge from Lin Tak Road to Sau Mau Ping Road, in order to maintain the traffic flow and minimize disturbance to the existing traffic on TKO Road and the existing vehicular bridge over TKO Road during the construction of the flyover, balanced cantilever construction method with in-situ adjustable form-travellers might be adopted.

3 SUMMARY OF KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Air Quality

Construction Phase

3.1.1 Construction dust is the key pollutant during the construction phase of the Project which would be generated from various construction works, including site clearance, soil excavation, backfilling, temporary storage, handling and transportation of materials, and wind erosion of open sites.

3.1.2 Quantitative fugitive dust assessments have been conducted, taking into account the cumulative impact caused by nearby concurrent projects. Effective dust control following the requirements given in the Air Pollution Control (Construction Dust) Regulation and in accordance with the EM&A programme during construction are recommended. Assessment results suggested that watering at site once per hour would be required to control the fugitive dust impact to acceptable levels.

Operational Phase

3.1.3 The major sources of air quality impacts during the operational phase of the Project include vehicular emissions from proposed road network (i.e. proposed internal road within the Study Area and the DAR development, and the road improvement works) and the existing road network as well as chimney emissions from the United Christian Hospital and nearby restaurants.

3.1.4 Quantitative assessment on cumulative air quality impact has been conducted and based on the assessment results, all the predicted cumulative 1-hour and annual Nitrogen Dioxide (NO₂), 24-hour and annual Respirable Suspended Particulates (RSP), 24-hour and annual Fine Suspended Particulates (FSP) concentrations would comply with the relevant Air Quality Objectives (AQOs), except a marginal exceedance of annual NO₂ (i.e. 41 µg/m³) is found at 1.5m of ASMP-34 (Sau Fai House). The ground level of this single aspect building was intentionally designed not for residential purpose, but only for non-sensitive uses such as machinery and transformers plant rooms etc. The assessment result at 1.5m of this ASR is therefore for reference only. The floors occupied by residences are at least 5m above the ground level, and all assessment results at 5m and other higher levels of this ASR comply with the AQOs. Therefore, adverse cumulative air quality impact within 500m assessment area during the operational phase is not anticipated.

3.2 Noise

Construction Phase

3.2.1 Assessment of construction noise, including cumulative impact from the proposed pedestrian connectivity and the rock cavern development, has been conducted. With the implementation of all the practicable mitigation measures including good site practice, use of site hoarding, use of movable noise barrier & enclosure, use of “quiet” plant and working methods, the potential construction noise impacts to the nearby Noise Sensitive Receivers (NSRs) would be minimised.

3.2.2 However, due to the close proximity of some NSRs to the construction sites, residual construction noise impacts are anticipated at several planned NSRs including two planned residential NSRs and three planned educational institutions where exceedances have been identified during the normal and examination period. To further reduce the noise impacts, it is recommended that the Contractor should closely liaise with the schools to avoid scheduling the noisy construction works during examination period.

3.2.3 With the implementation of all the practicable mitigation measures, the residual noise impacts have been minimised. Given the transient nature of the impact, the residual noise impacts are considered acceptable.

Operational Phase

3.2.4 Operational noise impacts associated with road traffic noise and fixed noise sources have been assessed. With the recommendation of noise mitigation measures in form of setback, building orientation, use of non-noise sensitive use and non-openable windows/maintenance window that are not opened for ventilation, compliance of road traffic noise criteria is achieved in the ARQ. However, the road traffic noise assessment revealed that exceedance of noise criteria are found at several planned residential and educational institutions NSRs at DAR along Road L4. Direct mitigation measure in the form of a semi-enclosure is recommended along Road L4.

3.2.5 The sound power level for the fixed noise source (proposed pumping station for saltwater and freshwater and the proposed rock caver development) has been specified. Noise control measures have also been recommended for this fixed noise source in order to comply with the statutory criteria. The public transport terminus is recommended to be designed to no direct line-of-sight of the noise sources at the noise sensitive uses.

3.2.6 With the implementation of the recommended mitigation measures, no adverse noise impacts are anticipated during the construction and operational phase.

3.3 Water Quality

3.3.1 The potential water quality impacts arising from the construction and operation of the ARQ development have been assessed in accordance with the requirements of Annexes 6 and 14 of the TM-EIAO.

3.3.2 Water sensitive receivers (WSRs) have been identified for the Project, including Tseng Lan Shue Stream and Ma Yau Tong Stream. There will be no dredging, reclamation and stream/river alternation works such that in general the works will have no direct contact with water bodies.

3.3.3 During construction phase, potential water quality impacts would arise from construction runoff, sewage from workforce. Control measures such as silt traps and oil interceptors will be implemented on site to control the potential surface runoff. Best management practice as stipulated in the Practice for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94) should be followed.

3.3.4 During operational phase, change of hydrological regime is not anticipated. Non-point sources pollution due to additional runoff will be intercepted by silt traps. Regular cleaning of drainage system should be provided. Point source pollution due to sewage will be diverted to existing sewage system. It is understood that EPD's "Upgrading of

Kwun Tong Preliminary Treatment Works – Feasibility Study, Agreement No. CE5/2008(DS)” recommended to upgrade the peak capacity of the Kwun Tong Preliminary Treatment Works and should be adequate to cater for the additional flow from the ARQ development. No additional mitigation measure is required.

- 3.3.5** With full implementation of the mitigation measures, no adverse residual and cumulative impacts are anticipated during both the construction and operational phase of the Project.

3.4 Sewerage and Sewage Treatment

- 3.4.1** Sewage generated from the Project will be collected at the Kwun Tong Preliminary Treatment Works (KTPTW) for further treatment and disposal. Since the capacity of the KTPTW will be upgraded and the upgraded capacity will be adequate to cater for the increased flow due to the Project, no additional pumping stations and sewerage treatment facilities are required. The KTPTW upgrading works is anticipated to be completed in June 2021 under Agreement No. CE47/2013(DS) “Upgrading of Kwun Tong Preliminary Treatment Works – Investigation, Design and Construction”. Since the first population intake is planned in 2022, no programme gap between the KTPTW upgrading works and the ARQ development is anticipated.

- 3.4.2** However to cater for the increased sewage due to the Project, two routes of sewerage system will be built in the ARQ and upgrade of the downstream sewers at Po Lam Road is also recommended in order to handle the sewerage generated from ARQ.

3.5 Waste Management

Construction Phase

- 3.5.1** During the construction phase, typical wastes include top soil, construction and demolition (C&D) materials, rock, chemical wastes, general refuse and sewage would be generated. All generated top soil and inert C&D material would be reused on-site and off-site disposal is not required. For other wastes types such as chemical waste and general refuse, mitigation measures including good site practices, on-site sorting and reuse, proper storage, collection and transportation of waste, etc. are recommended. A summary of the construction waste arising from the works area with recommendation for outlets during construction phase is presented in **Table 3.1**.

Operational Phase

- 3.5.2** During the operational phase of the proposed development, municipal solid waste would be the major waste type. Recommendations are given to ensure proper handling and disposal of the waste. No adverse impacts on the environment would be anticipated with the implementation of the recommended mitigation measures. A summary of the waste arising from the operational phase is presented in **Table 3.2**.

Table 3.1: Summary of waste arising from the works area with recommendation for outlets during construction phase (Phase I and Phase II)

Activities	Waste type	Total amount generated (m ³)		Total amount reused (m ³)		Total amount disposed (m ³)		Recommended outlets
		Phase I	Phase II	Phase I	Phase II	Phase I	Phase II	
Site clearance	Top soil	2,300	2,300	2,300	2,300	0	0	Reuse within the site
	Vegetation	2,000	2,000	200	200	1,800	1,800	Reuse within the site; Disposal to landfill
	Contaminated soil	TBC ^[5]		N/A		N/A		
Site formation	Inert soft C&D materials ^[1]	78,000	312,000	78,000	312,000	0	0	Reuse within the site
	Rock ^[2]	102,000	120,000	102,000	120,000	0	0	Reuse within the site
Construction of new buildings and structures	AHM ^[3]	23,112	25,800	23,112	25,800	0	0	Reuse within the site as much as possible
	Non-inert C&D materials ^[4]	5,778	6,450	0	0	5,778	6,450	Reuse and recycle as much as possible before disposal to landfill
General construction activities	General refuse	308 tonne	410 tonne	0	0	308 tonne	410 tonne	General refuse: Disposal to landfill
	Paper, metals, plastics etc.							Paper, metals and plastics etc.: Collected by recycler
	Chemical waste	A few hundred litres per month		A few hundred litres per month				Recycled by licensed facility as far as possible, the remaining was disposal of at CWTC
	Sewage	37.5 m ³ /day		0		37.5 m ³ /day		Chemical toilets to be collected and disposed by licensed collector

Notes:

- [1] “Inert soft C&D material” includes, but not limited to, excavated soil.
- [2] “Rock” includes all grade rock.
- [3] “Artificial hard material” includes, but not limited to, broken concrete, asphalt, bitumen and granular materials, etc.
- [4] “Non-inert C&D material” includes, but not limited to, bamboo, timber, paper and plastic, etc.
- [5] TBC: To be confirmed. As the Study Area is managed by private operator and still in operation, therefore undertaking the environmental SI at this EIA stage is not feasible. The proposed environmental SI should be carried out once the operation is terminated and the land is resumed to determine the extent of land contamination.

Table 3.2: Summary of waste arising from the operational phase

Major activities	Waste type	Total amount generated	Handling procedures	Recommended disposal outlets
General activities within Study Area	Municipal Solid Waste	32.2tpd	Provide on-site refuse collection points with recycle bins	Disposal to landfill
	Paper, metal, plastic and glass etc.	35.0tpd		Recycler
Laboratory from secondary school	Chemical waste	Insignificant	Store on-site in designated area before being collected and disposed of by licensed collector	Recycle by licensed facility as much as possible, the remaining was disposal to CWTC

3.6 Land Contamination

3.6.1 The potential contaminative land use within the Study Area and their potential impacts to the future development has been assessed which involved desktop review, site surveys and proposed environmental site investigation (SI).

3.6.2 Based on the assessment results, a total of five potentially contaminated areas within the Study Area were proposed for environmental SI. However, as all the five potentially contaminated areas are managed by private operator and still in operation, undertaking the environmental SI works at this EIA stage is not feasible. The proposed environmental SI works for these areas should commence once the operation is terminated and the land is resumed.

3.6.3 Following the completion of the environmental SI, a Contamination Assessment Report (CAR) will be prepared to present the findings and evaluate the level and extent of the potential contamination. If land contamination is identified and remediation is required, a Remediation Action Plan (RAP) will be prepared to recommend specific remediation measures. Upon completion of the remediation works, if any, a Remediation Report (RR) to demonstrate the clean-up works are adequate would also be prepared. The CAR, RAP and RR would be submitted to EPD for approval prior to commencement of any construction / development works.

3.7 Ecological Impact

3.7.1 The proposed development will be concentrated at the existing quarry site and the surrounding developed areas which are of low ecological value. The majority of the plantation and secondary woodland habitats will be preserved and remain contiguous with the terrestrial hillside habitats at Tai Sheung Tok Hill. Hence, no major ecological impacts are expected of the Project.

3.7.2 The proposed road and underpass works at the southeast part of the Study Area will cause the loss of three scattered small-sized young secondary woodlands (with a total area of about 1.13 ha). These affected woodland are either isolated patches or at the woodland fringe, and the proposed underpass will go underneath the woodland and emerge at Po Lam Road. Hence, the overall integrity of the major woodland patch at the southeast part of the Study Area will be kept.

3.7.3 A Wooded Area of about 1.2 ha will be provided at the proposed Quarry Park to compensate for the loss of these small secondary woodland patches. An updated vegetation survey identifying any potential presence of floral of conservation importance within the inaccessible secondary woodland and habitats to be directly impacted by the proposed development, as well as transplantation of the affected individuals will be conducted prior to the construction phase. Relocation of Hong Kong Newts (or other species of conservation significance) found in the water channels or streams within the proposed development area will also be carried out as a precautionary measure.

3.7.4 Other mitigation measures recommended include good site practices to prevent construction site run-off from entering the nearby watercourses and to minimise the potential indirect light disturbance impact on the wildlife groups inhabiting the terrestrial habitats surrounding the Study Area. Overall, with the implementation of the proposed mitigation measures, all ecological impacts of the Project will be fully mitigated. Only low or insignificant residual impacts are predicted after the implementation of the mitigation measures. On the other hand, there will be a positive enhancement on the existing habitat with the compensatory planting in the future Quarry Park.

3.8 Landscape and Visual

3.8.1 The scale of ARQ Development, particularly ex-quarry barren land, will inevitably result in some landscape and visual impacts; which have been minimized through careful consideration of the layout plans for the development incorporate design mitigation measures such as, creation of new Quarry Park, creation of new open space and green spines, creation of, pedestrian corridors and breezeways, retention of views to ridgelines at strategic level, preservation of the Tai Sheung Tok Hill Rock Face as landmark for Kowloon East, aesthetic design of roads and streetscapes and provision of compensatory planting proposals, in the development. It is considered that the urban planning scheme on ARQ Development will have enhancement to both landscape and visual perspective.

3.8.2 Based on a very broad brush estimate, approximately 1,100 existing trees will be impacted by ARQ Development, of which approximately 1,021 no. of trees will be felled and 79 no. of trees will be transplanted. Approximately 5,000 nos. of trees will be planted within new open spaces and approximately 1,000 nos. of trees will be planted for new roadside amenity to compensate for the loss of existing trees. The overall residual impact on trees is considered acceptable with mitigation measures and in the longer term beneficial.

3.8.3 A Wooded Area of about 1.2 ha will be provided to compensate the loss of semi-natural hillside vegetation due to the proposed road and underpass. The loss of landscape resource will be compensated by the newly created landscape resources, such as buffer planting along new road when the trees in the new landscape resources matured. The permanent loss would be compensated by new trees planting, new recreational space, quarry park, green promenade, civic spine, streetscape and gateway at ARQ development. It is considered that the residual impact on this resource will be reduced to slight with implementation of compensation measures.

3.8.4 A series of open space system that create landscape and visual connector with landscape elements to accommodate a number of leisure, recreation and civic activities are proposed in the development layout. These combine different types and character of

spaces, comprising Quarry Park, Green Spines, Summit Outlook, Gateway features, Children Playground, Viewing Platform, Civic Square, Viewing Deck, Rock Face, Rock Cavern, Hiking Trail and Green Promenade. Key major open space provided at the close vicinity includes, Jordan Valley Park, Shun Lee Tsuen Sports Centre and Park, Sau Ngau Road Playground, Hong Ning Road Park and Sau Ming Road Park. A total of approximately 25 ha of open space and 37 ha of green belts (mainly on rock face) will be provided within the ARQ development. These open spaces are well connected within the development and to the adjacent surrounding districts. These new open spaces network are provided within ARQ at the close vicinity of the adjacent districts. Therefore the residual impact on LR9 and LR9.1 will be substantially beneficial in the future when all mitigation measures become mature.

3.8.5 Quarry Landscape Character Area LCA6 and LCA7 will be significantly enhanced by the proposed ARQ Development after 10 years of operation. As compared with the barren quarry, with little landscape resources/interests, the proposed ARQ Development with new open spaces interconnected with green corridors in a new urban setting. It is considered that the residual impact on LCA6 and LCA7 will be substantially beneficial in the future when all landscape becomes mature.

3.8.6 The scale and the extent of ARQ development is extensive and significantly alters the visual context of area, particularly due to partially or fully loss of open view, enclosure and blocking or reduction of depth of current view. There will unavoidably be moderate residual impact on the VSRs in Sau Mau Ping local area (R1.1, R1.2, R1.3, R1.4, R1.5, R1.6, R1.7, R1.8, R1.12, R1.15, O1.4, and P1.1). However, the impact will be slight after 10 years of operation. With implementation of mitigation measures, there will be new open spaces and visual resources. These visual resources will bring insubstantial visual impact to the VSRs in district and strategic levels.

3.8.7 Overall, the landscape and visual impacts due to the ARQ Development are considered to be acceptable with the implementation of the appropriate mitigation measures, there will be insubstantial impact for visual and in the long term be beneficial in respect of landscape.

3.9 Environmental Monitoring and Audit

3.9.1 The Environmental Monitoring and Audit (EM&A) requirements and the mitigation measures to be implemented during construction and operational phases of the ARQ development have been specified in the EM&A Manual. The EM&A Manual contains full details of the proposed baseline and impact monitoring programmes, as well as performance specifications, audit requirements and monitoring procedures. The EM&A programme will be implemented throughout the entire construction period and operation period (i.e. noise commissioning test for fixed noise sources) to regularly monitor the environmental impacts on the neighbouring sensitive receivers.

4 OVERALL CONCLUSION

- 4.1.1** The findings of the EIA provided information on the nature and extent of the environmental impacts likely to arise from the construction and operation of the ARQ development. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.
- 4.1.2** Overall, the EIA concluded that the ARQ development would comply with the requirements of the EIAO and TM-EIAO with the implementation of the proposed mitigation measures during the construction and operational phases. The schedule of implementation of the proposed mitigation measures has been provided in the EIA report. An EM&A programme has also been recommended to check the effectiveness of the proposed mitigation measures.