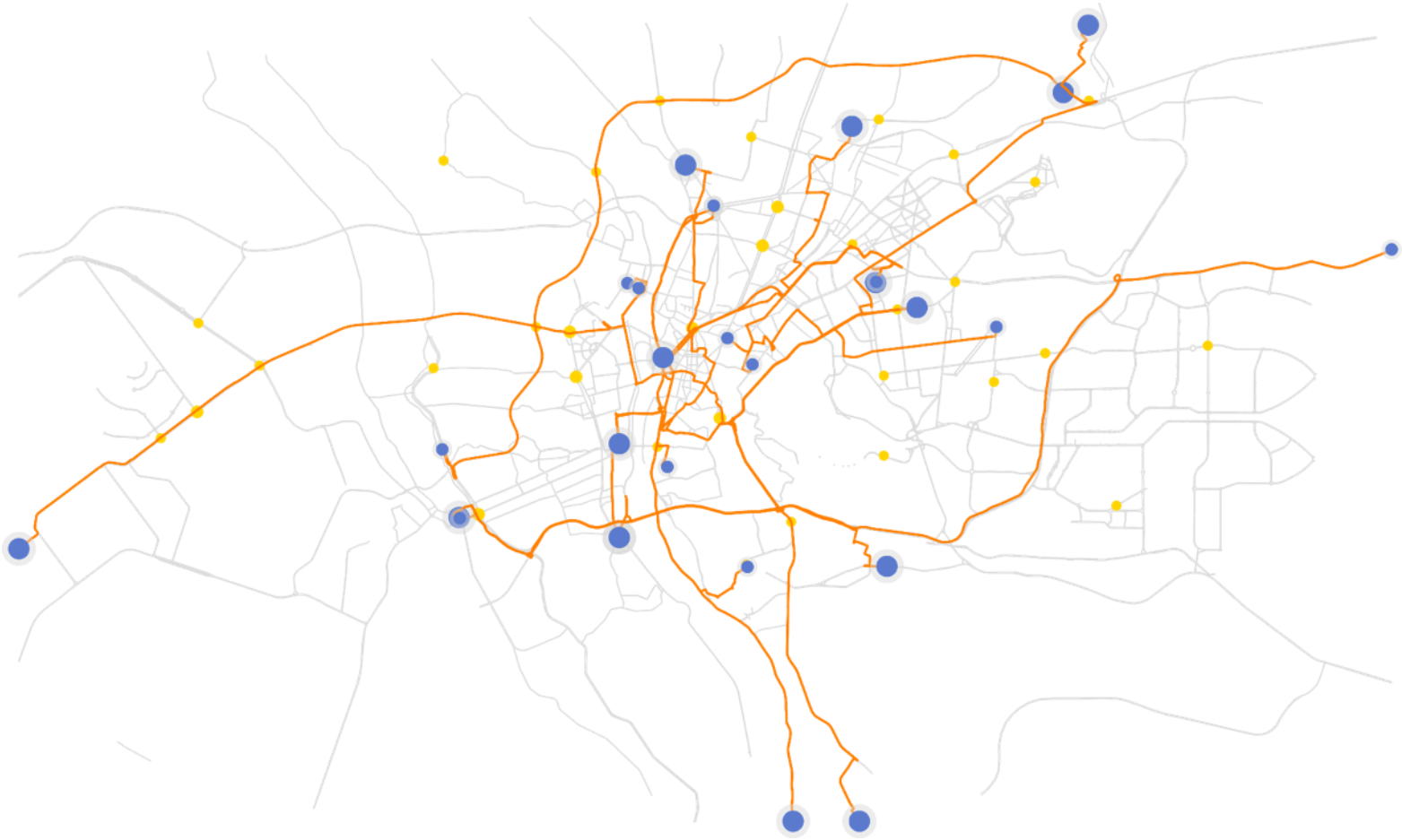

Environmental and Social Impact Assessment

D6-1 of the E-bus Demonstration Project

Task 6 – Environmental and Social Impact Assessment (ESIA)

SST-T06-RPT-014-7 ESIA (D6-1) TC.docx

Date 3/2/2025

Project Information Sheet

Client	Greater Cairo Air Pollution Management and Climate Change Project
Project Code	SETEC [026-53486] TfC [46]
Project Name	Electric Bus (e-bus) Demonstration Project Detailed Planning and Design Study for Cairo Transport Authority (CTA)
Project Director	Joachim NALET
Deputy Team Leader	Dr. Ahmed OSAMA
Consortium	SETEC/Shaker/Transport for Cairo
Start Date	09 January 2023

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Notice

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Abbreviation List

Acronym	Term
AC	Alternating Current
ANSI	American National Standards Institute
BC	Black Carbon
BMS	Battery Management System
C	Celsius
Capex	Capital Expenses
CAPMAS	Central Agency for Public Mobilization and Statistics
CCTV	Closed Circuit Television
CDA	Civil Defense Authority
CDM	Clean Development Mechanism
CIBSE	Charted Institution of Building Services Engineers
CNG	Compressed Natural Gas
CO	Carbon monoxide
CPOs	Charging point operators
CSS	Combined Charging System
CTA	Cairo transport authority
DC/C	Decommissioning and Construction
DSTA	Double Steel Tape Armored
E-bus	Electric bus
ECEPSE	Electrical Power Systems Engineering
EDC	Electrical Distribution Company
EEHC	Egyptian Electricity Holding Company
EGP	Egyptian Pound
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMC	Electromagnetic Compatibility
EMU	Environmental Management Unit
EoL	End of Life
ER	Environmental Register
ESCP	Environmental and Social Commitment Plan
ESF	Environmental And Social Framework

Acronym	Term
ESG	Environmental, Social and Gender
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EV	Electric Vehicles
EV-CS	Electric vehicle charging station
F °	Fahrenheit
F	Frequency
FGDs	Focus Group Discussions
FM	Factory Mutual
GBV	Gender Based Violence
GC	Greater Cairo
GCCC	Greater Cairo Air Pollution Management and Climate Change Project
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GIS	Geographic Information System
GIS	Gas Insulated Switchgear
GM	Grievance Mechanism
GoE	Government of Egypt
GPR	Ground Penetrating Radar
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HAZMAT	Hazardous Waste and Material Management Plan
HDPE	High Density Polyethylene
HR	Human Resources
HSE	Health and Safety Executive
HVAC	Heating, Ventilation, and Air Conditioning
ID	Identity Card
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers

Acronym	Term
IFC	International Finance Corporation
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
IPVSS	IP Video Surveillance System
JIN	Just-In-Time
kg	Kilogram
km	Kilometer
KV	Kilovolt
KWh	Kilo Watt hour
L*W*H	Length*Width*Height
LAN	Local Area Network
LED	Light Emitting Diode
LFP	Lithium Iron Phosphate
LMP	Labor Management Procedures
LTO	Lithium-Titanate-Oxide
MCA	Multi Criteria Analysis
MDB	Main Distribution Board
MEP	Mechanical, Electrical, and Plumbing
MoE	Ministry of Environment
MOHP	Ministry of Health and Population
MoLD	Ministry of Local Development
MoT	Ministry of Transport
MSDS	Materials Safety Data Sheets
MV/LV	Medium Voltage/Low Voltage
NCM Li-ion / NMC	Nickel Cobalt Manganese Lithium-ion
NFPA	National Fire Protection Association
NGO	Nongovernmental Organization
No.	Number
NOx	Nitrogen Oxides
NVRs	Network Video Recorders
O&M	Operation and Maintenance
O/M	Operation and Maintenance
OCC	Operation Control Center
Opex	Operating Expenses
OSH	Occupational Safety and Health

Acronym	Term
OSHA	Occupational Safety and Health Administration
PCU	Project Coordination Unit
PM10	Particulate Matter with a diameter of 10 microns or less
PM2.5	Particulate Matter with a diameter of 2.5 microns or less
PMSM	Permanent Magnet Synchronous Motor
PPE	Personal Protective Equipment
PRV	pressure reducing valves
PVC	Polyvinyl Chloride
RMU	Ring Main Unit
RTU	Remote Terminal Unit
S	Severity
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
SMP	Safety Management Plan
SOx	Sulfur Oxides
SPCC	Spill Prevention, Control, and Countermeasure
SS	Substation
SST	Setec Shaker Transport for Cairo Consortium (Consultant)
TfC	Transport for Cairo
TFT	Thin-film-transistor
TIUs	Technical Implementation Units
TOR	Terms of Reference
TTMP	Temporary Traffic Management Plan
UL	Underwriters Laboratories
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UPS	Uninterruptible Power Supply
V	Volt
VFD	Variable Frequency Drives
VSD	Variable Speed Drive

Acronym	Term
WB	World Bank
WBG	World Bank Group
WBG EHS	World Bank Group Environmental, Health and Safety
WDR	Wide Dynamic Range
WHO	World Health Organization
WMP	Waste Management Plan
WMRA	Waste Management Regulatory Authority
WU	Wheelchairs users

ESIA Team

Name	Positions
Dr. Amr Osama	President, Integral Consult
Dr. Ahmed Wafiq	CEO, Integral Consult
Dr. Hanaa El Gohary	Social Development Expert
Eng. Eman Maher	Technical Team Lead, Integral Consult
Eng. Yehia El Koot	Environmental Specialist
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الملخص التنفيذي

مقدمة

تواجه محافظة القاهرة على مدى السنوات الأخيرة تحديات كبيرة في مجال النقل العام، يأتي على رأسها الازدحام المروري المستمر، وارتفاع مستويات تلوث الهواء إلي مستويات مُقلقة، حيث تساهم حافلات النقل العامة، التي تعمل في الغالب بوقود الديزل منخفض الجودة بشكلٍ كبير في تلوث الهواء، مما يتسبب في حدوث تداعيات صحية خطيرة. حيث يسعى نحو مليوني شخص سنويًا للحصول على علاج طبي لمشاكل الجهاز التنفسي المرتبطة بتلوث الهواء. بالإضافة إلى ذلك، يتسبب تلوث الهواء في تكاليف اقتصادية كبيرة تتحملها الدولة، تعادل حوالي ١,٤٪ من الناتج المحلي الإجمالي لمصر سنويًا. لذلك، تأتي أهمية تطوير قطاع النقل العام لمعالجة هذه المشكلات الملحة.

واستجابةً لهذه التحديات، وافق البنك الدولي في سبتمبر ٢٠٢٠ على تمويل مشروع إدارة تلوث الهواء وتغير المناخ في القاهرة الكبرى، الذي يضم المكون الثالث "المشروع الاسترشادى للحافلات الكهربائية"، والذي يتضمن أستبدال ٧٥ من الحافلات التى تعمل بالديزل/ الغاز الطبيعى بحافلات كهربائية يقدر عددها ب ٩٨ حافلة لتأدية نفس خدمات الحافلات المستبدلة، كما يتضمن تحديث جراج الأميرية في منطقة السواح لاستيعاب أسطول الحافلات الكهربائية الجديد.

يمثل مشروع الحافلات الكهربائية خطوة استراتيجية نحو نظام نقل عام أكثر استدامة وكفاءة في القاهرة الكبرى، مع التركيز بشكل رئيسي على تقليل انبعاثات غازات الاحتباس الحراري وتلوث الهواء، وتخفيف الازدحام المروري، وتحسن/حماية الصحة العامة. وهذا الهدف يتماشى مع الرؤية الوطنية والعالمية للعمل المناخي، بما في ذلك رؤية مصر ٢٠٣٠، والالتزامات الدولية بموجب اتفاقية باريس، والجهود العالمية الأوسع لمكافحة تغير المناخ وتعزيز التنمية المستدامة.

أهداف المشروع

يهدف مشروع الحافلات الكهربائية إلى تحسين جودة الهواء وتقليل الانبعاثات من خلال شراء وتشغيل عدد من الحافلات الكهربائية حيث يهدف المشروع إلى استبدال ٧٥ حافلة تعمل بالديزل والغاز الطبيعي بحافلات كهربائية. وللحفاظ على نفس مستوى الخدمة والأداء الذي تقدمه الحافلات الحالية، يحتاج المشروع إلى ٩٨ حافلة كهربائية. كما يشمل المشروع تطوير جراج الأميرية في منطقة السواح ليستوعب أسطول الحافلات الكهربائية الجديد.

موقع المشروع

موقع الجراج

تم اختيار إحدى جراجات هيئة النقل العام ليكون المحور المركزي لتشغيل وصيانة أسطول الحافلات الكهربائية المستقبلية، وهو جراج الأميرية بحي السواح. يقع جراج الأميرية بالمنطقة الشمالية بمحافظة القاهرة، وتبلغ مساحته الإجمالية ٢٦,٨٤٤ مترًا مربعًا. ويعتبر طريق السواح وطريق المصانع هما الطريقين الرئيسين للوصول إلى الجراج، وتقع بوابة الدخول الرئيسية وبوابة الطوارئ على شارع "السواح" وتوجد بوابة ثالثة عند طريق المصانع.

ونظراً أن جراج الأميرية تابع لهيئة النقل العام، فلا توجد حاجة لحيازة أراضي لاستيعاب مشروع الحافلات الكهربائية.

يقع الجراج في منطقة تضم أحياء سكنية وتجارية وصناعية متنوعة. وبفضل قربه من الطرق الرئيسية، يمكن للحافلات الكهربائية الانطلاق بسهولة وفعالية دون التأثير بالسلب على حركة سكان المنطقة، مما يسهل دمج الحافلات الكهربائية الجديدة في نظام النقل العام الحالي.

مسارات الحافلات

قام الاستشاري بدراسة أحد عشر (١١) مسار للحافلات الحالية التي يخدمها جراج الأميرية والتي تم الحصول عليها من قبل هيئة النقل العام. بناءً على معايير اختيار الطرق الموضحة بمزيد من التفصيل في دراسة تقييم الأثر البيئي والاجتماعي المعدة للمشروع، تم اختيار خمسة (٥) مسارات لاستبدال حافلاتها التي تعمل بوقود الديزل/الغاز الطبيعي بالحافلات الكهربائية.

وفيما يلي المسارات المختارة:

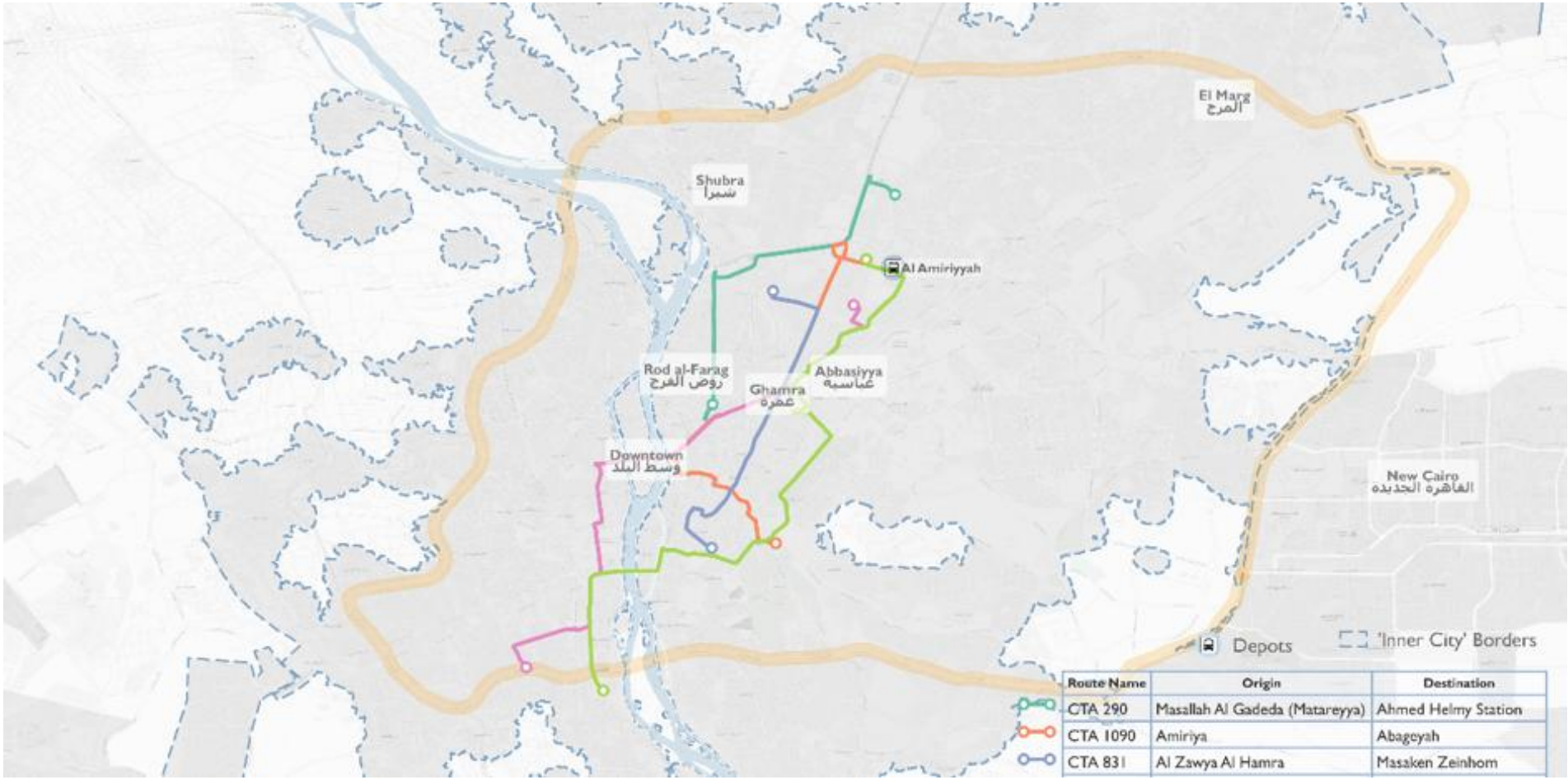
- الإباجية – الأميرية
- الأميرية – المنيب
- محطة أحمد حلمي – المسلة الجديدة (المطرية)
- العمرانية الجديدة - قسم الحدائق
- الزاوية الحمراء - مساكن زينهم

وكجزء من التحول نحو الاستدامة، تم تحديد مرحلة انتقالية أولية، حيث سيتم شراء عدد من الحافلات الكهربائية نظيفة وصديقة للبيئة وموفرة للطاقة لتحل محل ٧٥ حافلة تعمل بوقود الديزل/الغاز الطبيعي حاليًا في المسارات الخمسة المختارة لتحقيق التشغيل اليومي للطرق. حيث يقدر عدد الحافلات الكهربائية المطلوبة لتعويض هذا العدد من حافلات الوقود ب ٩٨ حافلة كهربائية.

وتوضح الأشكال التالية موقع الجراج ومسارات الحافلات الكهربائية المختارة السابق ذكرهم.

شكل ١: موقع جراج الأميرية

شكل 2: مسارات الخطوط الخمسة



مكونات المشروع

يتكون المشروع الإسترشادي للحافلات الكهربائية من ثلاث مكونات رئيسية كما هو موضح أدناه:

- اختيار وتجهيز جراج في نطاق القاهرة الكبرى، بما في ذلك تركيب محطات شحن في الجراج الحالي وبناء مرافق جديدة لاستيعاب بنية الشحن التحتية وورش الصيانة الخاصة بالحافلات الكهربائية.
- اختيار مسارات الحافلات الكهربائية الجديدة: تم دراسة عدد من الخطوط التي تخدم الجراج المختار واختيارها لتشغيل الحافلات الكهربائية واستبدال حافلات الديزل والغاز الطبيعي على تلك المسارات.
- توريد الحافلات الكهربائية والشواحن: يتضمن المشروع شراء أسطول من الحافلات الكهربائية حيث يقدر عددها ب ٩٨ حافلة كهربائية بمواصفات معينة لتحل محل ٧٥ حافلة تعمل بوقود الديزل/الغاز الطبيعي التقليدية في نظام النقل العام بأحد الجراجات بالقاهرة الكبرى.

الإطار القانوني

يخضع المشروع الحالي للقوانين والسياسات الوطنية والدولية، حيث يجب أن تتوافق مكونات المشروع المقترح مع المتطلبات الوطنية والدولية. إذا كان هناك اختلاف بين المعايير المحلية ومعايير مجموعة البنك الدولي، فسيتم اعتماد المعايير الأكثر صرامة.

بالاضافة إلى ذلك، تشمل دراسة تقييم الأثار البيئية والاجتماعية للمشروع الإطار القانوني والتنظيمي لهذا المشروع القوانين المصرية المعمول بها وجميع التعديلات واللوائح التنفيذية اللاحقة ومعايير مجموعة البنك الدولي ذات الصلة. تمت مناقشة المواد والمعايير ذات الصلة بالمشروع، وكذلك السلطات المسؤولة عن تنفيذ القانون وعقوبات المخالفات بدراسة تقييم الآثار البيئية والاجتماعية للمشروع. كما تلتزم وحدة إدارة المشروع بكل المعايير المحلية والدولية.

بعض القوانين والمعايير التي تنطبق على المشروع:

- قانون البيئة رقم ٤ لسنة ١٩٩٤ والمعدل بالقانون ٢٠٠٩/٩ و٢٠١٥/١٠٥ اللوائح التنفيذية المعدلة.
- قانون العمل رقم ١٣٧ لسنة ١٩٨١ المعدل بالقرار رقم ١٢ لسنة ٢٠٠٣ والمعروف أيضًا باسم قانون العمل الموحد.
- قانون المرور رقم ٦٦ لسنة ١٩٧٣، المعدل بالقانون رقم ١٢١ لسنة ٢٠٠٨ للتخطيط لحركة المرور.
- قانون رقم ٢٠٢ لسنة ٢٠٢٠ بشأن تنظيم جهاز ادارة المخلفات ولائحته التنفيذية ٧٢٢ لسنة ٢٠٢٢.
- قرار وزير الاسكان والمرافق والمجتمعات العمرانية رقم ٤٤ لسنة ٢٠٠٠ الخاص بتعديل اللائحة التنفيذية للقانون رقم ٩٣ لسنة ١٩٦٢ في شأن صرف المخلفات السائلة.
- المعاهدات الدولية.
- معايير البنك الدولي البيئية والاجتماعية (ESSs) ذات الصلة بمشروع حافلات النقل الكهربائي هي كالتالي: المعيار ESS1، المعيار ESS2، المعيار ESS3، المعيار ESS4، المعيار ESS6، المعيار ESS8، والمعيار ESS10.
- قانون العمل رقم ١٣٧ لسنة ١٩٨١ المعدل بقرار ١٢ لسنة ٢٠٠٣ والمعروف بقانون العمل الموحد.

الآثار البيئية والاجتماعية الإيجابية والسلبية المحتملة للمشروع

أ) <u>الأثار أثناء مرحلة تطوير وإعادة تأهيل الجراج:</u>

تتضمن **<u>الآثار الايجابية</u>** الرئيسية المتوقعة ما يلي:

- توفير فرص عمل جديدة مباشرة وغير مباشرة للعمالة المحلية والعمالة الوافدة.
- تحسين البيئة من خلال إزالة مصادر التلوث الحالية بالجراج مثل محطة الوقود وورش الصيانة، ومعادلة وردم أو استخراج خزانات الديزل بعد تفريغها. وقد افادت شركة مصر للبترول أن ٩٠٪ من الحالات المشابهة لخزانات الديزل تحت الأرض يتم تحييدها ودفنها باستخدام الرمال. بالإضافة إلى إزالة المضخات لتجنب تسرب الوقود وتلوث التربة والمياه الجوفية. علاوة على ذلك، إيقاف تشغيل نظام غسيل الحافلات الحالي ذو التكنولوجيا القديمة جدًا والذي يستهلك كميات كبيرة من المياه مما يسبب هدر الموارد.
- يوفر المشروع الفرص لمقدمي الخدمات الغذائية وخدمات التنظيف، مما يزيد من النشاط الاقتصادي في المنطقة.
- وتتضمن **<u>المخاطر والآثار السلبية</u>** الرئيسية المتوقعة للمشروع خلال مرحلة الانشاء ما يلي:
- جودة الهواء: يمكن أن تؤدي انبعاثات أول أكسيد الكربون(CO) ، الجسيمات العالقة(PM) ، الهيدروكربونات(HC) ، ثاني أكسيد الكبريت (SO_2) والغبار الناتج عن أعمال الحفر والهدم ومناولة المواد إلى تأثيرات مؤقتة تؤثر على العمال والسكان القريبين.

- الضوضاء والاهتزازات: الضوضاء الناتجة عن الآلات والمحولات وأنشطة البناء، إلى جانب الاهتزازات الناتجة عن المعدات الثقيلة وأعمال الدك والحفر، قد تسبب اضطرابات محتملة للعمال والسكان المجاورين والأنشطة التجارية.
- التربة والجيولوجيا والطوبوغرافيا: هناك خطر من تلوث التربة بسبب تسرب محتمل من خزانات الديزل المدفونة، بالإضافة إلى مخاطر سوء التخلص من النفايات وسوء التعامل مع المواد الكيميائية، كما قد يؤدي تعرض التربة للأمطار والرياح إلى حدوث تعرية.
- المسطحات المائية والمياه الجوفية: هناك احتمال لتلوث المياه الجوفية نتيجة تسرب الوقود أو المواد الكيميائية، أو بسبب التخلص غير السليم من مياه الصرف الصحي.
- كفاءة الموارد والتلوث:

زيادة استهلاك الطاقة والمياه.

استخدام مواد البناء مثل الأسفلت، الخرسانة، الكابلات، المضخات، والرمل المستخدم في تحييد خزانات الديزل.

إنتاج نفايات خطرة وغير خطرة، مثل خزانات الديزل والزيوت ومخلفات البناء.

مخاطر سوء إدارة النفايات مما يؤدي إلى التلوث والمخاطر الصحية العامة.

- مخاطر الكوارث الطبيعية / حالات الطوارئ:

تأثيرات الأمطار الغزيرة وموجات الحر على العمال والمعدات.

مخاطر الحرائق الكهربائية، تسرب الوقود، وتعطل المعدات.

خطر الانفجار بسبب خزانات الديزل المدفونة في حالة عدم التعامل معها بشكل صحيح.

- الصحة والسلامة المهنية:

التعرض للغبار، الضوضاء، الحرارة، والمواد الخطرة.

مخاطر الحفر، العمل على ارتفاعات، والمخاطر الكهربائية.

المخاطر النفسية مثل الإجهاد والتعب.

الحوادث الناجمة عن نقص التدريب والإجراءات الوقائية.

- إعادة توزيع القوى العاملة: سيتم نقل جميع العاملين في هيئة النقل العام بالقاهرة من جراج الاميرية إلى الجراجات المجاورة، مما قد يؤدي إلى مخاطر اجتماعية
- صحة وسلامة المجتمع: زيادة حركة المركبات الثقيلة قد تؤدي إلى حوادث مرورية، كما أن الوصول غير المصرح به إلى موقع البناء (مثل الأطفال أو السكان غير المدركين للمخاطر) قد يشكل خطراً، بالإضافة إلى مخاطر الانفجار بسبب بقايا الوقود في خزانات الديزل المدفونة.
- التدفق المؤقت للعمالة: قد يؤدي إلى ضغط على الموارد المحلية مثل الإسكان والطعام والرعاية الصحية، بالإضافة إلى مخاطر أمنية ونزاعات اجتماعية محتملة.
- عمالة الأطفال: هناك خطر توظيف الأطفال من قبل المقاولين الفرعيين أو مقدمي الخدمات، مما قد يؤدي إلى تعرضهم لظروف عمل غير آمنة وتعطيل تعليمهم.
- العنف القائم على النوع الاجتماعي (GBV) والاستغلال والانتهاك الجنسي :(SEA-SH) زيادة مخاطر التحرش والاستغلال والتمييز، مما يجعل النساء أكثر عرضة للمخاطر داخل مكان العمل والمجتمع المحيط.
- السلامة المرورية: زيادة حركة المركبات الثقيلة تؤدي إلى ازدحام مروري، مما يزيد من مخاطر الحوادث التي تشمل المشاة والمركبات الأخرى

ب) ,<u>الأثار أثناء مرحلة التشغيل:</u>

ب-١) تشغيل الجراج:

- تحسين البيئة: إزالة مصادر التلوث مثل محطات الوقود وخزانات الديزل.
- تحسين حالة التربة: تقليل مخاطر تلوث التربة من خلال إزالة مرافق معالجة وتخزين الوقود.
- الحفاظ على الموارد الطبيعية (المياه): تطبيق تكنولوجيا غسيل الحافلات الموفرة للمياه مع إعادة تدوير تصل إلى ٧٠٪ من المياه المستخدمة.
- التقدم التكنولوجي: تركيب معدات صيانة وتشغيل متقدمة.
- إعادة تأهيل عمال الجراج وهيئة النقل العام.

ب-٢) تشغيل الحافلات الكهربائية:

- تقليل انبعاثات الغازات الدفيئة.

- تحسين جودة الهواء.
- تقليل الضوضاء المرورية.
- تحسين تدفق المرور.
- تحسين جودة الخدمة.
- إعادة تأهيل عمال وسائقي هيئة النقل العام
- تشجيع سوق السيارات/الحافلات الكهربائية.
- تحقيق وفورات اقتصادية.

التأثيرات السلبية:

أ- تشغيل الجراج:

- تلوث التربة: مخاطر من تسرب الزيوت وإدارة النفايات غير السليمة.
- زيادة استهلاك الكهرباء: ارتفاع كبير في أستهلاك الكهرباء.
- توليد نفايات خطرة: نفايات متوقعة تشمل الأسلاك الكهربائية والزيوت وملفات المحولات، والبطاريات، ومواد التشحيم.
- تعرض الجراج لمخاطر الفيضانات والحرائق.
- تولد الحمأة: نتيجة عمليات معالجة المياه الناتجة عن غسيل الحافلات.
- مخاطر صحية وسلامة: التعرض للصدمات الكهربائية، والمواد الخطرة، والإصابات الجسدية.

ب- تشغيل الحافلات الكهربائية:

- انبعاثات الغبار من سير الحافلات الكهربائية على الطرق.
- ارتفاع الطلب على الكهرباء نتيجة الشحن المتكرر للحافلات.
- زيادة استهلاك البطاريات وتآكل الإطارات نتيجة لموجات الطقس الحارة.
- توليد النفايات والخردة.
- تعرض الحافلات لمخاطر الفيضانات والحرائق.
- مخاطر صحية وسلامة: التعامل مع أنظمة كهربائية ذات جهد عالٍ.

بدائل المشروع

تم دراسة عدد من البدائل الخاصة بتنفيذ المشروع المقترح والموضحة كالتالي:

أ) عدم اتخاذ أي إجراء

لن يستفيد سكان القاهرة الكبرى من نظام نقل مستدام وفعال وآمن، وسيستمرون في مواجهة مخاطر حوادث المرور ونظام نقل عام غير أمن عكس ما توفره الحافلات الكهربائية من نظم مراقبة وأمان وتدريب السائقين على القيادة الأمنة والوقوف فى الأماكن المحددة. كما سيظل الاعتماد على السيارات الخاصة، مما يزيد من الضغط على الطرق، ويرفع مستويات التلوث وانبعاثات غازات الاحتباس الحراري، ويزيد من تكاليف التنقل.

سيظل هناك ٧٥ اتوبيس يعمل بوقود الديزل/الغاز الطبيعي يصدر عنها انبعاثات تلوث هواء القاهرة ، وتتولد عنها انبعاثات الغازات الدفيئة، وتزيد من مستويات الضوضاء، وتزداد المخاطر المتعلقة بالسلامة والأمان، وتتقلص الفوائد الاجتماعية والاقتصادية، وتزداد المخاطر الصحية بسبب تلوث الهواء

بناءا على ما سبق، فأن المشروع يهدف إلى تحسين هذا الوضع بتوفير نظام نقل عام يعتمد على حافلات كهربائية تعمل بكفاءة وبأمان أعلى، مما يقلل من حوادث المرور بفضل تكنولوجيا أكثر تطوراً وتحسين إدارة النقل العام لتكون أكثر أماناً واستدامة.

ب) بدائل تكنولوجيا الحافلات

تم اختيار الحافلات الكهربائية لأنها تقدم مزايا عديدة مقارنة بالخيارات الأخرى. فهي لا تنتج العادم، وتقلل بشكل كبير من انبعاثات الغازات الدفيئة على مدى دورة حياتها، ولا تصدر ضوضاء مثل الحافلات التي تعمل بوقود الديزل/الغاز الطبيعي. ورغم أرتفاع تكلفة شراء الحافلات الكهربائية، إلا أنها توفر تكاليف تشغيل أقل على المدى الطويل بسبب التوفير في الوقود والصيانة. بالإضافة إلى ذلك، تساهم الحافلات الكهربائية في تحسين جودة الهواء والصحة العامة، مما يجعلها خيارًا أكثر استدامة وصديقًا للبيئة.

ت) بدائل البطاريات

تم تحليل ثلاثة أنواع رئيسية من البطاريات المستخدمة في الحافلات الكهربائية: فوسفات الحديد الليثيوم (LFP) ، ليثيوم تيتانات (LTO)، ونيكل مانجنيز كوبالت ليثيوم أيون(NMC) .

تمت مقارنة هذه البطاريات بناءً على وقت الشحن، سيناريوهات الاستخدام، التأثير البيئي، والتكلفة، حيث حصلت **بطارياتLFP** على أعلى تقييم بفضل دورة حياتها الطويلة واستقرارها الحراري وتكلفتها المعتدلة. تم اختيار سيناريو البطارية بسعة ٣٨٠ كيلوواط ساعة لكفاءتها العالية. كما تمت دراسة بدائل التخلص من البطاريات بانتهاء عمرها، وأفضل خيار هو **إعادة تدويرها من قبل المصنعين أو إعادتها للمورد.**

ث) بدائل المسارات والجراجات

تم تنفيذ تحليل متعدد المعايير لتحديد أفضل المسارات والجراجات لإدخال الحافلات الكهربائية في شبكة النقل بالقاهرة. بعد تحليل البيانات، والتحليل الفني والاجتماعي والبيئي والسياسي، والمسوحات الميدانية، تم اختيار جراج الأميرية كأفضل خيار. هذا الاختيار نابع من وقوع الجراج داخل كتلة سكنية وخدمية كثيفة، مما يعني أن المشروع سيخدم أكبر عدد من المواطنين من فئات عمرية مختلفة. بالإضافة إلى ذلك، المسارات التي تم اختيارها ذات كثافة مرورية عالية، وبالتالي سيحقق المشروع خفضًا كبيرًا في الانبعاثات والملوثات.

ج) تخطيط الجراج

تم اقترح ودراسة بدائل لمخططات الجراج، يهدف كل منها إلى تعزيز شروط التشغيل والصيانة. بالإضافة إلى ذلك، يهدف التخطيط المقترح إلى استيعاب عدد أكبر من أسطول الحافلات الكهربائية مستقبلي من خلال توفير مساحة متاحة لتوريد إضافي للحافلات الكهربائية، إذا لزم الأمر.

ح) بدائل طرق إيقاف التشغيل:

يوجد في الجراج أربع خزانات ديزل تحت الأرض، كل منها بسعة ٣٥ متر مكعب، مملوكة لشركة مصر للبترول. تم اقتراح السيناريوهين التاليين للتعامل مع هذه الخزانات:

السيناريو الأول معادلة الأس الهيدروجيني، وصيانة الخزانات تحت الأرض

في هذا السيناريو، سيتم تحييد وتنظيف خزانات الديزل تحت الأرض بشكل شامل حيث سيتم ملؤها بالرمل النظيف من الداخل. كما سيتم ملء غرفة الخزان العلوية بالرمل والخرسانة للحد من المخاطر البيئية. وستظل الخزانات تحت الأرض لتقليل الاضطراب في الموقع مع ضمان السلامة البيئية. هذا النهج يهدف إلى تقليل كمية النفايات الخطرة الناتجة عن إزالة هذه الخزانات والتربة الملوثة.

السيناريو الثاني: معادلة الأس الهيدروجيني، واستخراج، ونقل الخزانات

يتضمن هذا السيناريو تحييد خزانات الديزل تحت الأرض ثم استخراجها من الموقع. سيتم إزالة الخزانات بعناية ونقلها إلى منشآت مخصصة للتخلص منها أو إعادة تدويرها بشكل صحيح. يركز هذا المنهج على الإزالة الكاملة للخزانات ويشمل تطهير التربة لمعالجة أي مخاوف بيئية متبقية من التسريبات. هذا النهج يوفر مساحة لإعادة تطوير الموقع أو استخدامات أخرى، لكنه يولد كمية كبيرة من النفايات الخطرة (تربة ملوثة) تتطلب التخلص الآمن في مدافن النفايات الخطرة. بالإضافة إلى ذلك، ستتطلب هذه الطريقة الحصول على موافقة الدفاع المدني مما يزيد من مدة الاضطراب في الموقع.

بناءً على المقارنة والتقييم، يُعتبر السيناريو الأول: تحييد وصيانة الخزانات تحت الأرض الخيار الموصى به بسبب تكلفته المنخفضة، وتقليل إنتاج النفايات، والمدة الأقصر، وانخفاض مخاطر السلامة.

خطة الإدارة والرصد البيئي والاجتماعي

تم وضع خطة الإدارة البيئية والاجتماعية لضمان الامتثال لمتطلبات التشريعات واللوائح والمعايير البيئية الوطنية والدولية المعمول بها ذات الصلة من خلال تنفيذ مجموعة من تدابير التخفيف، فضلاً عن الإدارة السليمة لجميع الآثار البيئية والاجتماعية الهامة والتحسين المستمر في الأداء البيئي والاجتماعي للمشروع.

تلخص الخطة تدابير التخفيف المقترحة وتناقش تدابير المراقبة والإدارة الأولية والمستمرة للتأثيرات الكبيرة للمشروع المقترح أثناء مرحلة الانشاء والتشغيل للجراج والحافلات الكهربائية. سيتم ضمان الامتثال لمتطلبات خطة الإدارة البيئية والاجتماعية.

وقد تم تحديد خمسة عناصر كحجر الأساس لخطة فعالة كما يلى:

- **الأهداف والغايات البيئية:** تحديد مجموعة من الأهداف والغايات التي يجب تحقيقها، ومؤشرات لقياس الأداء البيئي للنظام، والتي تغطيها الأهداف والغايات البيئية والاجتماعية.
- **السياسة البيئية والاجتماعية:** صياغة سياسة بيئية واجتماعية من قبل الإدارة العليا، والتي تضمن جوانب السياسة البيئية والاجتماعية.
- **الإدارة البيئية والاجتماعية:** تعيين فريق إدارة بيئية واجتماعية لضمان التنفيذ الفعال لجميع تدابير الإدارة البيئية والاجتماعية المقترحة.

- **الرصد البيئي والاجتماعي:** وضع خطة لرصد المؤشرات والمعايير البيئية والاجتماعية، على النحو المبين في خطة الرصد البيئي والاجتماعي.
- **السجل البيئي:** الاحتفاظ بسجل بيئي لضمان الامتثال للمتطلبات القانونية الوطنية، المشمولة في السجل البيئي.

التخطيط للاستجابة للطوارئ ووضع خطط الطوارئ.

سلامة وصحة العمال.

إشراك المجتمع.

آلية التظلمات (GRM)

تم إعداد وثيقة مستقلة لآلية التظلمات (GRM) لهذا المشروع، تتضمن الخطوات الرئيسية لآلية التظلمات، والقدرات التنظيمية والمؤسسية، وتنفيذ الآلية، بالإضافة إلى عمليات المتابعة والتقييم. تغطي آلية التظلمات الشكاوى المتعلقة بـ:

- التحرش الجنسي،
- الأشخاص ذوي الإعاقة،
- التشغيل.

التشاور مع الجهات المعنية

قد تضمن التشاور المجتمعي - بالإضافة إلى الاجتماعات الشهرية لفريق البحث والهيئة ووحدة تنسيق المشروع- الأنشطة التالية مع الأطراف المختلفة على النحو التالي:

- ١٥ مقابلة جماعية مع السيدات والرجال والشباب في ٥ مناطق محيطة بخطوط الأميرية
- مقابلة مع ٧ أفراد من ذوى الاحتياجات الخاصة
- استطلاع رأي الركاب بناء على عينة مكونة من ٥٨٣ فردا من ٢٩ منطقة
- ١٥ اجتماع مع المسئولين بالهيئة والعاملين بجراج الأميرية
- مقابلات مع السائقين من الهيئة

وقد أجمع الحاضرون في اللقاءات المختلفة أن جماعات الركاب الهشة الأولى بالرعاية والاهتمام باحتياجاتهم في التصميم والتشغيل هي:

- الفئات ذوي الدخول المنخفضة
- السيدات من كل الفئات العمرية
- السيدات المرافقات لأشخاص تابعة
- الأشخاص ذوي الإعاقات بمختلف أنواعها
- كبار السن من الجنسين

عُقدت جلسة التشاور المجتمعي في فندق تريومف بلازا، هليوبوليس، في ١٧ يوليو ٢٠٢٤، بحضور حوالي ٤٦ مشاركاً. تم إبلاغ الضيوف بموعد ومكان الجلسة قبل أسبوعين على الأقل من تاريخ الاجتماع، حيث تم إرسال الدعوات من قبل المكتب الاستشاري بالتعاون مع وحدة تنسيق المشروع عبر الواتساب والبريد الإلكتروني والمكالمات الهاتفية.

كان الهدف من الجلسة عرض نتائج دراسة تقييم الأثر البيئي والاجتماعي مع التركيز على التأثيرات البيئية والاجتماعية الناتجة عن المشروع وطرق تخفيف الآثار السلبية وتعظيم الفوائد الإيجابية والتأكد من رضا الأطراف المعنية عن التدابير المتخذة لتقليل التأثيرات البيئية والاجتماعية.

خلال الجلسة، تم عرض الأفكار التالية:

- غسيل الحافلات باستخدام الطاقة الشمسية: لم يتم تضمين هذه الفكرة في الدراسة، ولكنها تتماشى مع الأهداف البيئية للمشروع. تم تصميم المرفق بحيث يسمح بدمج أنظمة الطاقة المتجددة في المستقبل، ولكن بسبب القيود المالية واللوجستية، فإن تطبيق نظام غسيل يعمل بالطاقة الشمسية في هذه المرحلة غير ممكن.
- تشغيل المرفق بالطاقة الشمسية: تعترف دراسة تقييم الأثر البيئي والاجتماعي بفوائد تشغيل المرفق بالطاقة الشمسية، وتم بالفعل دمج الأساسات والتجهيزات اللازمة لتركيب الألواح الشمسية مستقبلاً. ومع ذلك، نظرًا للمساحة الكبيرة المطلوبة (حوالي ١٠٠,٠٠٠ م^2) والتكلفة العالية لتشغيل الحافلات بالكهرباء الشمسية بالكامل، فلن تكون الطاقة الشمسية المصدر الرئيسي للطاقة في هذه المرحلة.
- تحويل الحافلات القديمة من الديزل إلى الكهرباء: تم دراسة جدوى إعادة تأهيل الحافلات القديمة، ولكن تبين أن شراء حافلات كهربائية جديدة يعد خيارًا أكثر كفاءة من حيث التكلفة، والأداء التشغيلي، والتوافق التكنولوجي.

- اختيار نموذج الحافلات وفقًا لظروف الطرق: تمت دراسة اختيار نموذج الحافلات بعناية لضمان ملاءمته لظروف الطرق في القاهرة. وقد تم اقتراح التواصل مع هيئة الأبحاث العسكرية للمساعدة في تحديد المواصفات المثلى للحافلات لتتحمل ظروف التشغيل المحلية.
- نظام إدارة الأسطول والتطبيقات الذكية: لا تشمل دراسة تقييم الأثر البيئي والاجتماعي نظام إدارة الأسطول، ولكن لدى هيئة النقل العام استراتيجية خاصة بها، كما يتضمن مستند المناقصة شرطًا بأن تكون الحافلات مزودة بنظام مراقبة وتتبع.
- نظام التذاكر: تعمل هيئة النقل العام حاليًا على تنفيذ نظام التذاكر المدفوعة مسبقًا، وتم توظيف استشاري متخصص في هذا المجال. لم يتم تضمين هذا النظام في الدراسة حيث يتم إدارته في إطار مبادرة منفصلة.
- تدريب سائقي الحافلات الكهربائية والعاملين: تؤكد الدراسة على أهمية برامج التدريب للعاملين والسائقين، والتي تشمل التدريب الفني والسلامة، خاصة فيما يتعلق بأنظمة الجهد العالي، والاستجابة للطوارئ، وقيادة الحافلات بأسلوب موفر للطاقة.
- إعادة توزيع العمالة: يتطلب التحول من الحافلات العاملة بالديزل والغاز الطبيعي إلى الحافلات الكهربائية خطة لإعادة توزيع العمالة. وقد تم الإشارة إلى هذا الأمر في الدراسة ضمن التخطيط لقوة العمل لضمان تقليل التأثيرات الاجتماعية السلبية وتعظيم الاستفادة من العمالة الحالية.
- انقطاع الكهرباء وأمن الطاقة: تم تناول مخاوف انقطاع الكهرباء في دراسة الجدوى، والتي أكدت أن تشغيل الحافلات الكهربائية سيكون من الأولويات القومية مثل نظام المترو، مما يضمن الحد الأدنى من التأثر بانقطاع الكهرباء. وقد تم النظر في إمكانية حدوث انقطاع لمدة تصل إلى ساعة واحدة، مع وضع خطط بديلة للتعامل مع هذه الحالة.ز

شارك معظم الحاضرين بفعالية في الجلسة وقدموا أفكاراً مثمرة للنقاش. كما تم توزيع استبيانات على المشاركين عند وصولهم لتقديم آرائهم وأسئلتهم.

Executive Summary

Introduction

In recent years, Cairo Governorate has faced significant challenges in the realm of public transportation, primarily due to persistent traffic congestion and alarming levels of air pollution. Public buses, which predominantly run on low-quality diesel fuel, are major contributors to air pollution, leading to severe health consequences. Annually, around two million people seek medical treatment for respiratory issues linked to air pollution. Furthermore, air pollution imposes substantial economic costs on the state, accounting for approximately 1.4% of Egypt's GDP each year. This underscores the critical importance of developing the public transportation sector to address these urgent issues.

In response to these challenges, the World Bank approved funding for the Greater Cairo Air Pollution and Climate Change Management Project in September 2020. This project includes a pilot initiative under its third component: the "Electric Bus Project," which aims to introduce electric buses and upgrade Al-Ameriyah Depot in the Al-Sawah area to accommodate this new electric bus fleet.

The electric bus project represents a strategic step towards a more sustainable and efficient public transportation system in Greater Cairo, with a primary focus on reducing greenhouse gas emissions and air pollution, alleviating traffic congestion, and protecting public health. This goal aligns with national and global climate action visions, including Egypt's Vision 2030, international commitments under the Paris Agreement, and broader global efforts to combat climate change and promote sustainable development.

Project Objectives

The Electric Bus Project aims to improve air quality and reduce emissions by purchasing and operating electric buses to replace the 75 existing diesel and natural gas buses. To maintain the same level of service and performance as the current fleet, it is estimated that 98 electric buses are required. The project also includes the retrofitting and development of the Al-Ameriyah Depot in the Al-Sawah area to accommodate the new electric bus fleet.

Project Location

1 Depot Location

One of the Public Transport Authority's depots, the Al-Ameriyah Depot in the Al-Sawah district, has been selected as the central hub for the operation and maintenance of the future electric bus fleet. The Al-Ameriyah Depot is located in the northern region of Cairo Governorate, with a total area of 26,844 square meters. The main access routes to the depot are Al-Sawah Road and Al-Masaneh Road, with the main entrance located on Al-Sawah Street and another gate on Al-Masaneh Road.

Since the Al-Ameriyah Depot is owned by the Public Transport Authority, there is no need to acquire additional land to accommodate the electric bus project. The depot is situated in an area with a mix of residential, commercial, and industrial zones. Its proximity to major roads allows the electric buses to be easily and efficiently deployed without negatively impacting local residents, facilitating the integration of the new electric buses into the existing public transport system.

As part of the transition towards sustainability, an initial phase with the selected five (5) routes will see the procurement of clean, environmentally friendly, and energy-efficient electric buses to replace the current 75 diesel/natural gas buses on these routes. Thus, to ensure the daily operation of the routes the 75 diesel/natural gas buses shall be replaced by 98 e-buses to maintain the same equivalent service levels.

The following figures illustrate the location of the depot and the selected electric bus routes.

Figure 0-1 Depot Location and surrounding activities

2 Bus Routes

The consultant studied eleven (11) current bus routes serviced by the Al-Ameriyah Depot.

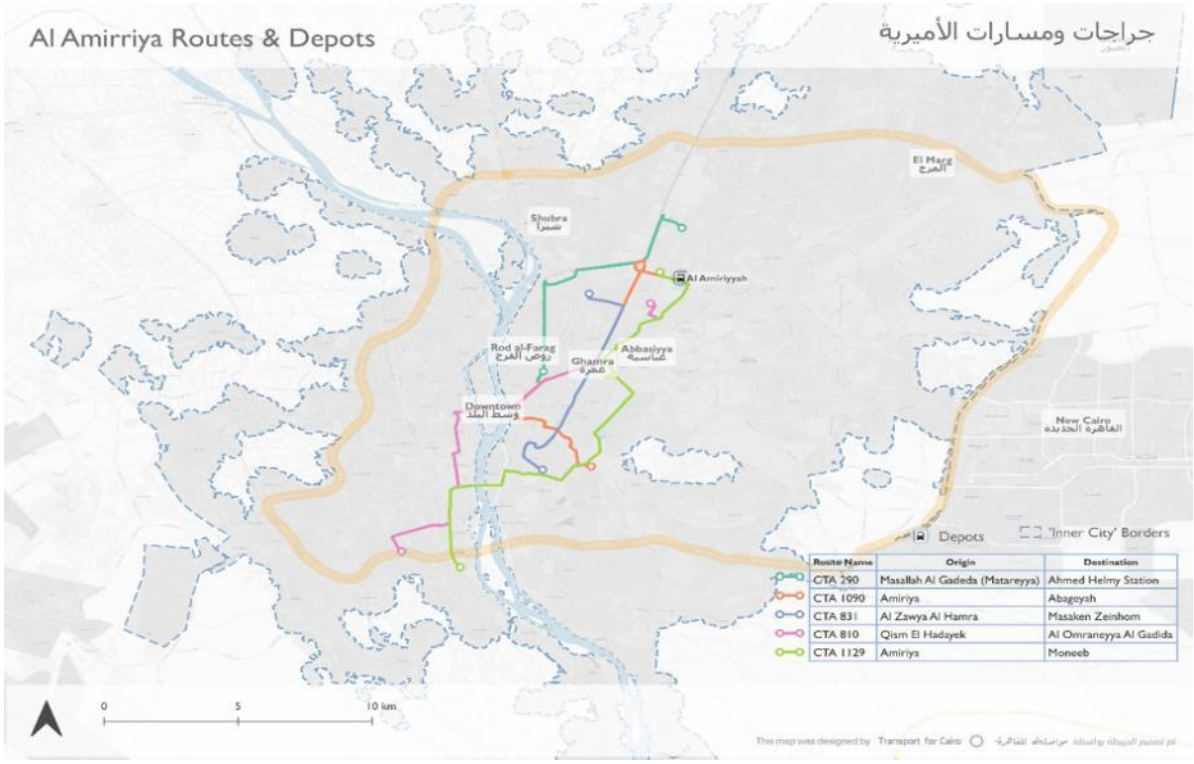


Figure 0-2 The five (5) selected routes

The data was provided by the Public Transport Authority. Based on route selection criteria detailed further in the project's Environmental and Social Impact Assessment (ESIA), five (5) routes were selected for replacing their diesel and natural gas buses with electric buses.

The selected routes are as follows:

- Abageyah - Al-Ameriyah
- Al-Ameriyah - Moneeb
- Ahmed Helmy Station - Masallah Al Gadeda (Matariyah)
- Al Omraneya Al Gadida - Qism El Hadeyek
- Al Zawya Al Hamra - Masakin Zeinhom

Project Components

The Electric Bus Project consists of three main components, as outlined below:

- Selection and Preparation of a Depot: This involves choosing and equipping a depot within Greater Cairo, including the installation of charging stations at the existing depot and the construction of new facilities to accommodate the charging infrastructure and maintenance workshops specifically for electric buses.
- Route Selection: Several bus routes serviced by the selected depot were studied and chosen for the operation of electric buses, replacing diesel and natural gas buses on these routes.
- Procurement of Electric Buses and Chargers: The project includes the purchase of a fleet of 98 electric buses with specific technical specifications to replace the traditional diesel and natural gas buses in the public transport system at one of the depots in Greater Cairo in order to maintain the same level of service and performance as the current 75 CNG/ diesel buses, it is estimated that 98 electric buses are required.

Legal Framework

The current project is subject to both national and international laws, standards and policies, and the components of the proposed project must comply with these national and international requirements. In cases where there is a discrepancy between local standards and World Bank Group standards, stricter standards will be adopted.

Additionally, the project's Environmental and Social Impact Assessment (ESIA) includes the legal and regulatory framework for this project, covering applicable Egyptian laws and all subsequent amendments and executive regulations, as well as relevant World Bank Group standards. The ESIA discusses the project-related materials and standards, the authorities responsible for law enforcement, and the penalties for violations. The Project Coordination Unit (PCU) is committed to adhering to all local and international standards.

The following illustrates some of the laws and standards applicable to the project:

- Environment Law No. 4/1994 amended by Laws No. 9/2009 and 105/2015, and its amended Executive Regulations by Decrees No. 1095/2011, 710/2012, and the Prime Minister Decree No. 964/2015, Decree No. 618, 1963 of 2017 and amended ER no 2466/2024. This law controls the potential environmental impacts of the proposed project
- Labor Law No. 137 of 1981, as amended by Decree No. 12 of 2003, also known as the Unified Labor Law.
- Public Cleanliness Law No. 38/1967 amended by Law No. 31/1976 and its executive regulations issued by the Ministry of Housing by Decree No. 134/1968 dealing with solid waste to regulate the collection and disposal of construction and operation waste and maintaining the cleanliness of roads and public properties.
- Law No. 93/1962 amended by Decree No. 44/2000 concerning sewage disposal on domestic wastewater network and its implementing regulations.

- Law No. 202/2020 and its Executive Regulation No. 722/2022 on regulating waste management (policies and commitments related to waste management hierarchy implementation and establishing the Waste Management Regulatory Authority (WMRA) and its mandates where Articles 15, 16,20,31, 33,34, 38 for municipal waste and articles 58,60 and 61 for hazardous waste.
- The following WB ESSs are relevant to E-bus demonstration project (ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8 and ESS10.

Potential Environmental and Social Impacts of the Project

Impacts During Decommissioning and Construction:

3 Positive Impacts:

In general, the project will enhance environmental conditions by removing current pollution sources at the depot, such as the fueling station and maintenance workshops. Diesel tanks will be either neutralized and buried or neutralized and extracted. However, it was reported by Misr Petroleum that 90% of similar cases, underground diesel storage tanks are neutralized and buried using sand. Fuel pumps will be removed to avoid potential spills. Additionally, decommissioning of the current washing area of very old technology consumes large amounts of water, causing a waste of resources.

During decommissioning and construction phase the project is expected to have the following positive impacts:

- Job Creation: New direct and indirect employment opportunities for local and migrant workers.
- Economic Activity: The project will stimulate economic activity in the area, providing opportunities for service providers, such as food vendors and cleaning services.

4 Negative Impacts:

- Air Quality: Gaseous emissions from machinery, vehicles, and transformers, including CO2, NOx, CO, PM, HC, and SO2 and Dust emissions due to excavation, demolition, and material handling. could lead to temporary impact affecting workers and nearby residents.
- Noise and Vibration: Noise from machinery, transformers, and construction activities and vibration from heavy equipment, pile driving, and excavation could lead to potential disturbance to workers, nearby residents, and businesses.
- Soil, Geology, and Topography: Potential soil contamination from underground diesel tanks.
  Risks of improper waste disposal and chemical handling and Soil erosion from exposure to rain and wind.
- Water Bodies and Groundwater: Potential groundwater contamination from fuel/chemical spills and wastewater discharge.
- Resource Efficiency and Pollution:
  Increased energy and water consumption.
  Use of asphalt, concrete, cables, pumps, and sand for neutralizing diesel tanks.
  Hazardous and non-hazardous waste generation (e.g., diesel tanks, oils, construction debris).
  Risk of mismanagement causes pollution and public health hazards.
- Natural Disaster Risk / Emergency Situations:
  Heavy rains and heat waves affecting workers and equipment.
  Risks of electrical fires, fuel spills, and equipment malfunctions.
  Risk of explosion from decommissioning of underground diesel tanks if not properly handled.
- Occupational Health and Safety
  Exposure to dust, noise, heat, and hazardous materials.
  Risks from excavation, working at heights, and electrical hazards.
  Psychological hazards from stress and fatigue.
  Accidents due to lack of proper training, safety inspections, and protective measures.
- Labor Force Relocation: CTA will temporarily relocate all workers to nearby depots which may lead to social risks if not managed properly.

- Community Health and Safety: Increased heavy vehicle movement leading to traffic accidents, risks from unauthorized access to the site (e.g., children, unaware residents), And explosion risks from due to in adequate safety measures during the decommissioning of the fuel tanks
- Temporary Labor Influx: Pressure on local resources (e.g., housing, food, healthcare) and potential security concerns and conflicts.
- Child Labor: Risk of child labor under subcontractors or service providers leads to exposure to unsafe working conditions and disruption of education.
- Gender-Based Violence (GBV) and SEA-SH: Increased risk of harassment, exploitation, and discrimination and vulnerability of women in the workplace and surrounding community.
- Road Safety: Increased heavy vehicle movement leading to traffic congestion which leads to higher risk of accidents involving pedestrians and other vehicles.

1 Positive Impacts During Operation:

a) Operation of the Depot

- Environmental Improvement: Elimination of pollution sources like fueling stations and diesel storage tanks at the depot.
- Soil Condition Improvement: Reduce soil contamination risks through removal of fuel handling and storage facilities.
- Water Conservation: Implementation of water-efficient bus-washing technology, with 70% wastewater recycling.
- Technological Advancement: Installation of advanced maintenance and operational equipment.
- Job Creations.

b) Operation of Electric Buses

- Reduction in Greenhouse Gas Emissions.
- Improved Ambient Air Quality.
- Reduced Traffic Noise.
- Traffic Flow Optimization.
- Improvement of Quality of Life (service quality).
- Rehabilitation of CTA Workers and Drivers.
- Market Expansion by encouraging the electric cars/buses market.
- Economic Savings.

2 Negative Impacts During Operation:

a) Operation of The Depot:

- **Soil Contamination:** Risks from accidental spills or leakage of lubricants, improper waste management, and leaks from the wastewater network inside the depot.
- **Increased Electricity Consumption:** Significant rise in electricity demand (up to 8 MVA) due to depot operations.
- **Hazardous Waste Generation:** Expected waste includes wires, transformer coils, spills, batteries, lubricants, and cleaning agents.
- The depot is exposed to risks from hot waves and/or heavy rains, which could disrupt operations.
- **Sludge Generation:** Resulting from the e-buses washing wastewater treatment processes.
- **Health and Safety Risks:** Risks include exposure to electric shocks, hazardous substances, physical injuries, ergonomic issues, and accidents related to bus operations and maintenance.

c) Operation of E-buses:

- Significant rise in electricity demand anticipated due to the frequent charging of e-buses.
- Potential increase in battery energy consumption leading to more frequent recharging, as well as accelerated tire wear requiring replacements.
- Generation of waste and scrap, including broken/unused parts, tires, spare parts, wastewater from sewage network failures, and municipal solid waste.

- Health and Safety Risks**:** Handling high-voltage electrical systems and battery management introduces specific risks, such as electric shocks and battery-related incidents.

Project Alternatives

Several alternatives were considered for the implementation of the proposed project, as detailed below:

No Project:

Impact on Residents: Residents of Greater Cairo would not benefit from a sustainable, efficient, and safe public transport system. They would continue facing traffic accidents and relying on an unsafe public transport system, unlike the benefits provided by electric buses, such as enhanced safety features, driver training for safe driving, and designated stopping areas. Continued reliance on private cars would increase road congestion, pollution, greenhouse gas emissions, and transportation costs.

Environmental Impact: Seventy-five diesel and CNG -powered buses would continue contributing to air pollution in Cairo, emitting greenhouse gases, increasing noise levels, and posing greater safety risks. The social and economic benefits would be diminished, and health risks from air pollution would increase.

Based on the above, the new electric bus project aims to improve this situation by offering a public transport system with efficient and safer electric buses, reducing traffic accidents with more advanced technology and better management for a safer and more sustainable public transport system.

Bus Technology Alternatives:

Electric Buses: Electric buses were chosen due to their significant advantages over other options. They produce no exhaust emissions, greatly reduce greenhouse gas emissions over their lifecycle, and are much quieter than diesel or natural gas buses. While the initial purchase cost is higher, electric buses offer lower long-term operating costs due to savings on fuel and maintenance. Additionally, electric buses contribute to improved air quality and public health, making them a more sustainable and environmentally friendly option for urban transportation.

Battery Alternatives:

Battery Analysis: Three main types of batteries used in electric buses were analyzed: Lithium Iron Phosphate (LFP), Lithium Titanate (LTO), and Nickel Manganese Cobalt (NMC) Lithium-Ion batteries. These batteries were compared based on charging time, usage scenarios, environmental impact, and cost. LFP batteries received the highest rating due to their long lifecycle, thermal stability, and moderate cost. The 380-kWh battery scenario was selected for its high efficiency. Disposal alternatives for end-of-life batteries were also considered, with the best option being recycling by manufacturers or returning them to suppliers.

Route and Depot Alternatives:

Multi-Criteria Analysis: A multi-criteria analysis was conducted to identify the best routes and depots for introducing electric buses into Cairo's transport network. After analyzing data, technical, social, and environmental factors, and conducting field surveys, the Ameriyah Depot was selected as the best option. This choice was based on its location within a densely populated residential and service area, meaning the project would serve the largest number of citizens from various age groups. Additionally, the selected routes have high traffic density, ensuring that the project would significantly reduce emissions and pollutants.

Depot Layout Planning:

Layout Alternatives: Various depot layout plans were proposed and studied, each aiming to enhance operational and maintenance conditions. The proposed layout also accommodates future expansion of the electric bus fleet by providing available space for additional electric buses if necessary.

a) Decommissioning Alternatives

The depot contains four (4) underground diesel tanks, each with a capacity of 35 m³, owned by Misr Petroleum Company. The following two scenarios have been proposed for handling these tanks:

i Scenario 1: Neutralize and Maintain Underground Tanks

In this scenario, the underground diesel tanks would undergo a thorough neutralization and cleaning process as they will be filled with clean sand from the inside. The above-ground tank room will be filled with sand and concrete, to mitigate environmental risks. The tanks would remain underground. This approach aims to minimize disruption to the site while ensuring environmental safety. Additionally, this will reduce the amount of hazardous waste generated by removing these tanks and the contaminated soil.

ii Scenario 2: Neutralize, Extract, and Transport Tanks

This scenario involves neutralizing the underground diesel tanks and then extracting them from the site. The tanks would be carefully removed and transported to designated facilities for proper disposal or recycling. This method prioritizes the complete removal of the underground diesel tanks and includes soil decontamination to address any residual environmental concerns from oil spills or leaks. This approach creates space for potential redevelopment or alternative land use but is expected to generate a large amount of hazardous waste (contaminated soil) that will require safe disposal in a hazardous landfill. Additionally, Civil Defense approval will be required for this method, which will maximize site disruption duration.

Based on Comparison and the scoring, Scenario 1: Neutralize and Maintain Underground Tanks is the recommended option due to its lower cost, reduced waste generation, shorter duration, and lower safety risks.

Environmental and Social Management and Monitoring Plan

An Environmental and Social Management Plan (ESMP) has been developed to ensure compliance with applicable national and international environmental regulations and standards. This plan involves implementing a range of mitigation measures and effectively managing all significant environmental and social impacts, as well as continuously improving the project's environmental and social performance.

The plan summarizes the proposed mitigation measures and discusses the initial and ongoing monitoring and management of significant impacts during the construction and operational phases of the depot and electric buses. Compliance with the ESMP requirements will be ensured.

The plan identifies foundational elements for an effective ESMP as follows:

- Environmental Objectives and Goals: Define a set of objectives and goals to be achieved, including indicators to measure the environmental performance of the system, covering both environmental and social goals.
- Environmental and Social Policy: Formulate an environmental and social policy by senior management that encompasses the environmental and social policy aspects.
- Environmental and Social Management: Appoint an Environmental and Social Management Team to ensure effective implementation of all proposed environmental and social management measures.
- Environmental and Social Monitoring: Develop a plan for monitoring environmental and social indicators and standards, as outlined in the Environmental and Social Monitoring Plan.
- Environmental Record: Maintain an environmental record to ensure compliance with national legal requirements, as included in the environmental record.
- Workers Health and Safety: Develop and implement measures to ensure the health, safety, and well-being of all workers. This includes providing adequate training, personal protective equipment (PPE), and safe working conditions in compliance with relevant health and safety regulations.
- Community Engagement: Establish a strategy for engaging with the local community, ensuring their involvement and addressing their concerns throughout the project's lifecycle. This includes transparent communication, feedback mechanisms, and addressing community grievances promptly.

- Emergency Response and Contingency Planning: Create a comprehensive plan for responding to emergencies, such as accidents, spills, or natural disasters. This plan should include clear procedures, roles, and responsibilities to minimize risks and ensure swift action to protect people, property, and the environment.

Grievance Mechanism (GRM):

A stand-alone document detailing the Grievance Redress Mechanism (GRM) was developed for this project. It includes the procedural steps, roles and responsibilities, grievances channels, organizational and institutional capacity, implementation of the GRM, and monitoring and evaluation of the mechanism. It also includes procedures to deal with and handle grievances related to SEA/SH according to the WB Good Practice Note.

Stakeholder Consultation

The community consultation included, in addition to the monthly meetings of the research team, the authority, and the project coordination unit, the following activities with various parties:

- 15 Groups' Interviews: Conducted with men, women, and youth in 5 areas surrounding the Ameriyah Routes.
- Interview with 7 Individuals with Disabilities.
- Passenger Survey: Conducted with a sample of 583 individuals from 29 areas.
- 15 Meetings: Held with officials from the authority and employees at the Ameriyah depot.
- Interviews with Bus Drivers: From the Cairo Transport Authority (CTA).

Participants in the various meetings agreed that priority should be given to the needs of vulnerable passenger groups in the design and operation of the project:

- Low-income Groups
- Women of All Ages
- Women Accompanying Dependents
- Individuals with Various Disabilities
- Elderly of Both Genders

The public consultation session was physically held on July 17th, 2024, at Triumph Plaza Hotel, Heliopolis. About 46 participants attended.

Guests were informed of the date and venue of the public consultation session at least two weeks prior to the meeting date. Invitations were sent by the Consultant in cooperation with the PCU via WhatsApp, e-mails and phone calls.

The aim of the session is to present the results of the ESIA study, with a focus on the environmental and social impacts resulting from the project, methods of mitigating negative impacts, maximizing the benefit from the positive effects, and ensuring that the parties involved are satisfied with the measures to reduce environmental and social impacts and management plan.

The following ideas were presented during the public consultation session:

- Car Washing Using Solar Power: While not initially included in the ESIA, the concept of solar-powered car washing aligns with sustainability goals. The design of the depot allows for future renewable energy integration, but due to financial and logistical constraints, the immediate implementation of a solar-powered system is not feasible.
- Depot Operation on Solar Energy: The ESIA acknowledges the environmental benefits of operating the depot on solar energy, and provisions have been incorporated into the design to accommodate future solar panel installations. However, due to the extensive space (100,000 m^2) and high cost required to power the entire fleet, solar energy will not be used as the primary power source at this stage.

- Retrofitting Old Diesel Buses to Electric Buses: While retrofitting existing diesel buses into electric buses was explored as an option, the feasibility study concluded that procurement of new electric buses would be more efficient in terms of cost, operational reliability, and technological compatibility.
- Bus Model Selection for Path Conditions: The selection of the bus model has been carefully considered to ensure suitability for Cairo's Road conditions and routes. It has been suggested to engage with the Armed Forces Research Authority to further refine bus specifications to withstand local operating conditions.
- Fleet Management System and Mobile Application: The ESIA does not include a fleet management system, but the CTA has its own strategy, and the bidding package ensures that buses will have a monitoring system.
- Ticketing System: The CTA is currently working on a prepaid ticketing system and has hired a consultant for its implementation. This was not included in the ESIA, as it is managed under a separate initiative.
- Training of E-Bus Drivers and Workers: The ESIA highlights the importance of training programs for drivers and depot workers. This includes technical and safety training, particularly on high-voltage systems, emergency response, and energy-efficient driving practices.
- Repositioning of Workers: The transition from diesel and natural gas buses to electric buses necessitates a repositioning plan for workers. This is acknowledged in the ESIA as part of labor force planning to ensure minimal social disruption and optimal workforce utilization.
- Electricity Cuts and Energy Security: Concerns about electricity shortages were addressed in the feasibility study, which confirmed that e-bus operations would be prioritized similarly to the metro system, ensuring minimal disruption. The study considered potential power outages (up to 1 hour), with contingency plans in place.

Most of the attendees actively participated in the session and came up with fruitful ideas for discussion. Moreover, surveys were given to the participants upon their arrival to fill in with their feedback/questions.

1 Introduction

1.1 Report Objective & Content

This report is designed to fulfill the requirements of the Terms of Reference, for developing an ESIA , as per Appendix A: Terms of Reference that contains a table which describes which chapters of the report address the various requirements of the Contract.

ESIA	ESIA Baseline assessment for the selected routes (all modes on the selected routes will be performed, including socio-economic aspects, ambient air quality and environmental assessment at an ex-ante level, potential risks and impacts, proposed mitigation measures, management plan, budget estimates for implementation)

1.2 Appendix A: Terms of ReferenceBackground

This document is the Environmental and Social Impact Assessment (ESIA) for the Electric Bus Demonstration Project (e-Bus Demo), a subproject under the Greater Cairo Climate Change Project (GCCC).

The GCCC, financed by the World Bank, addresses air quality and climate change in Greater Cairo.

The e-Bus Demo promotes electric buses to reduce diesel pollution, providing insights for scalable e-mobility.

This ESIA aligns with the Environmental and Social Management Framework (ESMF) that was prepared for GCCC project (August 2020 available here) and covers bus procurement, depot retrofitting, and route selection under GCCC Component 3, "Vehicle Emission Reduction."

The sub project consists mainly of three (3) main components as presented below:

- **E-Bus Procurement:** The e-Bus Demo involves acquiring electric buses to replace diesel buses in the public transport system at a selected depot in Greater Cairo.
- **Depot Retrofitting:** The e-Bus Demo includes upgrading one existing bus depot in Greater Cairo by installing charging stations and retrofitting facilities for e-bus maintenance and charging.
- **Route Selection:** Routes serving the selected depot will be studied and chosen to operate e-buses, replacing diesel buses.

1.3 Scope of ESIA

The ESIA assesses the environmental and social impacts of the e-Bus Demo under the GCCC Project. The scope includes:

- **E-Bus Specifications:** Assessment of the E&S requirements considered in the specifications of the electric buses, chargers, and charging stations.
- **Depot Selection and Retrofitting:** Including any required decommissioning, construction and operation activities
- **Route Selection:** 5 routes were selected out of 11 routes, based mainly on technical considerations without Environmental and social concerns.

The administrative Building revamping is out of the scope of the project.

The ESIA identifies and evaluates impacts from decommissioning, construction, and operation, proposing measures to avoid, minimize, mitigate and manage significant impacts to acceptable levels (as defined by the Egyptian law and the applicable WB Environmental and Social Standards (ESS)).

1.4 Project Proponent

The proposed project is state-led with funding provided from the WB to implement the Electric Bus (e-Bus) Demonstration Project.

The state-led entities are formed of partnership between the Ministry of Environment (MoE) and Cairo Transportation Authority (CTA). The Project implementation phases will be managed by staff formed from representatives of the above entities (Project Coordination Unit (PCU) and technical implementation unit (TIU)).

1.5 Methodology

The ESIA has been developed based on the following methodology:

- Conducting field visits to the depots identified by the CTA to develop full site understanding and to identify relevant environmental and social issues.
- Conducting comprehensive literature review to review e-Bus Demo and GCCC Project documents from CTA, applicable standards, and relevant online data.
- Participating in the detailed design document of the selected depot and the e-bus specs. Consultations with the SST Consortium were carried out to ensure incorporating all the environmental, social and gender and Occupational Health and Safety aspects in the depot design and the e-bus specs. The ESIA reflects the updates of the e-Bus Demo components corresponding to latest depot design (layout) issued on 20th of December 2024, the e-bus routes selected on 18th of April 2024, and the latest e-bus specs on 14th of May 2024.
- Participating in the setting of the selection criteria of the depot design alternatives, e-bus specs alternatives and the routes selection alternatives and assessing these alternatives from the environmental, social and gender and Occupational health and safety perspectives. For more details, please refer to Appendix B Service and operational plan, Appendix C E-bus specs and Appendix D Engineering design report. The selected depot location and design, routes and e-bus specs options from the alternatives chapter were described in detail in chapter 03.
- This ESIA was developed to cover the Project implementation phases.
- The baseline chapter was based on primary and secondary data Primary data included ambient air and noise measurements, focus groups' discussion, surveys, etc. Baseline components such as receptors identification and ambient air and noise measurements were reflected in the impact assessment chapter.
- Study of the relevant documents on national framework, World Bank Environmental and Social Framework (ESF) and Environmental and Social Standards (ESSs), legal and administrative framework and their review, particularly on environmental aspects, health and safety requirements, and social aspects.
- Identification and prediction of all related environmental, social and gender and Occupational Health and Safety impacts of the identified project activities on the surrounding environment in the area of influence and their relevancy to the World Bank ESSs.
- Scoping of the most significant impacts and suggesting mitigation measures in order to reduce/eliminate the negative impacts and enhance the positive impacts.
- Development of Environmental and Social Management Plan (ESMP) for all project phases.

Stakeholder engagement activities included:

- Field visits and observation
- Surveys conducted with diverse beneficiary groups, including women, men, mothers, the elderly, and people with disabilities, to gather insights into their specific transportation needs and preferences.
- Meetings and surveys held with bus drivers to understand their requirements and feedback for enhancing the efficiency and effectiveness of the transportation system.
- Organizing Public Consultation Meeting with different stakeholders and parties involved to present the results of the ESIA.

2 Project Background and Description

2.1 Project Background

The GCCC project, approved by the World Bank in 2020, aims to address air pollution and transportation challenges in Cairo, aligning with Egypt's Vision 2030 and its Paris Agreement commitments.

The ESIA for the Electric Bus (e-Bus) Demonstration Project, component 3 of the Greater Cairo Air Pollution Management and Climate Change Project (GCCC), focuses on assessing the environmental and social impacts of integrating electric buses into Cairo's public transport system to replace the 75 existing diesel and natural gas buses. However, to maintain the same level of service and performance as the current fleet, it is estimated that 98 electric buses are required based on the battery capacity and the operating hours. The e-bus Demo project also includes the retrofitting and rehabilitation of the Al-Ameriyah Depot in the Al-Sawah area, Cairo Governorate to accommodate the new electric bus fleet,

The ESIA is the assessment of the retrofitting of Al-Ameriyah Depot and electric bus specifications and operations. The project aims to reduce greenhouse gas emissions, traffic congestion, and air pollution while improving public health.

The retrofitting of Al-Ameriyah Depot, located in the Sawah district, is designed to accommodate up to 110 electric buses. All diesel / natural gas bus activities will be decommissioned before construction begins. The proposed E-buses will feature at least 370 kWh lithium ferrous phosphate (LFP) batteries, suitable for local operational demands. Through this subcomponent, Cairo's public transport system will be on track toward transitioning towards a fully electric fleet on selected routes, contributing to both local and global climate action.

2.2 Project Components

The Electric Bus (e-Bus) Demonstration Project consists mainly of 3 main components as presented below:

A Depot Selection and Retrofitting of one of the existing diesel bus depots in Greater Cairo including installation of charging stations at the bus depot and/or construction of new facilities to accommodate the charging infrastructure and maintenance workshops for the electric buses.

Routes' Selection: A number of routes serving the selected depot will be studied and chosen for the e-bus operation and replacing the diesel buses.

Electric Bus (e-bus) and Chargers Procurement: The project involves the acquisition of a fleet of electric buses with certain specifications including Environmental, Social and gender and Occupational Health and Safety measures to replace traditional diesel buses in the public transport system in one of the depots in Greater Cairo.

2.3 Project Time Plan

Table 2-1 shows the estimated timeline for implementing the Electric Bus (e-Bus) Demonstration Project with its components. The start dates and durations are based on the latest E-Bus Demo Workplan v15 issued December 2024.

Table 2-1 Project Time Plan highlighting Key Phases: Decommissioning, Construction, Testing, and Operation

Phase	Task	Start Date	Duration	Key Milestone
Decommissioning of Existing Structures	Contract Notification	Q3 2025	-	Notification issued
	Site preparation and initial decommissioning	Q3 2025	2 months[1]	Site ready for retrofitting
Construction	Civil construction period	From Contract Notification	06 - 12 months	Civil works completed
	Tie-in connection with Electricity Distribution Company		Tied into grid by end of MEP installations	Electrical tie-in operational
	Mechanical, Electrical, Plumbing (MEP) installations	Ends wih Civil Works	2 months	MEP systems installed
	Maintenance equipment installation and testing	Validated Design Date	08 - 14 months (from Contract Notification)	Maintenance systems installed and tested
	Installation of chargers	Q3 2025	1 months	Chargers operational
Testing, Commissioning, Operation Start	Depot retrofitting testing and commissioning	Q3 2025	1 month	Depot systems tested and commissioned
	Interface testing with E-bus contractor	Q3 2025	2 weeks	Interfaces operational
	Fleet commissioning and route deployment	Q4 2026	6 months	E-bus fleet fully operational on selected routes

2.4 Project Description

As mentioned in Section 2.2 E-bus demonstration project consists mainly of 3 main components (Depot – Routes – E-Bus)

2.4.1 Component (I): Depot Selection and Design

2.4.1.1 Depot Location and Area (Depot selection and Retrofitting)

The Al-Ameriyah Depot, located in Sawah District, Northern Cairo Governorate, serves as the central hub for the e-Bus Demo. This area has been selected to ensure efficient operations by minimizing travel distance to service areas. Accessible via Al Sawah and Al Masanea roads, the depot spans 26,844 m².

It is owned by CTA and occupies a total land area of 26,844 m2. Thus, there is no need for any land acquisition to accommodate the E-bus Project.

Surrounded by urban, commercial, industrial, and residential zones, it integrates seamlessly into Greater Cairo's transport network while minimizing disruptions. The depot lies at 30°52'35.45"E and 29°56'12.36"N.

[1] The duration is estimated based on oral CTA communication. No written duration was included by the CTA in the Decommission Plan drafty issued to SST on 2024-10-28.

Table 2-2 Depot Coordinates

Latitude	Longitude
30°06'14.5" N	31°17'55.2" E
30°06'15.7"N	31°17'51.0"E
30°06'21.0"N	31°17'52.6"E
30°06'19.6"N	31°17'57.5"E

The depot approximate coordinates[2] are as shown in Table 2-2.

The depot is surrounded by areas of distinct and well-defined land use:

- From the West and sharing borders is the "Bisco Misr" factory, a sweets manufacturer.
- From the East and sharing borders is "Al Sawah" CTA depot. Further to the east is "Matariyah" Depot.
- From the North there is Sanofi pharmaceuticals factory.
- From the South located a highly dense residential blocks, with mixed use.

The neighborhood in general is complex. Nearby is the "Qobba" presidential palace, residential blocks, military establishments and factories all within a 1-kilometer radius from the depot. The area is well serviced by utilities.

The Al-Ameriyah Depot has multiple gates for entry and exit, catering to buses, workers, and emergency scenarios.

- The main entrance on Al Sawah Road is divided into two sections: one designated for buses and another for workers/pedestrians. The bus section comprises two lanes—one for entry and another for exit—ensuring smooth traffic flow. (See (1) 'Main Entrance & Exit' on Map)
- There is an emergency gate on Al Sawah Street to facilitate access during critical situations. (See (3) 'Emergency gate' on Map)
- There is a third, entry on Al Masanea Street in the north. These gates follow a circuitous route and are normally locked shut and closed for use. Figure 2-1 below highlights the specific locations of all gates, with arrows illustrating the routes leading to and from the depot.

Figure 2-1

Figure 2-1 Depot Location and surrounding activities / * Masanea Exit is normally closed, and barely under use. It is shown only for

[2] Obtained from Google maps. However, this should be provided by the CTA for accuracy

2.4.1.2 Current Depot Description

Al-Ameriyah depot's total area is 26,844 m^2 and accommodates a fleet of approximately 158 buses; 108 are in operation on eleven (11) routes. The current depot includes the following:

- Administrative building consists of five (5) floors with an emergency gate for pedestrians, which is out of this ESIA scope.
- Fueling area: This area is equipped with two (2) shaded fueling stations, complete with service pits for easy access to the underside of buses. As reported by Misr Petroleum Co. there are four (4) underground diesel tanks that were installed to store diesel fuel each of 35000 liters capacity. These tanks are owned by Misr Petroleum Company.
- Bus wash station: A dedicated area for washing buses, ensuring that vehicles are clean for service.
- Oil change area: This area includes service pits covered by canopies, designed for efficient oil changes and minor undercarriage maintenance.
- Long-term immobilization area: A shaded area designated for buses that require extended maintenance periods.
- Short-term immobilization area: Similar to the long-term area, but intended for buses that need quicker, more routine maintenance interventions. This area also includes service pits and is covered by canopies.
- Maintenance workshops: One (1) floor building located near the oil change area, these include facilities for engine repair and oil maintenance, reinforcing the depot's capability to handle comprehensive mechanical works.
- Spare parts storage: one (1) floor building of multiple storage rooms for keeping a ready supply of spare parts, essential for the timely maintenance of buses.
- Multi-trade maintenance workshop: This area houses workshops for various maintenance needs such as battery servicing, pneumatics, and bodywork.
- No defined bus parking area: Currently, there is no designated area with marked grounds for bus parking, which could be considered for future improvements to optimize space and organization.
- Police building: A five-story building housing police offices (outside the project and ESIA scope).
- Mechanical and electrical rooms: These rooms contain the main electrical and mechanical equipment serving the depot such as (Ring main unit, Transformer, electrical panels, fire pumps, etc.)
- One (1) existing firefighting water tank compartment with capacity of $50m^3$
- About (33) toilets distributed along the depot where 31 for males and 2 for females.
- Four gates: Two (2) gates located at Al Sawah road; one main entrance gate to the depot, one emergency gate, and the other two (2) gates located at the backyard of the depot in the extension area at Al Masaneh road.

The following figure presents the current depot design (subject to minor evolutions as the Depot Design is on-going in parallel).

Figure 2-2 Al-Ameriyah depot current design (the existing depot layout)

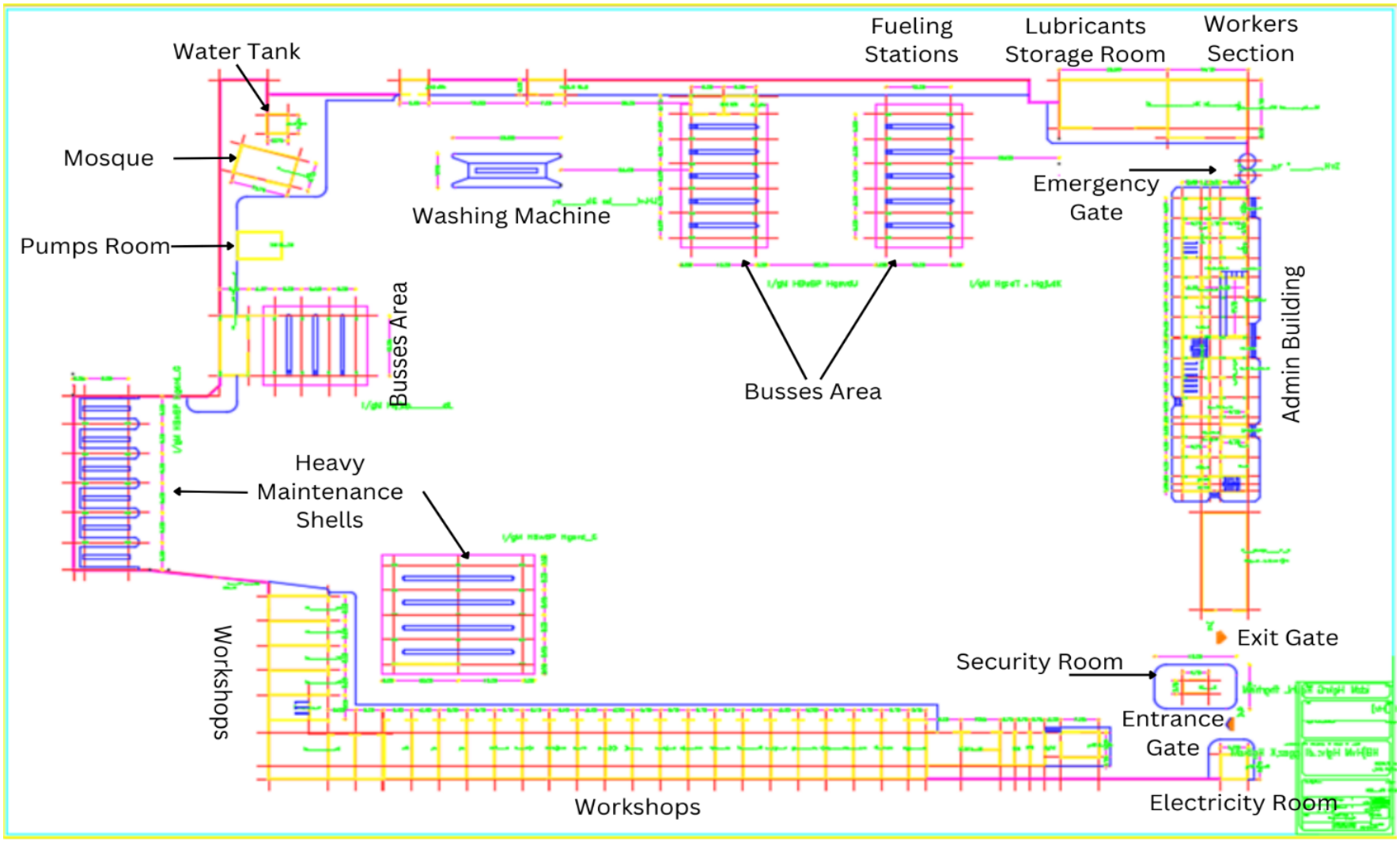


Figure 2-3 Water from Washing Machine

Figure 2-4 Eastern Wall of Bus Shade

Figure 2-5 Bus Shades

Figure 2-6 Washing Machine

Figure 2-7 Maintenance Workshops

Figure 2-3 Fueling Station

Figure 2-9 Northern Wall Workers Section

Figure 2-10 Electrical Technical Room

Figure 2-4 Maintenance Area

Figure 2-5 Fueling Station and Bus Shades

Figure 2-6: Admin Building

a) Current Electrical Works

To support the depot's operations, the following electrical infrastructure is in place:

- Transformers and Distribution: The depot is equipped with one 500 KVA oil-type transformer (which will be removed after the construction work is over) and a main distribution board (MDB) that distributes power to various depot loads.
- Interface with Electrical Distribution Company: A medium voltage Ring Main Unit (RMU) serves as the interface with the electrical distribution company, ensuring reliable power supply.
- Emergency Power Supply: A 75 KVA emergency diesel generator with 2.5 m³ diesel tank is installed to power critical loads during outages, including the administrative building, police buildings, entrance gate, fire pumps, and diesel dispensers.

Figure 2-14 shows clouded drawings showing the location of the generator storage tank.

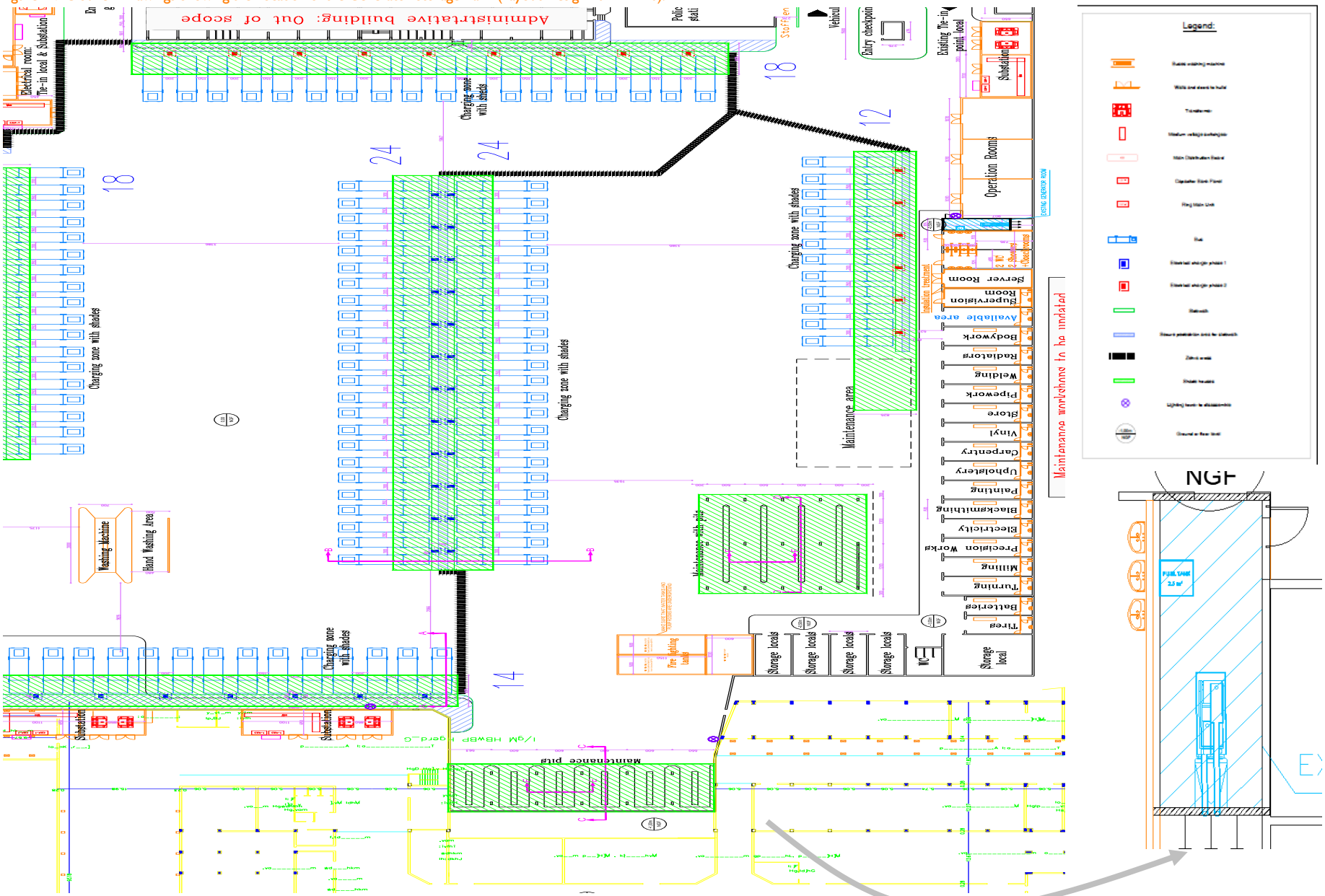
b) Fire Fighting Works

The fire safety systems currently in place at the depot need significant upgrades to meet safety standards and operational requirements.

- Fire Pumps: The existing fire pumps are not Underwriters Laboratories (UL) and Factory Mutual (FM) approved, and their flow rate and head specifications are unclear, which could affect their effectiveness in an emergency. The only existing pump was the fire pump and it is electrical pump.
- Fire Fighting Pipes: The main firefighting pipes are currently 75 mm in diameter, which does not meet the code requirement of at least 150 mm, indicating a need for system enhancement.
- Fire Fighting Water Tank: One (1) existing underground firefighting tank of capacity of 50 m3, which is insufficient according to code requirements and needs to be increased with extra 230 m3 tank which will be split into two (2) rooms; one room to provide water for the domestic use and the other for the firefighting.
- Electrical Room Safety: The main electrical room lacks an automatic fire suppression system, posing a significant risk in case of electrical fires and needs immediate attention to mitigate potential hazards.
- Install windsock(s) in strategic locations in the depot: Windsock helps visualizing danger and will instantly indicate the prevailing wind direction. In the event of fire. This information is crucial for workers to determine safe evacuation routes away from the fire.

For more information about Depot see Appendix (D) Detailed Engineering Design report.

Figure 2-7 Clouded Drawings Showing the Location of the Generator Storage Tank (Layout Design 2024-12-20).



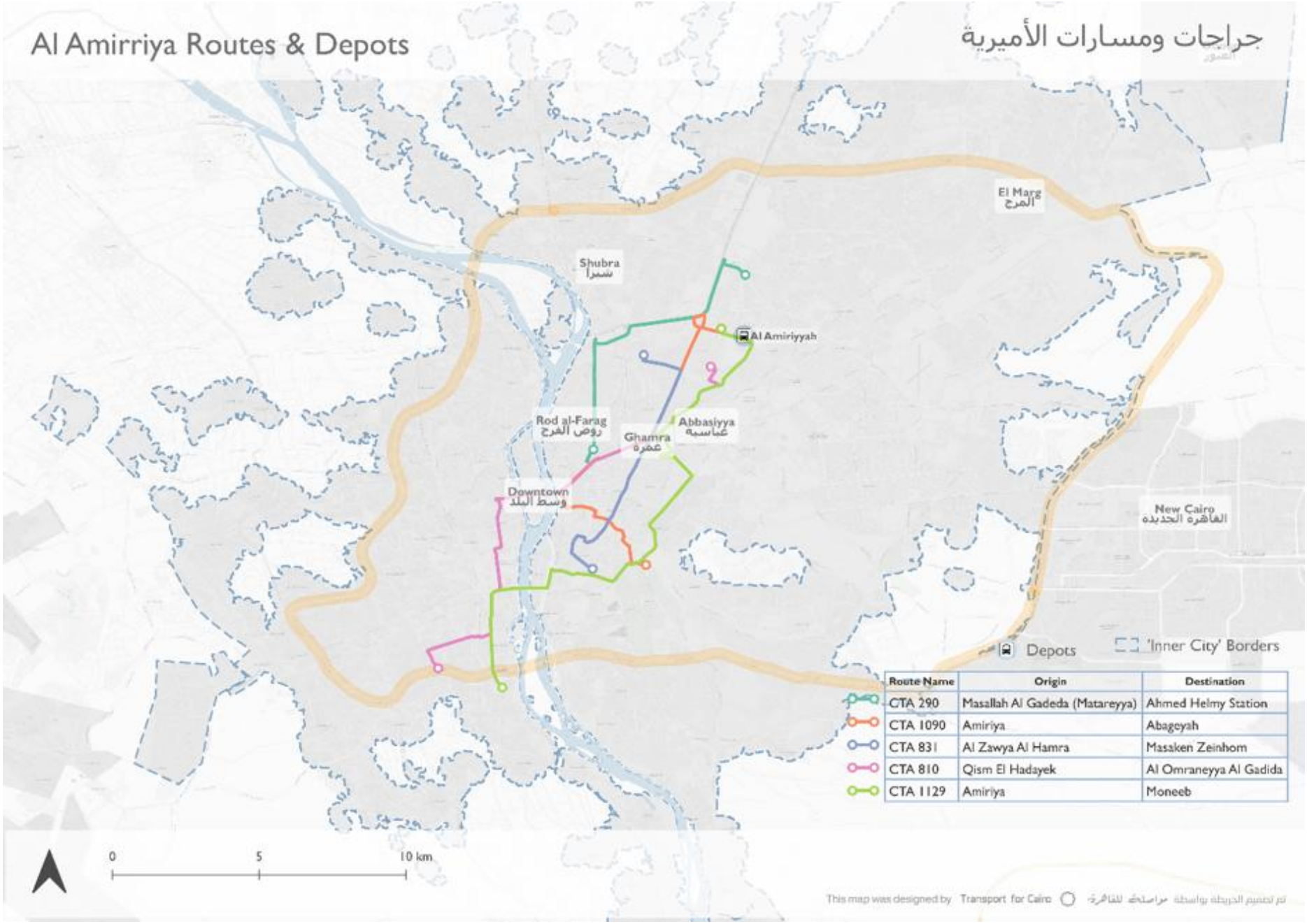
2.4.2 Component (II): Routes Selection

The Consultant has studied the eleven (11) routes that are served by Al-Ameriyah Depot as shared by the CTA. Based on the depot selection criteria described in more detail in the **alternatives chapter (section 5.4), five (5) routes have been selected to replace their diesel buses with e-buses.**

The average speed (commercial speed) for e-buses on all the five (5) selected routes will be between 15-17 km/h.

Appendix E shows the selected routes full information.

Figure 2-8 The five (5) selected routes



Route Name	Origin	Destination
CTA 290	Masallah Al Gadeda (Matareyya)	Ahmed Helmy Station
CTA 1090	Amiriya	Abageyah
CTA 831	Al Zawya Al Hamra	Massaken Zeinhom
CTA 810	Qism El Hadayek	Al Omraneyya Al Gadida
CTA 1129	Amiriya	Moneeb

2.4.3 Component (III): Bus Fleet

As part of the transition towards sustainability, an initial transition phase with the five (5) selected routes have been identified for electrification as shown in the table below.

Table 2-3 Transition of Al-Ameriyah Depot bus fleet from diesel to e-buses

Routes Number	Existing Diesel and Natural Gas Fleet[3]	Estimated E-buses fleet (370 kWh)
290	15	28
1090	15	20
831	15	7
810	15	15
1129	15	28
Total fleet From Al-Ameriyah Depot	75	98

98 clean, environmentally friendly and energy-saving electric buses are needed to replace the currently **75** diesel/CNG buses operating in the **5** selected routes as to fulfill the roads everyday operation. Where good, conditioned diesel and natural gas buses will be operated from other depots and others will be scrapped.

Appendix C includes E-bus Specifications" which followed the Environmental, Social and Gender considerations (Appendix F)

The following presents the main specs of the e-bus (vehicle):

1 Main Body of the E-Buses

The current diesel bus specs dimensions of 1.2 *2.5* 3.4 m (L*W*H) which make buses with minimum capacity for 80 passengers with 32 passengers' seats, giving more room for standing passengers, and for wheelchairs and baby strollers.

The vehicle will be equipped with two (2) doors which are designed to swing inward operated by an electro-pneumatic system and controlled from the driver's station. The two (2) doors will be located on the right side of the vehicle as follows:

- The 1st door will be located at the front, before the front wheel.
- The 2nd door will be located at the rear, after the rear wheel.

The platform in front of it will be at least one space for users in wheelchairs (WU) this space will be equipped with:

- A totem for securely positioning wheelchairs, which can be back-facing.
- External and internal request buttons for the ramp, piezo-electric, sensitive, and illuminated in blue with a dedicated regulatory pictogram.
- Wheelchair areas will be equipped with foldable seats to maximize accessibility and ensure efficient space utilization. The vehicle can accommodate wheelchairs comfortably, allowing for the foldable seats to be used when the space is not occupied by wheelchair users.

The chassis of the buses will be designed to withstand the rigors of daily operation, with advanced anti-corrosion protection and durable assembly ensuring a lifespan of up to 20 years without the need for preventive maintenance. The chassis will be constructed with aluminum or steel profiles.

The buses feature a resistant design to high-pressure washing, facilitating easy cleaning and maintenance, while also ensuring reliable starting in all climatic conditions, or the onboard systems, Additionally, pre-wiring for the OSS (Operation Support System) has been included. Three-point safety belts will be installed for the driver, promoting safe operation and the electric buses will have a ground clearance between 25 and 40 cm, which is consistent with current market offerings from various manufacturers.

[3] Data presented was provided by the CTA team

These buses will feature a low-floor configuration without interior steps, ensuring enhanced accessibility for people with reduced mobility (PRM). Additionally, the e-buses are equipped with a "kneeling" function, allowing the bus to lower on one side to make boarding and alighting easier for passengers where it lowers the bus a few cm below the driving height.

As reported by CTA the chassis at the end life will be sold as scrap via auction to be recycled or used in different purposes.

For more information about bus specs see **Appendix C E-Bus Specs**.

1 Chargers and Charging System (Batteries)

The average expected daily operation hours for the future e-buses are approximately 18 hours per bus.

With a maximum speed limited to **80 km/h.**, the e-buses will prioritize safety while providing efficient transportation within urban environments. The e-buses will be powered by **Lithium-ion Iron Phosphate** batteries, which has a nominal operating temperature around 25°C and can go up to 35°C (in nominal condition). With BTMS (Battery Thermal Management System) isolates the battery module if the temperature exceeds 50°C to ensure safety and prevent performance / lifespan degradation, Additionally with LFP has a minimum battery capacity of **370 kWh,** the e-buses will cover a daily range of **300 km** (a maximum of 18 hours of operation) after a slow and semi-rapid charge cycle, It is expected that the batteries will maintain up to 80% of their design capacity by the end of their eight-year lifespan, ensuring operational efficiency throughout this period.

Charging the e-buses will be facilitated through Combo 2 Combined Charging System (CSS) plugs, compliant with international standards ISO 15118 and IEC 61851, located on the right rear face of the bus for convenient access. The charge management system ensures a full recharge within a **maximum of 4 hours** during night, with built-in protection against short circuits, overload, excessive discharge, overheating, and water ingress, ensuring the safety and longevity of the battery system.

Additionally, the charging plug will be protected by an electromagnetically locked hatch, with safety measures to prevent vehicle operation if the hatch is open.

Moreover, the electric buses will be equipped with advanced engine systems designed to ensure optimal performance, efficiency, and safety in Cairo's challenging climate conditions especially in the very hot weather during summer season. These engines feature interchangeability of components, facilitating ease of maintenance and repair. They utilize insulating materials suitable for international standards, ensuring reliability and safety.

Powered by air condition (AC) synchronous, induction motor, or Permanent Magnet Synchronous Motor (PMSM), the buses will deliver a maximum power output of at least 200kW and a maximum torque of not less than 1000 Nm, providing ample power for smooth acceleration and performance. Engine protection will meet IP 65 standards, ensuring resistance to pollution and splash water tightness. Additionally, a sophisticated monitoring system will prevent engine overheating, enhancing safety and reliability. Integrated fire detection systems in the engine compartment, along with optional automatic extinguishing systems, further enhance safety measures. The e-buses also feature air production systems and pneumatic suspension, essential for comfort and performance in Cairo's hot climate, with features such as air purifiers, pneumatic suspension protection, and load leveling systems. The battery system will include 12V batteries mounted on a sliding trolley, with standardized connectors for easy and secure replacement, ensuring reliable operation and efficient performance of the electric buses in Cairo's urban environment.

2 Other Internal Bus Specifications

The electric buses are designed to provide passengers with a modern and comfortable travel experience, incorporating various advanced features and amenities. The passenger area lighting utilizes Light-emitting diode (LED) technology, offering efficient and uniform illumination while minimizing stray reflections on the windshield for enhanced visibility. A comprehensive passenger information system will be integrated into the e-buses, featuring LED electronic destination signs at the front, side, and rear to display route information and line numbers clearly. Thin film transistor (TFT) screens will be installed throughout the e-bus interior, providing dynamic information to passengers during their journey.

Additionally, a high-quality public address system with strategically distributed speakers ensures clear communication throughout the passenger compartment and driver's cabin, facilitating announcements and emergency notifications.

Moreover, for passenger safety and convenience, an emergency call button will be easily accessible next to the dashboard, allowing passengers to request assistance when needed. Finally, efficient ventilation systems will be installed to ensure continuous air renewal and demisting, maintaining a comfortable and healthy environment for passengers and drivers alike.

2.5 Project Implementation Phases

As the Al-Ameriyah depot transitions to accommodate an all-electric bus fleet, significant changes are required to adapt existing infrastructure and introduce new facilities that align with the operational needs of electric vehicles. These changes not only reflect a shift in the type of vehicles serviced but also embody a broader commitment to sustainability and technological advancement.

The project entails significant infrastructure modifications and additions, beginning with decommissioning activities related to diesel bus operations and followed by retrofitting the depot for electric buses (e-buses).

The activities during each phase of the project are illustrated below.

The following figure presents the new design of the Al-Ameriyah depot.

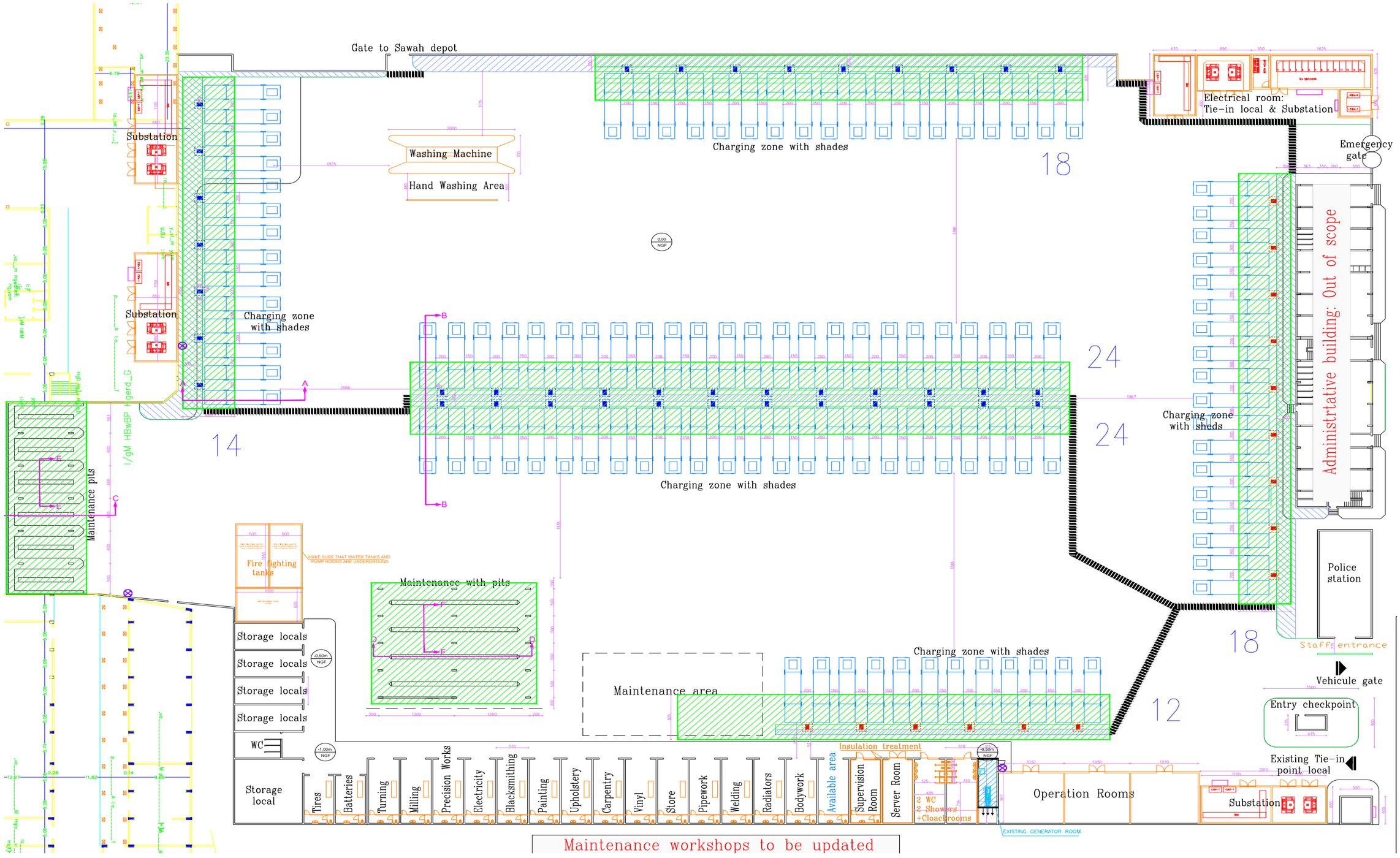


Figure 2-9 Updated Al-Ameriyah Depot Layout (2024-12-20). Subset of full design for clarity, for full design please refer to Appendix R: Project Layout

Table 2-4 Total area of the depot

Function	Length (m)	Width (m)	Surface (m^2)
Electrical room -Tie In	35	12	420
Stabling area -18 buses	77,4	13,5	1045
Washing machine	20	7	140
Stabling area -14 buses	13,5	62	837
Electrical room	7	40,2	281
Maintenance area	12	41,13	494
Pit area	28	24	672
Workshop + WC & showers + storage locals			1790
Stabling area - 12 buses	53,2	14,25	758
Electrical room (storage rooms, substation, existing tie-in)	57,05	~8	483
Entrance & Access control zone	15	9	246
Administrative building + security	12,25	83,5	1023
Stabling area - 18 buses	12,25	63,6	779
Stabling area - 48 buses	105	28	2940
Total (A)			**11907**
Pedestrian zone & traffic bus area (B)			**14544**
Total depot area (A+B)			**26451**

2.5.1 Depot Decommissioning Phase

Prior to Depot retrofitting / construction, the Depot will be decommissioned by CTA, which mentioned an approximate necessary duration of 3 months (2 months of preparation and 1 month of equipment removal and decommissioning). This decommissioning period will include the treatment of Misr Petroleum Tanks (removal or cleaning and sand filling according to the final solution decided by Misr Petroleum and CTA).

1 Decommissioning Activities

Bus Wash Station: Replace the existing wash area with a tunnel wash system and a high-pressure wash zone. This new setup is designed to efficiently handle the cleaning needs of electric buses, which may have different maintenance requirements compared to diesel buses.

Fueling Area Removal: The existing diesel fueling station and its accompanying underground diesel tanks shall be addressed based on the decision made by Misr Petroleum Company. Currently, the fueling station will be removed; however, no decision has been taken regarding the underground diesel tanks (to the date of submission the ESIA study and the final decision will be taken after sending an official request by the CTA when the depot retrofitting started).

The two possible scenarios for the decommissioning of the diesel fuel tanks are presented below:

- **Scenario 1:** In-Place Burial - If the decision is made to bury the tanks in place, they will be filled with clean sand to ensure environmental safety. The above-ground tank room will be similarly filled with sand and concrete, with all necessary safety precautions in place, including the presence of a Health, Safety, and Environment (HSE) representative and fire extinguishers.

- **Scenario 2**: Tanks Removal - Alternatively, if the decision is made to remove the tanks, they will be neutralized by filling with sand and extracted from the site. This process will be conducted in compliance with all relevant safety and environmental standards.

It was reported by Misr Petroleum that 90% of similar cases, underground diesel storage tanks are neutralized and buried using sand. In both scenarios, the procedures will be carried out under strict supervision from Misr Petroleum Co. to ensure adherence to environmental and safety regulations.

The analysis of disposal methods for underground diesel storage tanks, is covered in Section 5.5 (Alternatives Chapter) of the ESIA. This section provides a comparative analysis of both scenarios, evaluating their environmental and safety implications. Based on this assessment, scenario 1 (neutralization underground) is the recommended approach due to its lower safety risks and minimal environmental and safety risks.

- Oil Change and Maintenance Areas: The oil change zone and maintenance workshops focused on engine oil and diesel engine repairs shall be eliminated. These services are irrelevant to electric buses, which do not require oil changes or traditional engine maintenance.
- Transformers and Distribution: The depot is equipped with one 500 KVA oil-type transformer that will be removed after the construction work is over.
- Removal of the existing 50 m³ firefighting water tank as it doesn't' follow standards and replacing it with one new 230 m³ combined firefighting and domestic water tank
- Remove the entire concrete platform and redo a platform consistent with the electric e-bus load.
- Decommission of some of the existing buildings including, the fire pump room, oil storage, diesel service station, the mosque and the toilets in the depot yard, total area to be decommissioned is 1000m³, while site levelling is (8100 m²).

1 Workforce

Table 2-5 Workforce During Decommissioning Phase

Workforce	Number
Supervisors /Engineers	15
Labours (skilled, semi-skilled and unskilled)	91
Security/guards	9

About 115[4] people will be employed during the decommissioning phase as the number of workforce is shown in **Error! Reference source not found.** The workforce will include supervisors, engineers, skilled and unskilled laborers. For the semiskilled and unskilled workers, the Contractor might employ people from the communities which live around the project area as a way of making sure that the project benefits the community members in the project area. Some of the unskilled labor force is expected to be day-labor; thus, the contractor will prepare a local hiring plan, which primarily relies on engagement with the local labor office; additional entities include community liaison desks, or through local Nongovernmental organizations (NGOs), local advertisements. During decommissioning and construction, if it will not be allowed for the workers to use utilities of the administrative building, the contractor shall be the responsible for providing temporary utilities like mobile toilets.

Additionally, the working conditions and the provision of labor facilities, including mobile toilets, changing rooms, and safe drinking water, aligns with the Labor Management Procedures (LMP) for the GCCC project will be the responsibility of the contractor. The contractor is required to develop and sign a code of conduct which includes but not limited to measures to prevent sexual exploitation and abuse (SEA) and sexual harassment (SH), ensure proper worker accommodation, and implement the project grievance mechanism, including anonymous channels. while a penalty system will be enforced for non-compliance, ensuring adherence to labor and occupational health and safety (OHS) standards.

2 Resources and Inputs

Water

[4] Estimated based on similar activities

Water will be used by the workers for domestic use, cleaning, dust suppression and soil compaction. Water will be mainly provided from the city water and will be the Contractor's responsibility. Expected about 6 m³/day[5] will be consumed by the workers for domestic use.

Fuel

Fueling of trucks / machinery will be performed outside the site by the contractors from the nearest fuel station. While storage tank for the diesel generator will be refueled on-site from fueling vehicles.

Electricity

The electricity needed for lighting and operating electrical equipment during decommissioning will be provided through the existing electrical network at the depot.

Raw Materials

Raw materials such as concrete, steel, and wood required for site leveling activities and sand that will be used for neutralizing the diesel tanks to prevent environmental hazards will be provided from the local market through construction subcontractors. Raw material will be acquired from markets that source their material from commercially operating licensed quarries. The same measures will be applied by Misr Petroleum Company in case of providing Sand used in the decommissioning of the diesel tanks Depot Construction and Retrofitting Phase

Pursuant to the decommissioning phase, the Depot retrofitting works (including preparation works and testing and commissioning) are planned to span over approximately 18 months.

1 Construction Activities

- **Electric Bus Charging and Parking Zones:** Four new areas will be established for the charging and parking of electric buses. These zones will be equipped with state-of-the-art charging stations to ensure efficient energy management and quick turnaround times for bus servicing. Each charger will supply two bus parking spaces. The electrical power allocated to each charging station is 60kW, giving a total power per charger of 120kW.
- **Water Supply Improvements**: One new underground water tank of total capacity 230 m3 will combine firefighting and domestic water. This single underground system offers several strategic advantages, particularly in addressing the unique challenges of urban and resource-constrained environments like those in Egypt. This design maximizes land utilization by consolidating storage needs into a single tank, which is particularly beneficial in urban areas with limited space. It also ensures enhanced fire safety by providing a larger, readily accessible water reserve during emergencies, with dedicated pump systems ensuring rapid and efficient water delivery to fire-fighting systems. Additionally, the subterranean design protects water quality by shielding it from environmental factors like sunlight, contaminants, and temperature fluctuations, while integrated circulation and chlorine dosing systems maintain optimal water quality. This approach reduces initial infrastructure investment and ongoing maintenance costs, making it a cost-effective and efficient solution. The tank will be divided into two sections, with 60% dedicated to firefighting and 40% to domestic use. To prevent contamination, a system will be implemented where, after a certain water level is reached, the domestic water pump will stop functioning, ensuring only the firefighting pump remains operational. It will be equipped with circulating pumps and a system to maintain free residual chlorine levels between 0.5 PPM to 0.8 PPM, ensuring water quality and safety,
  - Additionally, installation of new pumps for the combined underground water tanks where the system consists of:
    - One Horizontal Spit case Electrical Firefighting Pump with estimated Flow Rate 750 GPM. (Working)
    - One Horizontal Spit case Diesel Firefighting Pump with estimated Flow Rate 750 GPM. (Stand-by)
    - One vertical multistage Jockey Pump with estimated Flow Rate 25 GPM. (Make-up water)

2 New Building (MV/LV Technical Room):

[5] According to the World Health Organization (WHO), the amount of water needed for an individual is estimated at approximately 50-100 liters per day to ensure that most basic needs are met.

- Construction of Medium Voltage/Low Voltage (MV/LV) Technical Room, including civil works (524m²).
- Installation of Heating, Ventilation, and Air Conditioning (HVAC) system.
- Installation of Mechanical, Electrical, and Plumbing (MEP) systems for lighting and electrical components.
- Fire Detection and Fire Fighting system installation.

a) Electrical Equipment:

- Procurement and installation of MV Cells (2 units).
- Installation of MV/LV Transformers (6 units, 2MVA each) for bus charging.
- Installation of LV Switchboard (6 units).
- Installation of Chargers sub-distribution panels (9 units).
- Installation of LV Cables.
- Installation of MV/LV Transformers (2 units, 1000kVA each) for auxiliaries.
- Procurement of Spare Parts for charging infrastructure.

b) E-bus Stabling Area:

- Construction of Stabling Shed Infrastructure (5250m²).
- Installation of infrastructure to support chargers (35 units).
- Installation of lighting and maintenance sockets (5250m²).

c) Roads and Utilities:

- Excavation and installation of multi tubular trench and cable ducts at depth of 2 m (1500m).
- Installation of Manholes at depth of 1200 mm (50 units).
- Drainage system installation .
- Asphalt surfacing (15000m²).

d) Heavy Maintenance Equipment:

- Installation of drainage and water connection for Washing Machine location (1 unit).
- Procurement and installation of Washing Machine (1 unit).
- Installation of Mobile chargers (3 units).
- Installation of heavy maintenance equipment, including lifting columns and hoists.

e) Extra Low Voltage Equipment:

- Installation of Depot Closed-Circuit Television (CCTV) coverage for e-bus CCTV (25 units).
- Provision of Depot Wifi coverage.

f) Operation Control Center:

- Upgrade of Operation Control Center (OCC) Room (150m²).
- Procurement and installation of OCC Room Furniture.
- Installation of HVAC system for OCC Room.
- Provision of Depot Wifi coverage.

During construction, the design will incorporate provisions for future solar panel installation. This includes building foundations, slabs, walls, support massifs, retaining walls, metallic frameworks, and roofing, all engineered to support the additional loads from rooftop solar panels and charging equipment. Rainwater disposal systems will also be integrated.

3 Retrofitting Activities

- Facilitate future readiness for solar panel installation, major structural work includes the construction of foundations, slabs, walls, support massifs, retaining walls, metallic frameworks, and roofing. This work incorporates systems for rainwater disposal and is designed to support the necessary loads for rooftop solar panels and associated charging equipment. These conservative measures ensure that the structure can accommodate solar panels without requiring significant modifications later.

- Electric Bus Charging and Parking Zones: Four new areas shall be established for the charging and parking of electric buses. These zones shall be equipped with state-of-the-art charging stations to ensure efficient energy management and quick turnaround times for bus servicing. Each charger shall supply two bus parking spaces. The electrical power allocated to each charging station is 60kW, giving a total power per charger of 120kW.

g) Enhanced Infrastructure Networks:

- Electrical Network: The total load required to operate the project is about "8 MVA" at Medium Voltage switchgear level. The depot will be fed by two (2) ring main units receiving the tie-in cables from Electric distribution company EDC and one (1) medium voltage switchgear of 11 KV, dry type transformers, low voltage distribution boards as described in more details below.
- Ring Main Units: Two new Ring Main Units (RMU) shall be installed to receive tie-in cables from the Electricity Distribution Company (EDC), enhancing the depot's power intake capabilities. The RMU will be Gas Insulated Switchgear (GIS) type. Each Ring Main Unit will comprise of three (3) motorized three poles load break switches rated 630A, 11KV for the incoming feeders' cables and No. (1) three poles load break switches rated 630A for the outgoing cable connected to the switchgear with RTU (monitor + control).
- Medium voltages switchgear (MVSG): Installation of 11 KV MVSG to receive cables from the two ring main units and to distribute the power among the transformers. The 11KV MVSG will consist of a single bus-bar, metal clad, indoor type integrated unit incorporating enclosures for circuit breaker units (Vacuum type), draw out type, current and voltage transformers and auxiliary wiring. The 11KV MVSG will be equipped with the necessary protection, control devices and instruments. The control supply for the protection system will be Direct Current (DC). The MVSG will be completed with Remote Terminal Unit (RTU). The MVSG will consist of 14 cells as follows:
- Two (2) cells for circuit breakers receiving the two (2) incoming (11KV) feeders from the Ring Main Units (RMU).
- Two (2) cells for the bus coupler and cable riser.
- Eight (8) cells for circuit breakers feeding the outgoing transformers.
- Two (2) cells spare for future loads.
- Medium voltage Cables (11KV): The incoming medium voltage cables to the 11KV RMU will be as per EDC requirements, and will be aluminum conductor, XLPE/DSTA/PVC,12/22(24KV) insulation class level. All medium voltage cables used between the 11KV RMU and the 11 KV MVS will be (3x500) mm^2, copper conductor, XLPE/DSTA/PVC, 12/22 (24KV) insulation class level.
- All medium voltage cables used between the MVS, and transformers will be (3x240) mm^2, aluminum conductor, XLPE/DSTA/PVC, 12/22 (24KV) insulation class level.
- Electrical Substations: Four electrical substations (SS-1, SS-2, SS-3, SS-4) compromising the transformers and electrical panels will be constructed to feed the chargers and the various loads of the depot as outlined in the Low Voltage riser diagram in appendix 1 of **Appendix (D) Detailed Engineering device report**. This setup ensures a stable and reliable power supply to all charging stations.
- Transformers: Six (6) transformers (2MVA each) for bus charging, two (2) per each substation (SS-1, SS-2, SS-3). Additionally, two (2) MV/LV Transformers (1000kVA each) for auxiliaries (substation SS-4). All transformers will be dry type (IP-23) complete with enclosure and provided with forced ventilation fans for 40% increased capacity.
- Exiting 75 KVA emergency diesel generator with tank capacity of 2.5 m^3. set is installed to power critical loads during outages, including the administrative building, police buildings, entrance gate, fire pumps, and diesel dispensers.
- Fifty-Five (55) DC chargers, each with a capacity of 120 KW.

4 Parking Control

Install car parking control equipment to manage and optimize parking space usage effectively.

5 Lighting Fixtures

- The lighting design and Light Emitting Diode (LED) lamp selection shall be based on achieving recommended illumination levels taking into consideration proper color rendering, and

temperatures for each task minimum and glare as per Charted Institution of Building Services Engineers (CIBSE) recommendation.

- All functional areas such as back of house parking areas, office spaces and technical rooms shall be prepared by electrical designers.
- Lighting for mechanical and service areas, pump area and other similar areas with high ceiling shall be of industrial high bay luminaires equipped with LED lamps and lower ceiling heights shall be illuminated with waterproof luminaires equipped with LED lamps.
- In general, LED luminaries shall be used in all areas with L70 lamp life of minimum 50,000 hours.
- Lighting fixtures used in each type of space shall be determined based on the functional requirements of the space as well as the architectural considerations
- Lighting fixtures shall be standard products of reputable manufacturers.
- The driver for the luminaire equipped with LED lamps shall be a high frequency Solid-state, high-power factor.
- The protection class of all lighting fixtures shall be specified in accordance with the location where they are installed.
- The parking area shall be illuminated by using High masts, and outdoor flood light.
- All indoor lighting fixtures shall be controlled via local switches or push buttons.
- All parking areas high mast shall be controlled by photocell, timer and push button also selector switch shall be provided for manual / automatic operation.

6 Domestic and Fire Fighting Water Network:

- Water Supply Improvements: A new underground water tank of capacity of 230 m^3 will be installed. It will combine firefighting and domestic water supply which is illustrated above in section 2.5.2.1.2
- Fire Fighting Enhancements:
- The project shall be protected by Fire Standpipe System and shall be served through water tanks and Firefighting Pump set.
- 150mm Firefighting tie-in pipe only shall be provided for the administrative building firefighting network. However, for the firefighting network inside this building it shall be done by other.
- The project shall be provided with fire department connections (Siamese connections).
- Main Electrical rooms, MDB rooms, M.V switchgear and Battery room, shall be protected by automatic CO2 fire suppression system.
- All Main and Distribution Electrical panels shall be protected By CO2 Fire-search Extinguishers
- ERW black steel schedule 40 shall be used for above-ground Fire Fighting water networks. In addition to High-density polyethylene (HDPE PN16) shall be used for under-ground Fire Fighting water networks.
- Galvanized steel shall be used for Fire Fighting drain network.

Appendix G includes all firefighting specs

3 Storm Water:

- Storm water from all roof areas shall be collected by gravity and shall be free discharged to the sewage network.
- Storm water from site layout shall be collected by trenches and area drains and discharged to the sewage network.

4 Safety and Surveillance:

- a comprehensive fire detection and alarm system, structured cabling system for communications, active data network equipment for operational connectivity will be implemented, and an IP video surveillance system to enhance security and monitoring.
- An Intelligent Addressable Fire Alarm System will be provided to cover the depot closed areas, in addition to manual call stations in the depot open areas. The Fire Alarm Control Panel will be provided with Backup Batteries and Battery Chargers to maintain the full operation of the entire fire alarm system as per National Fire Protection Association (NFPA) requirements.

- The Fire Alarm Control Panel will have addressable data communication circuits to provide connection with the addressable devices. No more than 80% of the available addressable loop or audio power amplifiers capacities will be used to enable future addition of any field devices.
- The System will achieve continuous supervision of all Devices (Detectors, Manual Call Point, Alarm Sounders…etc. Additionally, all Fire Alarm System Cables and all related system interfaces will be Fire Resistant Cables according to BS-6387, Categories C, W & Z.
- The Fire Alarm Control Panel will be located in the Main Control Room in the existing Admin. Building.

5 IP Video Surveillance System (IPVSS)

- The system shall be capable of providing cameras monitoring, control and storage capabilities for the critical areas in the depot. The system shall be user friendly allows for training of non-technical personnel to effectively operate and administrate the system, a Security Monitor and control room shall accommodate the operators, workstations and monitors and shall be located in Main Control Room in existing Admin. Building.
- System NVRs/ Storage Servers shall be installed in the Main Telecom. Room at existing Admin. Building.
- The Operator Workstations and Video Walls of IP Video Surveillance System shall be located at the main control room at the existing administrative building.
- All Cameras at entrances and outdoor cameras changing in light conditions will be equipped with Wide Dynamic Range (WDR) functionality for automatic adjustment to compensate for changing lighting (sunlight) conditions, Recommended Wide Dynamic Range is 120 dB or higher.
- The system Storage shall be calculated based on the following:
- Camera Specifications: All cameras will have a native resolution, 25 frames per second, storage for 21 days and 24 hours, and 25% spare capacity.
- System Components: The system includes fixed indoor/outdoor dome cameras, network video recorders (NVRs), a PC operator workstation for monitoring and control, control keyboards/keypads, and video wall screens.
- Coverage Areas: The IP-CCTV system, aligned with MOI requirements, will monitor depot outdoor areas, EV chargers zones, entrances/exits, the main telecom room, and the main control room.

For more information about retrofitting see **Appendix (D) Detailed Engineering Design report**.

6 Workforce

Table 2-6 Workforce During Construction Phase

Job	Number
Supervisors/Engineers	75
Labors (skilled, semi-skilled and unskilled)	416
Security/guards	9

The Labor Management Procedures (LMP) will be applied throughout the construction phase to ensure compliance with labor standards and worker protections, About 500 people[6] will be employed during the construction phase. The workforce will include supervisors, skilled and unskilled laborers as shown in Table 2-6 Workforce During Construction Phase. For the semiskilled and unskilled workers, the Contractor might employ people from the communities which live around the project area as a way of making sure that the project benefits the people community members in the project area.

I Resources and Inputs

a) Water

- Water will be used by the workers for domestic use.

[6] Estimated based on similar activities, and to be confirmed by the future Contractors

- Water will be needed for construction purposes such as dust suppression, and general site maintenance.
- The installation of the firefighting and domestic water supply system will require water for testing and commissioning.
- Water will be mainly provided from the city water and will be the Contractor's responsibility. Expected about 25 m³/day[7] will be consumed by the workers for domestic use.

b) Fuel

Fueling of trucks / machinery will be performed outside the site by the contractors from the nearest fuel station.

c) Electricity

The electricity needed for lighting and operating electrical equipment during construction will be provided through the existing electrical network at the depot.

d) Construction Materials

Various construction materials such as concrete, steel, asphalt, and building components will be supplied by the contractor. Electrical equipment, including Medium Voltage (MV) cells, transformers, switchboards, chargers and spare parts will be supplied by the contractor.

2.5.2 Operation and Maintenance Phase

I Activities

a) Bus Operations:

- Daily deployment and operation of electric buses on the 5 selected routes detailed in section 2.4.2.
- Regular bus inspections and maintenance checks to ensure safe and efficient operation.
- Scheduling and coordination of bus drivers and routes to optimize passenger service.

b) Charging Infrastructure:

- Monitoring and maintenance of charging infrastructure to ensure reliable charging for electric buses.
- Routine checks and repairs of charging stations and associated equipment.
- Management of charging schedules to minimize downtime and maximize bus availability.

c) Washing Facilities:

- Regular Bus Washing: Electric buses will undergo a thorough washing every night, following their daily check-up and maintenance activities. This regular cleaning ensures the buses maintain their cleanliness and appearance
- Water Filtration and Recycling: To minimize water consumption and adhere to environmental regulations, the washing process will utilize a sophisticated water filtration and recycling system. The system includes a settling tank (25 m³), hydrocarbon separator tank (15 l/s), biological reactor vessel (25 m³), recycled water lifting tank (25 m³), and a rainwater tank (120 m³). This system will treat and recycle the water used during washing, reducing the need for fresh water.
- Supply Provision: Adequate water and detergent supplies will be maintained for the bus washing activities to ensure consistent availability for daily operations.
- System Maintenance: Regular maintenance of washing machines, the industrial water treatment plant, and drainage systems will be conducted to ensure they are functioning optimally and comply with the necessary environmental standards.

[7] According to the World Health Organization (WHO), the amount of water needed for an individual is estimated at approximately 50-100 liters per day to ensure that most basic needs are met.

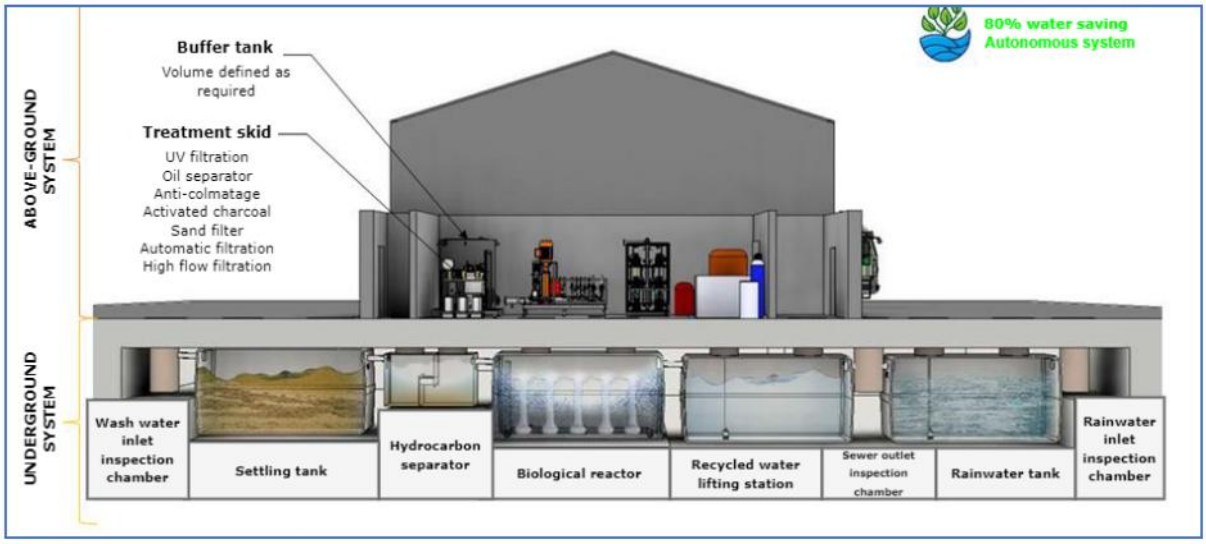


Figure 2-10 Scheme of principle of water recycling

d) Maintenance and Repairs:

- Scheduled maintenance of electric buses to address wear and tear, ensure battery performance, and other mechanical issues.
- Emergency repairs and troubleshooting of e-bus components as needed.
- Procurement and management of spare parts inventory for bus maintenance.

e) Workforce

Table 2-7 - Expected Workforce

Position	Total[8]
Managers	**5**
Mid-level	**185**
Conductors	**220**
Drivers	**306**
Engineers	**4**
Workers	**298**
Services	**61**
Total	**1079**

The working hours and shifts will stay the same as they exist. as the depot operates for three shifts; each shift for 8 hours including a maintenance shift. According to CTA, there is a minor maintenance routine every week (seventh day of the week) and a major maintenance routine every two weeks (fifteenth day of the month); bus washing takes place every night between 12 am and 5 am.

1 Resources and Inputs

8 The current workforce in the depot will not change as reported by the CTA. However, during the PC session it was mentioned that there will be labor force relocation as drivers and conductors working on routes rather than the 5 selected routes related to the project will have to go to other depots or change their jobs as what happened to the drivers in COP 27 in Sharm el sheikh as they were trained in MCV and proved themselves during their work.

a) Water

Water will mainly be used by the workers for domestic use and will be used in e-bus washing. The expected water required for domestic use is 32 m^3/day[9] and that in the e-bus washing is 0.15 m^3/bus/wash/day (150 l/bus/wash/day). Where the first wash will be from the water network and then will be from the recycle treated wastewater in addition to back up from the water network as needed. Additionally, water will be provided once for the firewater tank of capacity 230 m^3.

Water will be provided via the public water network.

b) Electricity

The electricity needed for lighting, powering equipment, and operating facilities and devices as well as charging the e-buses will be provided through the electrical network that will be implemented at the depot. The depot will be fed by two (2) ring main units receiving the tie-in cables from Electric distribution company (EDC) and one (1) medium voltage switchgear of 11 KV, dry type transformers, low voltage distribution boards. The maximum required power will be 8 MVA.

c) Chemicals

Chemicals used during the operation phase will include:

- **Cleaning Agents:** Used for regular washing of buses to maintain cleanliness and hygiene. Including detergents, soaps, and specialized cleaning solutions.
- **Refrigerants:** Using of refrigerants that are environmentally safe for the air conditioning (AC), as Egypt is a party to the **Montreal Protocol** on Substances that Deplete the Ozone Layer

d) Spare Parts

Spare parts necessary for the operation phase will include:

- **Mechanical Spare Parts:** Essential for the maintenance and repair of bus components. Include items like brake pads, filters, belts, and other mechanical parts.
- **Electrical Spare Parts:** Necessary for the maintenance of the bus's electrical systems. Include fuses, relays, wires, and other electrical components.
- **Battery Spare Parts:** Used for the maintenance and replacement of bus batteries. Include battery cells, connectors, and related components.
- **Charging Infrastructure Spare Parts:** Essential for the upkeep of the electric bus charging stations. Include chargers, cables, connectors, and other electrical materials required for charging infrastructure maintenance

9 According to the World Health Organization (WHO), the amount of water needed for an individual is estimated at approximately 50-100 liters per day to ensure that most basic needs are met.

3 Policy, Legal and Administrative Framework

The current project is subject to national and international laws and policies. This chapter lists national laws and regulations and international policies applicable to the project, identifies gaps between national legal framework and WB guidelines and standards, and presents the implementation arrangement for the project.

The proposed project components must comply with both national and international requirements. If there is a difference between local and WBG standards, more stringent standards will be adopted. The project must also comply with the instrument developed specifically for the implementation of this project. This mainly includes the Stakeholder Engagement Plan (SEP), the Labor Management Procedures, and Environmental and Social Framework (ESMF).

Gap analysis for key environmental, social and gender issues concerns: Egyptian laws and WB Policies were conducted in the Environmental and Social Impact Assessment Framework (ESMF) of the Greater Cairo Air Pollution Management and Climate Change Project and disclosed on EEAA website. See section 3.3.2 in The Greater Cairo Air Pollution Management and Climate Change Project Environmental and Social Management Framework (ESMF), available online here.

Note: All specifics such as legal limits and regulations pertaining to the project are all included in Appendix F.

3.1 National Legal Framework

The Ministry of Environment, Egyptian Environmental Affairs Agency (EEAA) issued, in 2009, general guidelines for Environmental Impact Assessment (EIA) preparation. In accordance with these guidelines, the projects are classified into three categories according to the severity of the potential environmental impacts and place of residence of the establishment and its proximity to the residential areas.

As per the updated projects' classification list issued by EEAA, in 2023 by the decree number 518/2023, **this project is classified as category "C" as defined by Egyptian requirements.** Category "C" projects require developing a full EIA study including a public consultation event.

The governing environmental laws applicable to the scope of this project are:

- Environment Law No. 4/1994 amended by Laws No. 9/2009 and 105/2015, and its amended Executive Regulations by Decrees No. 1095/2011, 710/2012, and the Prime Minister Decree No. 964/2015, Decree No. 618, 1963 of 2017 and amended Executive Regulations (ER) no 2466/2024. This law controls the potential environmental impacts of the proposed project
- Public Cleanliness Law No. 38/1967 amended by Law No. 31/1976 and its Executive Regulations issued by the Ministry of Housing by Decree No. 134/1968 dealing with solid waste to regulate the collection and disposal of construction and operation waste and maintaining the cleanliness of roads and public properties.
- Law No. 93/1962 amended by Decree No. 44/2000 concerning disposal of liquid waste on domestic wastewater network and its implementing regulations.
- Waste Management Law 202/2020 and its Executive Regulations issued by Prime Ministerial Decree No. 722/2022 in February 22,2022.

In accordance with Article No. (2) of the Waste Management Law 202/2020, the units of integrated municipal waste management in the competent administrative authority established under the accompanying law will authorize the cleaning funds of the local administration units established under Article No. (8) of Law No. 38/1967 in the general cleanliness matter. The Executive Regulation (ER) dealt with 4 chapters consisting of 56 articles detailing the articles of the law and specifying (defining) the requirements, standards and technical specifications for them as well as frameworks for coordination between the competent and effective authorities through a clear statement of roles and responsibilities among all. In addition to setting the standard operating procedures and the steps that the licensee for dealing with waste must follow and setting specific time frames for them.

The following articles are applicable to the project:

- Articles 15-16: The generator or waste carrier shall bear the cost of integrated waste management in a healthy and environmentally safe manner, as determined by the executive regulations of this law.
- Article 20: Open burning of waste is prohibited.
- Article 38: It is prohibited to throw, sort, or treat municipal waste except in designated places in accordance with the procedures specified by the executive regulations of this law.
- Article 55: It is prohibited to consume hazardous materials and wastes except after obtaining the authority's approval with a license from the competent administrative authority. Persons licensed to handle hazardous materials or waste are prohibited from abandoning or delivering them except in designated places and persons authorized to do so.
- Article 56: The owner of the facility or the person responsible for its management, whose activities produce hazardous waste in accordance with the provisions of this law, must keep a record of these wastes and how to dispose them and contracting with competent authorities to manage the process of handling and safe disposal of this waste.
- Article 58: Use empty packages of hazardous materials or use products resulting from their recycling except in accordance with the requirements specified by the Executive Regulations of this Law.

The Decree No. 722/2022 also includes the following annexes applicable to the project:

- Annex (7): Register form for hazardous materials and waste
- Annex (8): Requirements and standards for remediation of contaminated soil
- Annex (9): Terms of use of empty containers
- Annex (10): Requirements and standards for the disposal of hazardous materials and waste
- Annex (11): Requirements and standards for tools and supplies for hazardous materials and waste segregation, collection, transporting and storing such as hazardous healthcare waste and other hazardous waste.
- Annex (13): Industrial waste register form
- Annex (17): Hazardous waste tracking form

Other regulations pertinent to solid and hazardous waste management:

- Law159/1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste.
- Laws 106/1976 and 101/1996 allow local governments to include the management of construction and decommissioning waste in the permits required for construction activities
- Law 140/1956 regarding occupation of public roads
- Law 84/1968 regarding public roads
- Codes of Practice of Infrastructure Works
- Egyptian Code 102: Designing and Implementing Pipelines for Drinking Water and Wastewater Networks.
- Egyptian code for rural and urban road works (ECP-2008) for roads and hydrological and hydraulic design.
- Traffic Planning and Diversions
- Traffic Law 66/1973, amended by Law 121/2008 traffic planning
- Law 140/1956 on the utilization and blockage of public roads
- Law 84/1968 concerning public roads
- Work Environment and Operational Health and Safety
- Law No. 4/1994 amended ER no 2466/2024; articles 43 – 45 related to workplace emissions, noise levels, heat stress, ventilation and workers' protection
- Law No. 12/2003 on Labor and Workforce Safety

Other laws and decrees relevant to occupational health and safety provisions consist of:

- Decree No. 126/2003 replacing Decree No. 75/1993 defining procedures and forms for the notification of work-related accidents, injuries, fatalities and diseases.

- Decree No. 134/2003 replacing Decree No. 116/1991 defining the types of establishments covered, OSH services and committees, and related OSH training institutions.
- Decree No. 155/2003 identifies works, occupations and industries prohibited for women workers,
- Decree No.211/2003 identifies the safety limits, requirements, and necessary precautions to prevent physical, mechanical, biological, chemical, and environmental hazards, and to ensure a secure working environment.
- Law No. 137/1981: Labor and Workforce Safety,
- Law No. 79/1975 as amended by Law No. 25/1977 defining the Social (and Health) Insurance
- Law No. 12/1996 enacts the Child Law according to Law No. 12/2003

Minister of Manpower Decree No. 48/1967 for implementing the social insurance law No. 79/1975, requires employers to inform their employees that they are dealing with hazardous waste, accordingly every worker is required to follow protective measures and observe safety precautions set by the employer. The establishment is authorized to take disciplinary action against a worker who does not follow the safety precautions as prescribed (article 218 of the law, article 57 of Law No. 79/1975, and Decree No. 48/1967).

More details about applicable labor legislation: occupational health and safety can be found in the project's Labor Management Procedures (LMP) / Government of Egypt/ Ministry of Environment / Greater Cairo Air Pollution Management and Climate Change Project (available here). [10]

3.2 The Relevant International Treaties Signed by Egypt

Egypt has signed and ratified a number of international conventions that oblige the country to preserve environmental resources.

- United Nations Convention on Climate Change (New York 1992). The Convention covers measures to control greenhouse gas emissions from various sources, including transportation
- United Nations Framework Convention on Climate Change and the Kyoto Protocol (Kyoto, 1997)
- Convention on the Protection of the Ozone Layer (Vienna 1985)
- Convention on the Prevention and Control of Occupational Hazards caused by Carcinogenic Substances (Geneva, 1974)
- Convention on the Protection of Workers from Occupational Hazards in the Work Environment due to Air Pollution, Noise and Vibration (Geneva 1977)
- ILO: Basic labor standards to be followed during project implementation. Egypt has been a member of the International Labor Organization (ILO) since 1936 and has signed 64 conventions that regulate labor standards and working conditions. In 1988 Egypt ratified the Occupational Safety and Health Convention of 1979 (No. 152)
- Consultation, participation and public disclosure: Aarhus regulation promotes transparency of environmental information and involvement of project stakeholders. The consultation identifies and manages any public concern at an early stage. The Regulations include provisions for public disclosure of key project information: such as non-technical summary and environmental impact assessment.

3.3 World Bank Requirements

The World Bank requires that the projects it finances be compliant with both the country's national standards as well as environmental and social framework (ESF) requirements. Therefore, in addition to the national laws and regulations, the project components must comply with the World Bank (WB) Environmental and Social Standards (ESS).

The World Bank Group Environmental, Health and Safety (WBG EHS) General Guidelines, as well as the relevant Infrastructure Sector Guidelines (i.e., Water and Sanitation and Electric Power

[10] https://documents1.worldbank.org/curated/en/583541596080184788/pdf/Labor-Management-Procedures-Egypt-Greater-Cairo-Air-Pollution-Management-and-Climate-Change-Project-P172548.pdf

Transmission and Distribution, Telecommunications), available at www.ifc.org/EHSguidelines, are considered.

3.3.1 World Bank Environmental and Social Standards (ESSs)

The WB has identified 10 environmental and social standards (ESS) that should be complied with in its financed projects.

The following ESSs are applicable to the Greater Cairo Air Pollution and Climate Change Management (GCCC) Project. They have been assessed in relevance to the E-bus demonstration project (ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8 and ESS10):

1 ESS 1: Assessment and Management of Environmental and Social Risks and Impacts

ESS1 is relevant to GCCC project and also for this subcomponent under the study "E-bus demonstration Project" due to the environmental and social risks and impacts associated with the project activities.

2 ESS 2: Labor and Working Conditions

ESS2 is relevant to GCCC project and also for this subcomponent under the study "E-bus demonstration Project" due to the need for workers and occupational health and safety impacts associated with the nature of project activities as well as the other risk related to the hiring procedures and the labor working conditions which are all addressed under the developed Electric Bus (e-Bus) Demonstration Project.

3 ESS 3: Resource Efficiency and Pollution Prevention and Management

ESS3 is relevant to GCCC project and also for this subcomponent under the study "E-bus demonstration Project" due to activities involving consumption of resources and generation of waste and emissions.

4 ESS4: Community Health and Safety

ESS4 is relevant to GCCC project and also for this subcomponent under the study "E-bus demonstration Project" due to possible risks and impacts on the community health and safety from the project activities.

5 ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

ESS5 is applicable to GCCC project; however, it is not applicable to this subcomponent under the study "E-bus demonstration Project" since all the potential depot locations and routes are already either existing, operating and/or owned by the Cairo Transport Authority (CTA).

2 ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESS6 is not relevant to GCCC project and not relevant for this subcomponent under the study "E-bus demonstration Project" as there are no valuable or threatened species found in the project's surrounding.

6 ESS 8: Cultural Heritage

ESS8 is relevant to the GCCC project due to possible chance of finding physical cultural heritage because of excavation works. However, it's very unlikely that there will be any archaeological sites in the sub-component 3 of the GCCC area as the depot is currently existing for a long time and based on the general understanding of the region's cultural heritage distribution, which suggest that the project area has a low likelihood of containing undiscovered cultural heritage sites. Additionally, no deep exaction activities are expected.

7 ESS 10: Stakeholder Engagement and Information Disclosure

ESS10 is relevant to GCCC project and also for this subcomponent under the study "E-bus demonstration Project" due to the involvement of various stakeholders and complex implications of

the project. Relevant stakeholders include governmental entities such as the CTA and the PCU as well as local communities (Greater Cairo residents that use public transportation for commuting and those surrounding the depot location). More details regarding the Project Relevant Stakeholders can be found in Chapter 8 "Stakeholders Consultations and Public Disclosure" and the Project's Consultation Report (**Appendix H** includes ***Consultation Strategy Plan and Report***).

3.3.2 World Bank Environmental, Health and Safety (EHS) Guidelines

The general World Bank Environmental, Health, and Safety Guidelines (available at www.ifc.org/EHSguidelines) will be followed to ensure that all infrastructure components, including their construction and operation activities comply with the Environmental, Health and Safety (EHS) standards and requirements of the WB. Specific environmental health and safety guidelines will also be followed including the following:

- Water and Sanitation
- Electric Power Transmission and Distribution
- Telecommunications

3.3.3 World Bank Good Practice Note

8 World Bank Good Practice Note on SEA/SH:

Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works.

This Good Practice Note (GPN) discusses three (3) key issues, among others, that involve project preparation and implementation as follows:

- Identification and assessment of risks of SEA/SH, including social and capacity assessments. This should be carried out during project preparation. The fact that SEA/SH risk assessment is a continuous process and should take place throughout the project life cycle has to be well-understood, since SEA/SH is a potential occurrence at any moment.
- Addressing the identified risks through the identification and implementation of appropriate SEA/SH risk mitigation and monitoring measures.
- Responding to any reported Gender Based Violence (GBV) allegations in a survivor-centric approach, proposing referral mechanisms to appropriate service providers, regardless of its relevance to the project. This is achieved through effective monitoring and evaluation mechanisms, which meet the World Bank's requirements on SEA/SH.

9 World Bank Good Practice Note on Road Safety:

Addressing road safety is a critical concern in projects involving significant construction and operational activities, especially those affecting public transportation systems like the E-Bus Demonstration Project.

Key considerations of this Good Practice Note are:

- Conducting a comprehensive road safety risk assessment at the outset of the project, covering all phases, including decommissioning, construction, and operation of e-buses.
- The project design should incorporate road safety considerations, such as the layout of bus depots to minimize interaction between buses and other vehicles. This includes ensuring that e-buses are equipped with advanced safety features like cameras, collision-avoidance systems, and clear signage for pedestrians and other road users.
- A comprehensive Traffic Management Plan (TMP) should be developed, addressing the safe movement of construction vehicles and ensuring minimal disruption to traffic.
- A robust road safety monitoring system must be implemented to track compliance with road safety standards throughout the project. This includes regular inspections, audits, and the use of safety performance indicators.
- Even after the construction phase, the road safety measures must continue to be applied during the operational phase of the e-buses. Regular safety audits, traffic assessments, and continuous monitoring of bus routes should be undertaken.

3.4 Electrical Installations Codes and Standards

The following Regulations, Codes, and Standards will be followed in the design of the electrical installations:

- Egyptian Electrical Code.
- British Standard, Regulations for electrical installations IET wiring regulations,18th Edition issued by the Institution of Electrical Engineers were not in contradiction with the local codes.
- EEE guides issued by the institute of electrical and electronic engineers.
- CIBSE British "code of interior lighting" issued by the (Chartered Institution of Building Services Engineers).
- IEC Standards, issued by the International Electro-Technical Commission.
- All applicable parts of National Fire Protection Association (NFPA) will be used throughout the project, particularly any electrical materials subject to fire hazard and NFPA-70 (national electrical code), to prevent hazard to life and property, to minimize damage to the system and its components and to limit the extent and duration of service interruption whenever abnormalities occur on any part of the system.

Table 3-1 List of Standards for Main Electrical System Components

Equipment	Standard & specification
Medium Voltage Switchgear	IEC 62271-1
Medium Voltage Circuit Breakers	IEC 62271-100
Medium voltage cables	IEC 60502
Dry-Type Distribution transformers	IEC 60076
Low-voltage switchgear	IEC 61439-1&2
Capacitors - Low-voltage	IEC 60831-1&2
Circuit Breakers	IEC 60947-2
Contactors and Motor Starters	IEC 60947-4
Low Voltage Cables	IEC 60502-1
Fire Resistant Cables	BS 7846 (Category F2 for life safety)
Cable Trays	BS EN 1461 & IEC 61537
Conduits (PVC)	BS 4607 &IEC 61386-21
Conduits (IMC)	UL 1242 & ANSI C80.6
Conduits (EMT)	UL 797 & ANSI C80.3
Conduits (RSC)	UL 6 or BS 4568-1 & ANSI C80.1
Switch Dis-connectors	IEC 60947-3
Sockets	IEC 60884-1
Lighting Fixtures	IEC 60598
Safety/Exit Lighting	BS 5266
Switches	IEC 60669-1
Uninterruptible Power Supply	BS EN 62040 & EN 62040
Earthing (Grounding)	IEC 60364-1, 51, 4-41, 5-55 & BS 7430
Lightning	BS-EN62305-1, 2, 3 & 4

Chargers typically adhere to standards and guidelines that prioritize aspects like safety, energy efficiency, and performance rather than having specific environmental requirements outlined in standards such as IEC 62430. These standards ensure that chargers operate safely, reliably, and efficiently, addressing criteria such as electrical safety, compatibility with power sources, and electromagnetic compatibility (EMC).

Additionally, for the electrical safety provisions of electrical vehicles (EV) Charging Stations shall follow the following standards:

- **IEC 61851-1:2017**: Standard for electric vehicle conductive charging system – Part 1: general requirements,
- **IEC 61851-23:2014**: Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station,
- **EC 61851-24:2014**: Electric vehicle conductive charging system - Part 24: Digital communication between DC EV charging station and an electric vehicle for control of DC charging; and
- **ISO 17409:2020**: Electrically propelled road vehicles- Conductive power transfer – Safety Requirements

3.5 Fire-Fighting Codes and Standards

Firefighting systems will be designed in accordance with NFPA and the requirements of local civil defense, and fire AHJs of the Project buildings. Additionally, firefighting systems will conform to the technical guidelines requirements and design criteria of latest editions of the applicable codes and standards listed in the table below.

Table 3-2 Firefighting applicable codes and standards

Code/Standard	Full Definition
NFPA	National Fire Protection Association
ASME	American Society of Mechanical Engineers
ASTM	American Society of testing materials
AWWA	American Water Works Association
ANSI	American National Standard Institute
FM	Factory Mutual
UL	Underwriters Laboratories Inc.
EPC	Egyptian Firefighting Code

3.6 Required Approval and Permits and their Associated Administrative Authorities

The following presents the approval and permits required for the infrastructure and their associated administrative authorities:

- Approval of Civil Defense Authority (CDA) on firefighting network design that will be implemented in the depot.
- The Electricity Distribution Company (EDC) will be responsible for providing the tie-in to the project, upon request from the Landowner (CTA), and at a cost paid by the Project.
- The Electricity Distribution Company will be responsible for the approval of the internal design of the electricity network.
- Approval of Al-Ameriyah district and Waste Management Regulatory Authority (WMRA) to dispose of waste generated during construction and operation (identification of certified landfills).
- Approval from the traffic department should be obtained by the contractor prior to the construction preparation
- EEAA environmental approval
- Construction license

4 Environmental and Social Baseline

The main objective of studying the baseline environment is to acquire a comprehensive background on the project site and the study area before starting the project construction and operation activities.

The baseline chapter includes three types of environments: the physical, biological and socio-economic environment. All three of them have been described in this chapter using various information sources. The Consultant relied on primary and secondary data. Secondary sources included many published reports, research and studies, including climatic data from the climate charts provided by Meteoblue are based on weather model simulations for the years 2022 and 2023, as they are the most recent and expressive.

Primary sources included a number of site visits to Al-Ameriyah Depot, baseline measurements (ambient air quality and noise levels), surveys conducted with diverse beneficiary groups, including women, men, mothers, the elderly, and people with disabilities, to gather insights into their specific transportation needs and preferences. Additionally, meetings and surveys were held with bus drivers to understand their requirements and feedback for enhancing the efficiency and effectiveness of the transportation system.

4.1 The Project site

Al-Ameriyah Depot occupies an area of 26,844 m² in Al-Sawah district, Cairo. The main access roads to the depot location are Al Sawah road and Al Masanae road.

Surrounding the depot are mixed urban and industrial zones, with residential areas nearby. The location provides easy access to major transportation arteries, supporting the seamless integration of the electric bus fleet into the existing transport network while minimizing disruptions to local communities. The depot is located at longitude of 30°52'35.45"E and latitude of 29°56'12.36"N.

The depot approximate coordinates[11] are as shown in the following table.

Table 4-1 Depot Coordinates

Latitude	Longitude
30°06'14.5" N	31°17'55.2" E
30°06'15.7"N	31°17'51.0"E
30°06'21.0"N	31°17'52.6"E
30°06'19.6"N	31°17'57.5"E

Al-Ameriyah Depot is surrounding by the following:

- From the West and sharing borders is the "Bisco Misr" factory, sweets manufacturer.
- From the East and sharing borders is "Al Sawah" CTA depot.
- From the North there is Sanofi pharmaceuticals factory.
- From the South, there is a highly dense residential block.

The neighborhood in general is complex. Nearby is the "Qobba" presidential palace, residential blocks, military establishments and factories all within a 1-kilometer radius from the depot. The area is well serviced by utilities.

The depot has one entry gate and one exit gate: one morning gate for normal operation, and another emergency gate.

The depot location and its surrounding activities are presented in section 2.4.1.1.

[11] Obtained from Google maps.

4.2 Soil Properties

Al-Ameriyah Depot soil is covered all over with concrete layer.

During the site visits conducted by the Consultant, oil spills were observed along the depot site. Additionally, due to the presence of four (4) diesel storage tanks placed underground, soil is expected to be contaminated. Thus, a soil decontamination plan shall be developed by Misr Petroleum after removing the contaminated soil from oil spills/leaks to eliminate any residual environmental concerns and create space for potential redevelopment or alternative land use.

The type of soil beneath the concrete layer is currently unknown and will be determined by the contractor during the decommissioning phase through geotechnical investigations.

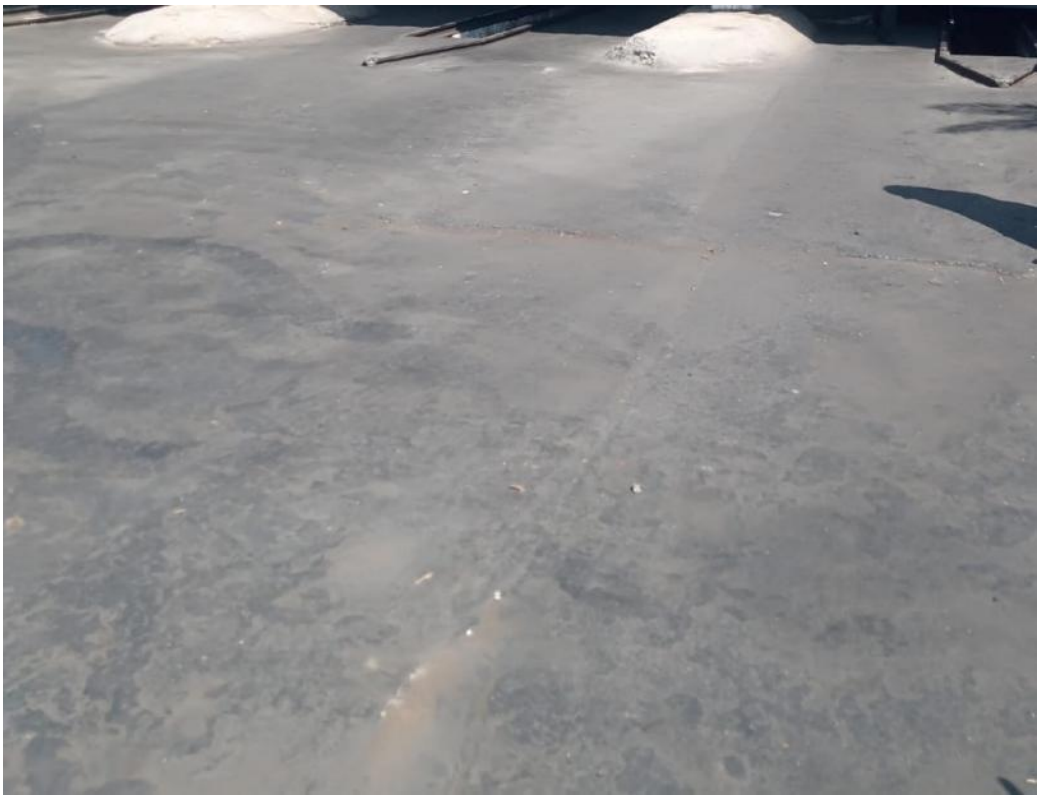


Figure 4-1 Current land in the depot

4.3 Climate Conditions

The following sections show more details about temperature, rain, wind, humidity and solar radiation in the project area.

MeteoBlue's climate charts are based on simulations of 2023 weather models and are the most expressive of novelties. They give good indications of typical climate patterns and predictable conditions.

4.3.1 Temperature

The project area is characterized by a warm climate and hot summer (between April and October) and warm winter (between November and May).

The meteorological data was collected from the Cairo Airport Meteorological Station, the closest one to the project area, Environment Report (Geography and Climate), 2021, issued by CAPMAS, and as shown in the table below.

Table 4-2 Climate monthly averages (Cairo Airport Meteorological Station)

Meteorological Elements	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average Daily Max.Temperature (°C)	21.4	22	23.7	29.3	35.4	34	35.5	37.4	33.3	29.7	26	19.5
Average Daily Minimum Temperature (°C)	12.7	11.2	13.0	15.3	20.9	22.6	24.5	26.7	23.0	20.0	18.0	12.8
Average Daily Relative Humidity (%)	60	60	52	45	43	51	53	55	57	57	58	60
Average Monthly Rainfall (mm)	0.4	9.2	0	0	0	0	0	0	0	0	4	0.5

The average monthly temperature reaches its maximum in August (38°C maximum-21°C minimum) and its lowest value in January (21°C maximum) and lowest minimum (8°C).

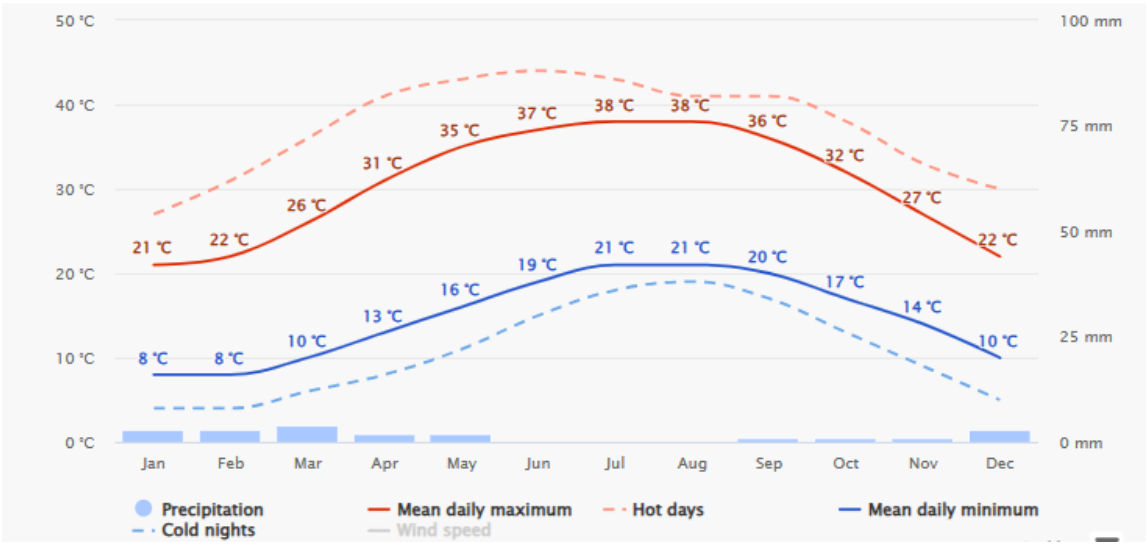


Figure 4-2 Average monthly temperatures and rainfall throughout the year (METEOBLUE)

4.3.2 Rainfall

The amount of annual rainfall in the vicinity of the project is small, reaching approximately 35 mm in March. The following figure shows the average monthly rainfall values over 2023 for the region.

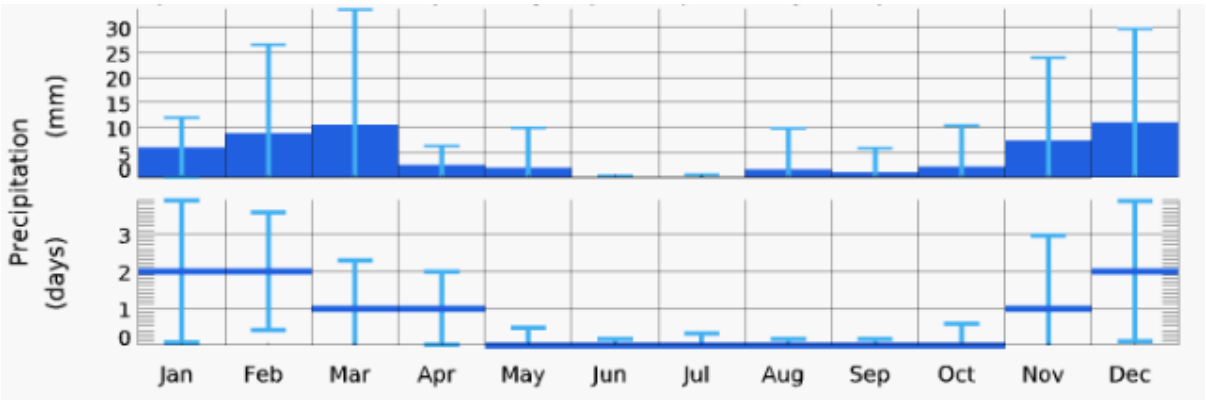
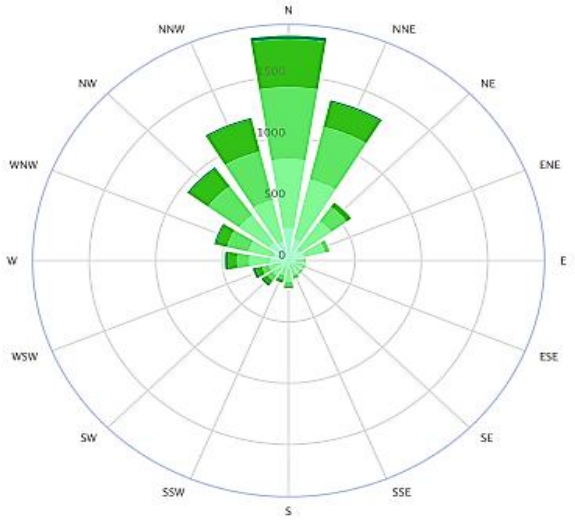


Figure 4-3 Average monthly rainfall values over 2023.

4.3.3 Wind

The direction of the wind varies throughout the year with different seasons. The following figures show the wind-roses and the wind speeds over the months of 2023. Wind roses represent the frequency of wind gusts (column length) from a particular direction, while the colors and width of the column represent the wind speed in knots.

Figure 4-4 (Right) Wind Rose in the project area



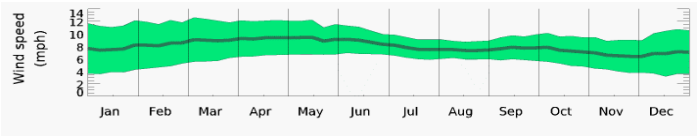


Figure 4-5 (Top) Average, maximum and minimum wind speeds in the months of 2023

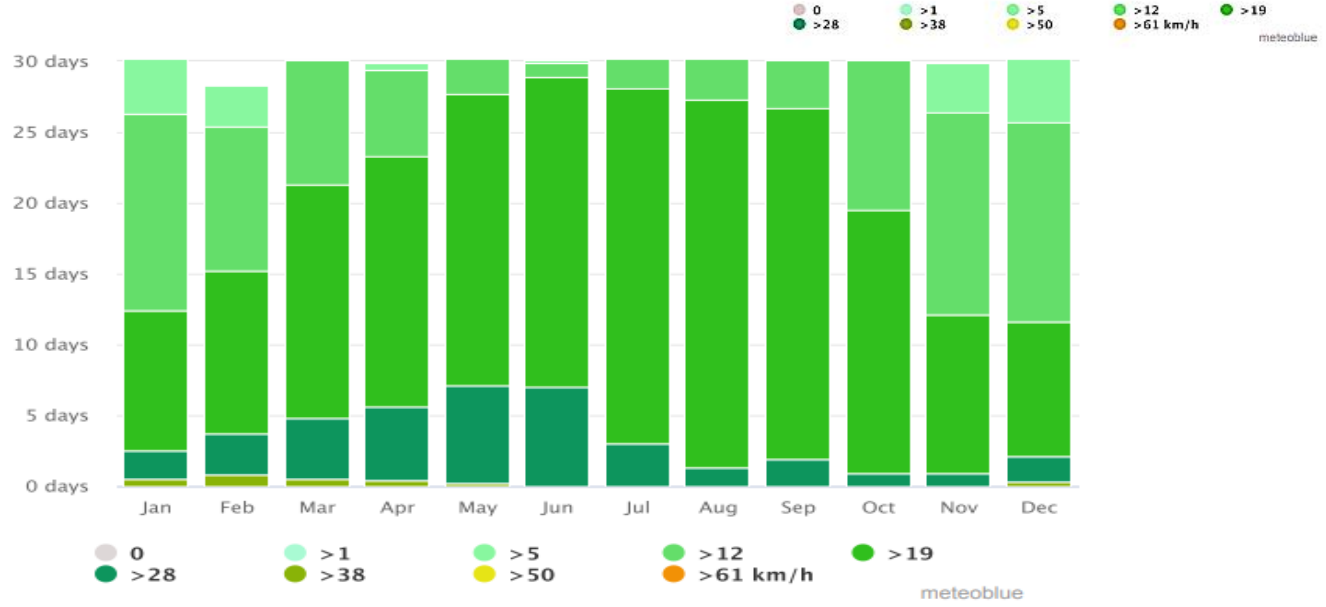
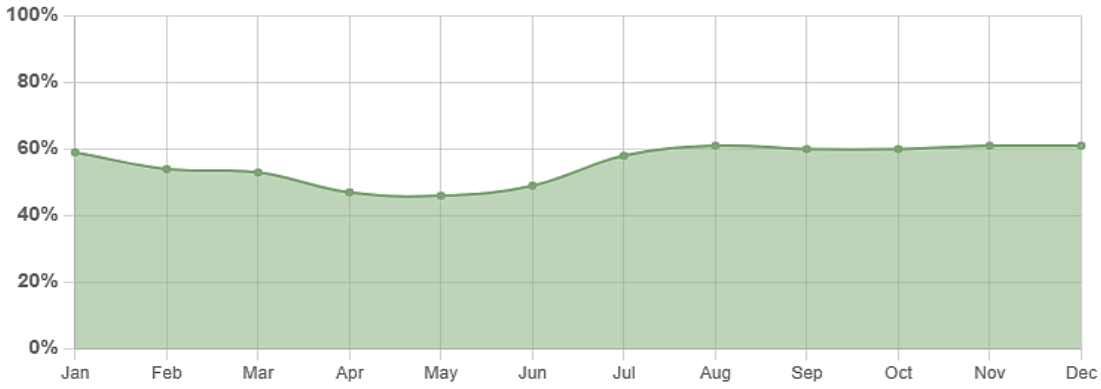


Figure 4-6 Distribution of wind speed (Cairo Airport Meteorological Station)

4.3.4 Humidity

The average relative humidity in the project area ranges between 45% in May and 60% in December, with an annual average of 60%. The following figure shows the relative humidity of the project area for each month.

Figure 4-7 Average relative humidity



4.3.5 Solar Radiation

The solar radiation in the project area is high, increasing during the summer months and decreasing during the winter months. The following figure shows the average hourly profile ofc the solar radiation Wh/m² for each month.

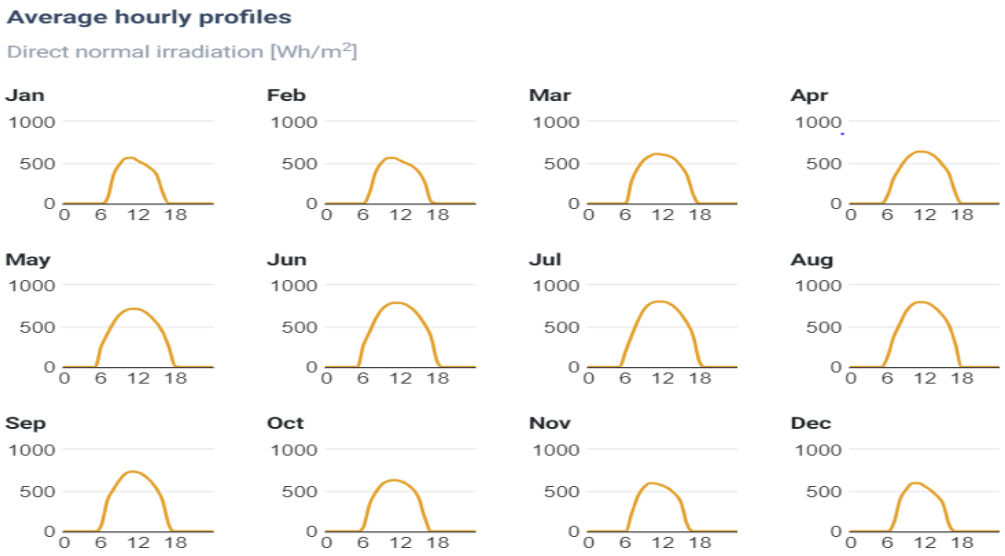


Figure 4-8 Average hourly solar radiation Source: globalsolaratlas.info

4.4 Ambient Air Quality and Noise Levels at the Depot Site

Baseline including ambient air quality and noise levels measurements were carried out on the 4th, 5th and 6th May[12], 2024 by Plus Green Environmental Solutions in three selected locations which have been chosen based on the following criteria

- Point 1: Located at the beginning of the depot next to the administration building, likely chosen to assess the baseline environmental conditions in the vicinity of the main operational hub within the depot.
- Point 2: Positioned at the end of the depot, selected to capture environmental data from another critical operational area within the depot, providing a comprehensive view of conditions across the site.
- Point 3: Situated outside the depot near a residential area. This point was likely selected to monitor potential impacts of depot operations on the surrounding community, particularly in terms of air quality and noise levels

Areas within and near the depot that are sensitive to operational emissions or noise might have been prioritized to provide data that could inform mitigation strategies. These locations were likely selected to give a well-rounded assessment of environmental conditions, both within the depot and in areas where the community might be impacted.

Locations of the selected points are shown in the following table.

Table 4-3 Measurements Locations

Location	Description	Coordinates	
		Latitude (N)	Longitude (E)
Point 1	At the beginning of the depot next to the administration building	30°06'20"N	31°17'54"E
Point 2	At the end of the depot	30°06'15"N	31°17'55"E
Point 3	Outside the depot near the residential area	30°06'19"N	31°17'59"E

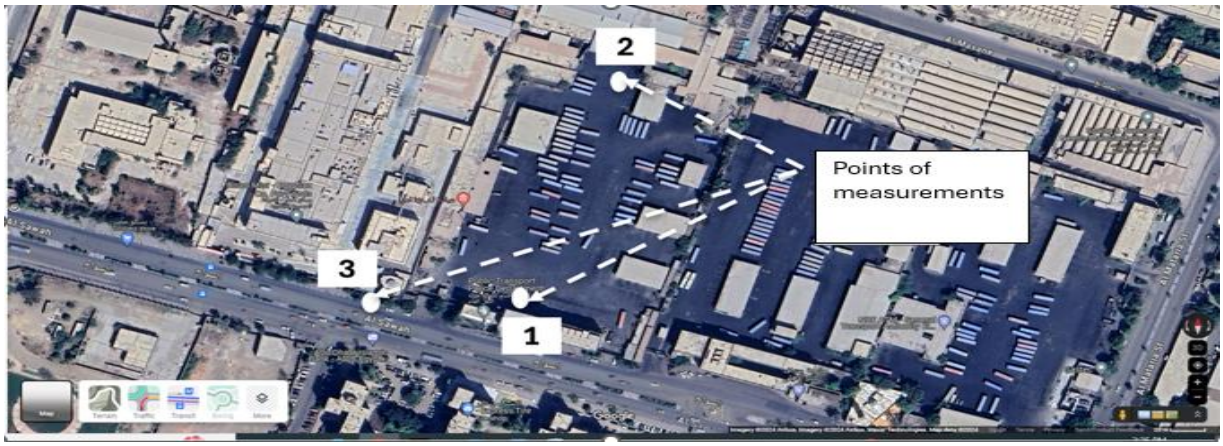


Figure 4-9 Measurements' Locations

Appendix I include the detailed baseline measurements analysis report including ambient air quality and noise levels.

12 The baseline measurements were conducted on Saturday and two national holidays.

4.4.1 Ambient Air Quality

It was observed from the measurements analysis report that the three (3) parameters exceeded the national and the WB limits at Point (1). These parameters are **average PM10, Average PM2.5 and average T.S.P.**

Regarding the elevated pollutant concentration at Point 1, Point 1 is positioned directly in the path of the wind (Down Wind) and is surrounded by buildings, creating a confined environment that significantly amplifies the concentration of dust particles. In contrast, Point 2 is located in the opposite direction of the wind (Up Wind), where the presence of surrounding buildings acts as a barrier, effectively mitigating the dust concentration compared to Point 1. Point 3, however, is situated in an open street area, where the absence of buildings means there is no significant influence on dust concentration, allowing it to disperse more freely This can be shown using the location map and wind rose.

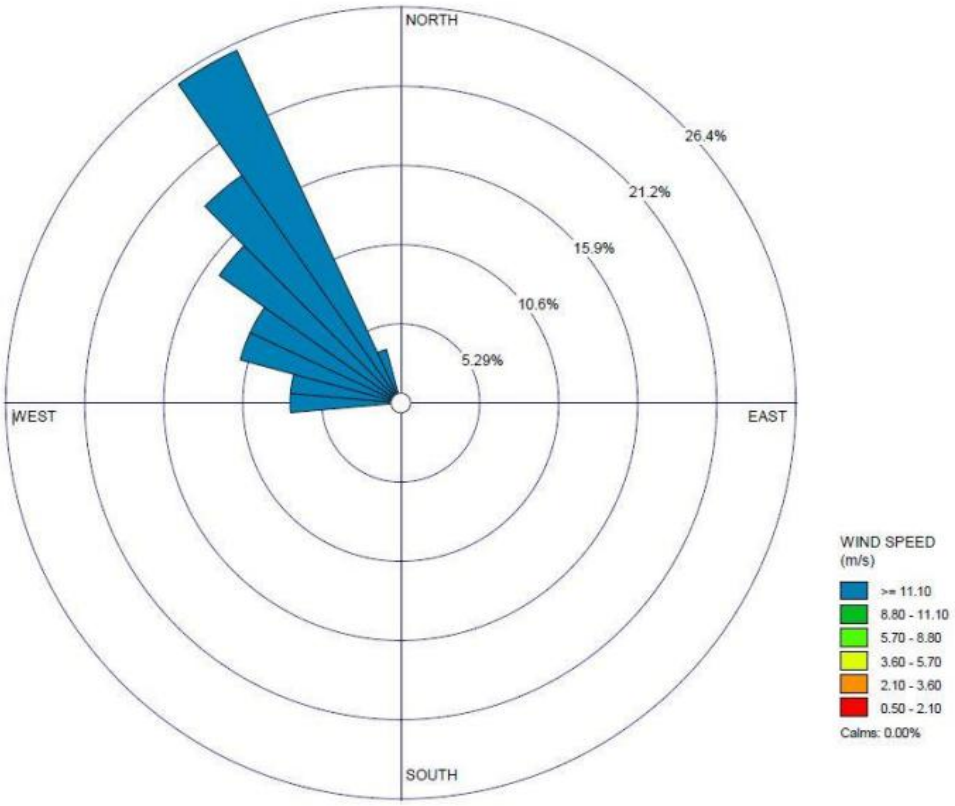


Figure 4-10 Wind Rose of Al-Amirya

It should be noted that the ambient gases, including sulfur dioxide, carbon monoxide, and nitrogen dioxide, were measured over an 8-hour period, with the one-hour average subsequently calculated from these measurements. In contrast, particulate matter (PM10) was collected over the same 8-hour duration, after which the dust was weighed on the filter to determine the daily average. This approach aligns with the standards mentioned in Annex No. (5) of the Executive Regulations of the Egyptian Environmental Law.

The following table presents one-hour average results for 8 hours continuous measurements (11AM-6PM for point 1 and 10AM-5PM for pints 2 and 3) of the ambient air quality measurements conducted in the three (3) selected locations and their compliance with the national and WB limits.

Table 4-4 Results of ambient air measurements and permissible maximum limits

Measured	Average SO2 (µg/m³)	Average CO (mg/m³)	Average NO (µg/m³)	Average NO2 (µg/m³)	Average NOx (µg/m³)	Average O3 (µg/m³)	Average PM10 (µg/m³)	Average PM2.5 (µg/m³)	Average T.S.P (µg/m³)
Point 1	165.51	1.26	26.56	52.95	26.56	75.49	520.5	514.9	529.7
Point 2	124.78	1.24	7.51	21.45	32.94	76.15	136.1	70.1	195.56
Point 3	53.95	1.6	14.69	24.69	46.02	83.77	116.1	72.1	182.56
National Limits	**300**	**30 (mg/m³)**	**---**	**300**	---	**180**	**150**	**80**	**230**
WB (EU-WHO) Guidelines	**350**	**---**	---	**200**	---	---	**150**	**75**	---

4.4.2 Noise Intensity

The measurements mainly included the Equivalent continuous noise level (LAeq)، Peak sound pressure level (LCpeak)، LAFmax, LAFmin and were compared with the maximum limits mentioned in Annex (7) for safe noise levels stated in the amended executive regulations of Law No. 4/1994 and the amended regulation of 710/2012 and amended ER no 2466/2024. and compared with the maximum WB limits.

The noise levels were monitored for a duration of 8 hours during the day. This approach was taken to reflect the typical daytime environmental conditions, in accordance with the relevant standards and permissible limits for equivalent noise levels as outlined in Table No. (3) of Appendix No. (7) to the Executive Regulations of the Environmental Law.

The following table presents the results of the noise level measurements conducted at the three (3) selected locations, showing that while the levels are compliant with national limits, they exceed the World Bank (WB) thresholds.

Table 4-5 Noise Intensity Measurement

Measured	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours (Day time)			
	LAeq	LAFmax	LAFmin	LCpeak
Point 1	66.50	83.44	52.63	101.26
Point 2	60.11	78.85	50.86	104.58
Point 3	63.20	92.65	52.60	108.93
National Permissible Limits for (Residential area with roads more than 12 m) – daytime	**70**	-	-	-
WB General EHS Guidelines (Residential) - daytime	**55**	-	-	-

Based on the environmental monitoring and measurements performed for ambient air and noise, the results showed compliance with all national and World Bank guidelines, except for dust (TSP, PM10, & PM2.5) at point 1 (highlighted in red) and noise levels at the 3 points, where the dust levels exceeded both the national and the World Bank limits, and the noise levels found to be exceeding the WB limits only.

4.4.3 Green House Gases, Black Carbon and PM2.5

The Consultant utilized the emissions measurements report conducted for the public transport modes in Cairo, Egypt in 2017 by EEAA" in calculating the Black Carbon (BC) emissions, PM10, PM2.5 and GHG emissions for the diesel/natural gas buses on the five (5) selected routes. Calculations were based on the types/models of the buses provided by the CTA. Appendix J includes the detailed measurements' report on Public Transport Modes in Cairo, Egypt in 2017 by EEAA and Appendix K detailed methodology to calculate GHG, PM2.5 and BC emission.

Based on the calculations conducted, the following presents the emissions generated from the current fleet of the five (5) selected routes:

- PM2.5 emissions = 0.22 ton/year
- BC emissions =0.16 ton/year based on calculations using the following relation:

Black Carbon/ PM2.5= 0.74

- While for the Green House Gases (GHG) were 4525.61-ton CO2 equivalent/year

4.5 Access Roads

The depot could be accessed via two main roads; Al Sawah road which is paved, has width of 15.3 m and 2 lanes and Al Masaneh road which is paved, has width of 12 m with only one lane.

4.6 Surface Water

The nearest surface water body, "Ismailia Canal" that comes out from the Nile River to the project site is located about 1.6 km northwest of the project site. Thus, **no impact is expected on it from the project activities**.

4.7 Groundwater

Groundwater[13] [14]: In general, the depot is situated within the Nile Delta aquifer system, which forms the primary groundwater reservoir in the region. This quaternary aquifer is highly productive and consists predominantly of sand and gravel layers interbedded with clay. It is generally semi-confined, with unconfined conditions near the Nile or other surface water systems. The depth to groundwater in this aquifer typically ranges between 10 to 50 meters below ground level. However, in areas closer to the Nile River, groundwater levels can be shallower, sometimes less than 5 meters below the surface. Thus, the Consultant recommends that the construction contractor to conduct investigation to know the groundwater depth in the depot site before any construction activities.

4.8 Ecological Characteristics

The Consultant conducted field visits to the depot site and found that the area is mixed urban and industrial zones that lies inside the city and is not considered environmentally insensitive in terms of ecological life, and no flora or fauna was observed inside the depot. Additionally, no important or endangered/rare flora and/or fauna were reported in the depot area. Thus, **impact is expected to be low from the project activities on the ecological life.**

4.9 Protected Areas

The depot site does not have nature reserve areas, public parks, or areas of ecological importance. Thus, **no impact is expected on it from the project activities**.

[13] Hydrogeological Map of Cairo RIGW1989

[14] El-Sayed, S. (2018) Study of Groundwater in Northeast Cairo Area, Egypt. Journal of Geoscience and Environment Protection, 6, 229-251.

4.10 Socio-economic Environment

4.10.1 Methodology and Approach

The social assessment in this report builds on secondary and primary data sources, as well as quantitative and qualitative information. The main focus of this assessment is inclusion of gender and passengers with reduced mobility. Various consultation sessions with different stakeholders helped to arrive at specific concerns, recommendations, actions, protocols and specifications to observe during fleet procurement and operational design-stages that will improve the experience of women in public transport, particularly their personal safety. In line with the gender-related considerations, consultation with persons with disabilities and passengers accompanying persons with limited mobility or disabilities helped to address concerns, and design considerations for passengers with reduced mobility including senior citizens, passengers traveling with minors, pregnant women, and passengers with physical disabilities.

1 Data Sources

Secondary Data Sources

- All project documents and manuals provided by GCCC and the WB;
- Formal and informal documents provided by CTA;
- CAPMAS census for population and housing conditions 2018; and
- KMZ and layout of buildings files were shared among the consultants' team.

Primary Data Sources

- Passengers' surveys carried out by TFC as shown in Appendix B. Passenger interviews were conducted in a street-intercept method in selected zones surrounding the 14 surveyed CTA routes. 29 zones were selected across the GCR with 583 surveys collected from all zones;
- A total of 15 Focus Group Discussions (FGDs) with passengers in 5 areas along Al-Ameriyah routes i.e., El Daher (5 lines); Hadeyk Al Qobba (4 lines); Al Waily (3 lines); Al Azbakeya (3 lines); and Heliopolis (2 lines). Groups were limited to a maximum of 8 participants to be able to focus on the groups' concerns in detail. The total number of male groups in each area is 5, another 5 with females, 3 with young men, and 2 with ladies/girls (a total of 120 participants);
- One FGD with persons with disabilities (a total of 7 participants); and
- 15 Key Informant Interviews (KIIs) with CTA officers and Al-Ameriyah Depot staff, e.g., CTA central depart., CTA planning dept., CTA training depart., depot manager, depot observers, engineering depart., public relation depart., human resources depart., drivers, and deputy head of workers' syndicate.

2 Data Analysis

Quantitative survey data was entered in excel sheets to produce simple tables and graphs. Transcripts of different KIIs and FGDs were organized in a corresponding spread sheet by type of group, overarching themes, and subthemes. The corresponding spread sheets were used to conduct thematic analysis for qualitative data to find and interpret main patterns and meanings from FGDs transcripts.

4.10.2 District

1 Administrative Jurisdiction

Al-Ameriyah District is located in the Northern Area of Cairo Governorate. It is bordered by Al Matariyah District from the North, Hadeyek Al Qobba from the South, Al Zawya Al Hamra from the West, and Al Zatoon from the East. The district comprises 8 sub-districts (Sheyakha), namely: Al Kafassin, Shaheen, Marsa Khalil, Al-Ameriyah Al Shamalya, Al Ameriyah Al Ganoubya, Nasser, Monshaeet Al Qobba Al Gadida, and Gad Al Mawla. The district is in general complex containing areas of distinct and well-defined land use.

Figure 4-11 Al Ameriyah District

4.10.3 Socio-economic Characteristics

1 Population

According to CAPMAS population census 2018, total population Al-Ameriyah District is calculated at 152,554 capita; total number of households is calculated at 42,798 with average household size of 3.6 members. Male/female ratio is calculated at 50.71/49.29; where about 30.1% never married (or under the age of marriage), 59.7% are married, and 10.2% are divorced or widowed.

2 Education

Almost half (49.2%) of population of Al-Ameriyah 6+ were enrolled in education and completed, a bit more than a quarter (27.1%) is currently enrolled, 5.7% were enrolled and dropped out, and another 18% were never enrolled in formal education. Subsequently, the illiteracy rate of population 6+ is calculated at 15.8%, 6.8% can read and write, 0.6% completed illiteracy classes, and 0.3% completed cognitive education classes. About 17.6% completed basic education (primary and preparatory schooling), and another 37.3% have completed a level of secondary education (general, Azhar, technical, and post-secondary), while 21% have a university degree and about 0.6% have a post university degree (high diploma, Master, and PhD)[15].

3 Housing Conditions

A total of 58.1% of total households in Al-Ameriyah live in owned units, 25.5% in old rent units, 9.4% in new rent, 5.8% in units donated by the family, and only 1.2% live in employment-housing units. Official statistics[16], indicate that 97.6% of households live in an apartment. The crowdedness rate is calculated at 1.05 persons per room. Almost 97.9% of households have a private bathroom and kitchen. All households are connected to the public water network (99.8% inside the house and 0.2% inside the building), and 99.91% to the public sewage network. A total of 99.95% use public electricity for lighting; about 93.4% use natural gas as cooking fuel, while 6.4% use bottled gas, and 0.2% use electricity or solar energy or kerosene.

4.10.4 Al-Ameriyah Depot capacity and Operation

The depot capacity is 225 buses, and the number of allocated buses is 158. During consultation sessions, the depot manager stated that the scheduled number of operating buses is only 108 out of 158 due to shortage of operational staff, e.g., drivers and conductors.

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[15] CAPMAS. *General Census for Population, Housing and Facilities*. (2017).
[16] CAPMAS. *Bulletin of Housing in Egypt 2018/2019*. https://censusinfo.capmas.gov.eg/Metadata-en-v4.2/index.php/catalog/413/overview (2020).

Table 4-6 Selected routes of buses of Al-Ameriyah depot

Line No	Alignment	Length of route in km	Allocated buses		Bus round in minute	Average frequency in minute	No of passengers / day	Average/ daily km/bus	Mean/ bus stops	Mean/ speed/ hour
			Morning	**Evening**						
1090	Masakin El Ameriyah-El Abageyah	16.500	11	11	150	14	8475	255	44	15
1129	El Ameriyah-El Moneeb	24.600	16	13	164	20	8065	345	46	16
290	Masakin El Ameriyah-Ahmed Helmy	20.500	15	11	130	18	7338	340	31	14
810	Qism El Hadeyek- El Omraneya	20.250	15	11	168	34	5696	245	41	17
831	El Zawya-Hadeyek Zeinhom	14.500	7	4	130	51	1851	250	32	17

The depot operates for three shifts; each shift for 8 hours including a maintenance shift. According to CTA, there is a minor maintenance routine every week (seventh day of the week) and a major maintenance routine every two weeks (fifteenth day of the month); bus washing takes place every night between 12 am and 5 am.

According to CTA, all buses operating on the routes are very old, as manufacturing dates vary between 2004-2014[17]. During various consultation sessions, it was clearly confirmed that Al-Ameriyah Depot will be fully dedicated to e-buses. Therefore, CTA is aiming at a best practice for this pilot project to encourage the WB for a second batch of e-buses in the future.

1 Current Labor Force

a) Composition of Labor Force

The Head of Al-Ameriyah Depot reported a total of 1,079 employees.

- Females constitute a very low percentage (0.83%, 9 females). These females are mainly in mid-level administrative roles, except for one employed as a workshop operator.
- Persons with disabilities represent 4.36% of the workforce, aligning with the Egyptian labor law quota (5%). Among them, 17 males and two (2) females work in mid-level administrative roles, two (2) males are employed as conductors and in workshops, and (5 males) are engaged in service roles. This totals 21 males and 1 female (2 males work as conductors and in the depot workshops (total of 21 males and one female (operator/telephone switch) in non-administrative roles.

Table 4-7 Composition of labor force at Al-Ameriyah Depot

Position	Employees		Employees with disabilities		Total
	Males	**Females**	**Males**	**Females**	
Managers	5	-	-	-	**5**
Mid-level	160	6	17	2	**185**
Conductors	218	-	2	-	**220**
Drivers	306	-	-	-	**306**
Engineers	4	-	-	-	**4**
Workers	277	-	20	1	**298**
Services	56	-	5	-	**61**
Total	**1026**	**6**	**44**	**3**	**1079**

The low percentage of females' participation in CTA in general and in Al-Ameriyah Depot in specific and all other CTA depots was repeatedly discussed during consultation meetings. It was over and over explained that the nature of work and working shifts (very early in the morning and very late in the evening) does not suit Egyptian females and culture. When discussing the participation of females in operation, it was tremendously refused and defended.

b) Labor Force Relocation During Decommissioning and Commissioning Phase

The relocation of labor force during commissioning phase is not a physical relocation per se. CTA confirmed that all employees, admins, engineers, technicians, drivers, conductors, and service workers will be transferred to the neighboring garages, namely: Al Sawah and Al Matariyah. Buses are supposed to operate on the same existing routes but from the neighboring depots during decommissioning

[17] More detailed information on the manufacturing details of operating buses is presented in Environmental section.

instead. This matter should not imply any significant social risks if well managed timely ahead of evacuation and decommissioning. Passengers will not be affected in this regard.

c) Labor Force Repositioning During Operation and Maintenance Phase

Engineers, technicians, and drivers will need to be repositioned to conform with the shift from fuel or diesel buses to e-buses. Technical capacity building and training needs are covered in a stand-alone document under Appendix N.

However, FGDs reveals the following as general considerations for drivers and conductors' capacity building:

Control unneeded/unplanned/sudden bus stops;

- Instruct drivers to stop in stations close to the sidewalk/pavement;
- Introduce a system for cash change;
- Conductors should be able to drive in case of any emergency happens to drivers;
- Prepare and train drivers and conductors on different contingencies and emergencies;

Provide personal skills (general behavior modification, humanitarian approach to deal with elderly and persons with disabilities, stress management …etc.);

- Apply medical check-ups and random drug tests;
- Train drivers effectively on the new e-bus because it is different than old buses; and

Train drivers, conductors, and workers on basic first aid principles.

The FGD with **persons with disabilities** was very useful in drawing attention to the importance of community behavioral change and the urgent need to adapt a set of community behavioral change campaigns and workshops to raise the awareness of community members in Egypt towards persons with disabilities. It was explained to them during the meeting that the GCCC project includes a component for behavioral change and that the team will get back to them for further discussion on this topic and welcomes their cooperation in the design of messages and material. Perceived concerns related to community behavioral change can be summarized as follows:

i Bus drivers and conductors:

- Bus drivers are mostly impatient to wait until persons with limited mobility can get into and out of the bus; Some drivers do not stop intentionally when they see persons with disabilities waiting to take the bus; Bus drivers and conductors need to learn basics of sign language to be able to communicate with people with hearing and speaking disabilities; Conductors as well as bus drivers need to be educated about the "comprehensive services card" to accept it from passengers without forcing them to pay a ticket or harass them; and conductors must accept to see a hanging/pendant "comprehensive services card" without asking to see to card itself, especially with persons with amputated arm(s) or hand(s). Disrespect of passengers to preserve spaces and seat allocated for people with limited mobility (elderly, pregnant women, and persons with limited mobility or disabilities); passengers on stations or inside the bus ignore any support or even mercy that should be provided to persons with disabilities; and
- Inside the bus, no one would stand up for someone with reduced mobility (pregnant, seniors, persons with disabilities … etc.).

ii Community members

- Impatience of car drivers on the road, when the bus drivers need time until a person with limited mobility gets in or out of the bus;
- Females with all kinds of disabilities are more frequently subject to physical/sexual harassment, especially if they need any support in moving;
- Awareness raising about persons with disabilities is highly required, as some people do not respect that people are different;
- Introduce types of wide range of disabilities to the public

2 Depot Facilities

The administrative building falls at the southmost edge of the depot. The building includes the clinic complex and the mosques; both (being located in the administrative building) are not included in the

scope of depot retrofitting design. So, during decommissioning and construction, if it will not be allowed for the workers to use utilities of the administrative building, the contractor shall be the responsible for providing temporary utilities like mobile toilets.

a) Clinic Complex

- **Infrastructure:** A clinic complex close to the mosque. The complex comprises 2 praxis rooms, a relatively large waiting area, a small pharmacy, and a toilet. The praxis' rooms are moderate in size, but poorly furnished and equipped. During site visits, the toilet was closed; only the prayers' washing area (wudu') was open. To meet the international standards, the clinic complex will need painting, improvement of medical furniture (examination bed), expansion of medical equipment and first aid facilities for acute cases, upgrade of toilet, and installation of at least one more toilet in the complex.
- **Medical staff:** During ongoing consultation with the CTA, it was made clear that there is at least one doctor or nurse daily for one shift (8 hours). At the time of the inspection visit (10/01/23), a mid-weekday (Wednesday) and during working hours (10 00 to 14 30), there were neither doctors nor nurses in the medical complex. It is highly recommended to ensure that at least one doctor or one nurse is operating for at least 18 hours (2 shifts) per day around the week.
- **Pharmacy:** During the same inspection visit, the pharmacy was also closed and could not be assessed. It is highly recommended to ensure that the pharmacy is operating for at least 18 hours (2 shifts) per day around the week, and to establish a mini first aid unit with sufficient equipment and medication around the clock for life threatening emergencies.
- **Equipped ambulance:** There is no ambulance in the depot, nor in the neighboring depots (El Sawah and El Matariyah). The importance of having at least one ambulance in this area when discussed with CTA staff, was completely rejected the idea. It was confirmed that minor emergencies are treated in the clinic, while emergent and acute cases are transferred to the closest general hospital (Al Matareyah Educational Hospital) which includes an emergency unit, while steady or chronic cases can always go to CTA Hospital in Ramses under the coverage of CTA health insurance system.

b) Hygiene Amenities

- **Toilets:** according to CTA informal documents[18], there is a total of 33 toilets, 31 for males and only 2 for females. Two toilets are located in the managers' office, eight in the mosque, seven in the oil ducts, four in the laydown area, ten in the second and third floor of the administrative building (8 for males and 2 for females), one in the operation room, and one in the clinic complex. Only one female toilet in the admin building was investigated; it was muddy/not clean and flush was not fully functioning. It is therefore recommended to fully upgrade the currently existing toilets, establish a cleanness and maintenance plan for toilets, and ensure that the plan is fully implemented. It is proposed to hang a list in each toilet to present shifts of housekeeping, name of workers, and signature of supervisor(s); while underachievement of cleanness shall be punished by management. Clean water, soap, and toilet paper shall also be provided and checked within this plan.
- **Showers** There are 22 shower cabins inside the above-mentioned toilets; 2 in the managers' offices, 8 in the mosque, 7 in the oil ducts, 4 in the laydown area, and one in the operation room. However, CTA confirmed that upgraded depots include a separate toilet and shower for each workshop, and this will be considered in the retrofitting design.
- **Changing rooms and lockers** There are 2 large changing rooms; one close to the mosque and one in the area of the oil ducts. As for lockers, there are 8 personal lockers in the workshop area. Because no more oil will be used in the depot, the changing room in the area of oil ducts will be reallocated and upgraded in the retrofitting design.

3 Social Services

c) Social and Health Insurance

[18] Numbers mentioned in this paragraph were verified and updated with head of Al-Ameriyah Garage.

The Ministry of Social Solidarity governs the social network scheme for all governmental and public employees. In addition to that, there are solidarity funds in each institution to provide extra support to employees and workers. These include extra pension funds, recreation facilities, medical health services, and other financial support as per internal regulation of the institution. CTA provides the conventional services stipulated by the Egyptian law, regulations of Ministry of Social Solidarity, and pertinent syndicates. Such services were discussed in various consultation meetings and were cross-checked with drivers and depot observers in Al-Ameriyah Depot.

d) Medical Checkups and Drug Tests

There are basic medical check-ups for chronic diseases and random or ad-hoc drug tests, especially for bus drivers. The CTA confirmed that both types of tests are undertaken on a regular basis for all staff members. The medical commission is the entity in charge of assessing whether drivers are eligible for driving or not. Those not eligible will have to stop driving and can provide other in-house services, except driving buses. It was verbally explained that medical check-ups are very important to assess the general health condition and fitness of drivers in specific; this is considered as a safety measure for the drivers on one hand and passengers on the other hand.

As for drug tests, these are conducted ad-hoc for drivers in the operation room before the shifts; therefore, no schedules are announced. However, it was confirmed during consultation meetings with CTA staff that any driver who tests positive for drugs for the first time will be halted from driving for 3 months and is put under monitoring until he tests negative over a steady period of time; any driver if tested positive for a second time, will be dismissed for good from CTA. Worth mentioning here is the fact that participants of FGDs pointed to the importance of drug tests for all drivers and conductors during operation hours.

e) Cafeterias and Sheltered Areas

There is one big cafeteria in the entrance of Al-Ameriyah Depot. During the validation field (15.05.2024), the cafeteria was found closed and it was stated that it has been closed for many years. There is only a tea corner and poorly covered spaces in the garage. An adequate cafeteria or canteen and adequate resting areas should be made available for employees and workers inside the garage to supply hygienic food and beverages or allow personnel to eat or drink or rest when needed.

Though, CTA confirmed that hot meals are provided to operating workers during the month of Ramadan at Iftar time. Food supplements/boxes are distributed to all drivers, conductors, workers and service workers once during the month of Ramadan; these are mainly provided by the Armed Forces.

f) Capacity Building

CTA provided a single page presenting 3-days training provided to workers between 1st of October 2022 to 23rd of March 2023 in 25 garages around Greater Cairo Region. The table indicates that a total of 7 workers were trained during this period in the area of electric lighting, bus break repair, Mercedes electronic injection, firefighting, oil works, and bus polish (2 workers).

It was made clear during consultation meetings that all the trainings are provided in-house through the technical training center under CTA general directorate of training centers. A separate document "Capacity Building Needs" has been prepared under (Appendix N) "Technical Capacity Needs and Training needs and Procurement Package".

g) Safety measures

During consultation sessions with observers and engineering department, officers emphasized the need for signboards for workers inside the depot on fires, emergency management plan, and safety tools; increase number of fire-fighting equipment; provide all kinds of safety tools on regular basis, especially inside dangerous workshops (blacksmithing… etc.); training on fire-fighting equipment, and first aid; increase lighting systems at night; and provide a fire-fighting line in the depot. Further details are presented in the occupational health and safety section.

4 Workers' Rights

a) Effective Internal Grievance Mechanism

During discussions with depot observers and head of engineering department (3 interviews), it was made clear that they have the channels to complain whenever they want. The process starts by trying to solve the problem on a friendly basis first, and it usually works. If a problem is not solved, it gets elevated to the next higher level of management. In all cases, the head of department is the person responsible to elevate the grievance to the higher/highest level as needed. On the other hand, CTA when asked about anonymous complaints, they saw it neither needed nor effective for solving a specific problem for an "unknown complainer". According to CTA staff, most internal grievances are related to the settlement of employment status, restarting work after termination due to high absenteeism (more than 30 days), change of shifts, getting leaves/vacations, desire for professional designation, and complaints from foremen/direct managers. It was also confirmed that almost all grievances are settled before being elevated to the legal affairs department.

The Grievance Mechanism established for the project is in full compliance with the Labor Management Procedures (LMP), ensuring that all workers, including direct, contracted, and primary supply workers, have accessible, transparent, and effective channels to report grievances. The GM aligns with the LMP's principles by providing confidential, anonymous, and gender-sensitive complaint mechanisms, addressing issues such as working conditions, wages, accommodation, discrimination, and workplace harassment, including SEA/SH-related grievances.

A stand-alone document has been prepared in the ESIA to design a functional anonymous complaint mechanism to be easily accessible by e-bus demonstration route(s)/corridor(s) users.

b) Right to Protest

CTA confirms that all workers have the right to protest within the Egyptian law. In addition, they can contact the workers' syndicate at any point of time. During consultation sessions with drivers (2 drivers) and garage observers, and deputy head of workers' syndicate, such information was confirmed. However, because workers understand that protests are national safety risks, they never undergo such protests. Instead, they resolve their complaints or demands through the depot management. It is rarely the case that the workers syndicate is officially involved. In addition, CTA drivers have an interactive public Facebook page "breathing space for CTA workers" where they can spell out and interpret concerns related to their work.

c) Equal Opportunities

In general terms, CTA provides equal opportunities for females in administrative positions, especially in the mid-or high-level management. No quantitative data was provided to proof; however, field visits and consultation activities with heads of departments showed that many of them are females. The case might be different inside CTA depots in general and Al-Ameriyah Depot in particular, where females are mainly employed in administrative positions, as discussed above. As for equal opportunities for people with disabilities, CTA confirmed that they comply with the 5% stipulated by the Egyptian Law.

4.11 Sensitive Receptors

Sensitive receptors are people or groups that may have a significantly increased sensitivity or exposure to contaminants by virtue of their age and health, e.g., low-income groups, females, persons with disabilities, persons with limited mobility/elderly. Special consideration should be given to those groups to 1) achieve a socially-sound pilot project, and 2) ensure improved passengers' satisfaction during monitoring and evaluation activities for the e-bus project.

4.11.1 Low-income Groups

All participants confirmed cost of service as a major concern; therefore, cost of fares is topmost priority for low-income passengers.

A closer look at the selected routes indicates that almost all areas covered by these routes are comparatively middle and working class, being mostly located in old Cairo. The implication of these coverage areas will be directly related to the affordability of passengers, willingness to pay, and personal preferences. Passengers' perceptions of current and future (e-bus) operation, and respective proactive measures reflect alarming concern about service fares.

FGDs and passengers' surveys clearly showed that affordable cost of service fare is a main concern to all followed by comfort inside buses, speed of transportation mean, and short time of journey; except for girls and women who prioritized personal physical/sexual safety, security, and comfort of ride over cost of ticket. In other words, participants of FGDs when asked about aspects if made available would encourage them to use CTA buses, they pointed to roominess, spaces/seats for elderly and females, affordable fares, specified entrance and exit doors, spaces for baggage/belongings, allocation of main stations, elimination of street vendors, and punctual timings of rides (respectively).

When asked about main concerns of introducing CTA E-buses, the first concern was the cost of fares followed by unequal distribution of e-buses along different routes, insufficient battery charge, and elimination of some passengers who might not afford the ticket cost. Then again when asked about main requirements to use e-buses, they mentioned affordable cost and monthly passes at the first place followed by comfort of seats, limitation of passengers to number of seats to avoid crowdedness inside the bus, clarity of bus route, adherence to official bus stops, monitoring cameras, air conditioning, and internet (respectively). The key conclusion derived from discussions is that all participants prefer to use e-buses and believe the service is much better and cleaner than current buses in all aspects, but they also assume that fares might be higher or unaffordable to them.

During consultation activities, CTA staff and FGD participants indicated that current fares for Internal Combustion Engine (ICE) buses (diesel/natural gas) are unified at EGP 6 for any destination, while diesel and e-buses charge EGP 11.5 for two destinations on the same route. CTA is planning to expand routes to three destinations, allowing passengers traveling shorter distances to pay less than those on longer journeys. However, since the consultations and before report submission, fares increased twice—first by EGP 1 and later by EGP 2.

4.11.2 Young and Old Females

A study on gender equity in Greater Cairo's public transport system[19] points to a number of challenges faced by women, including irregular service, overcrowding, and constant risk of sexual harassment. Over 80% of women surveyed face harassment at some stage of their journey, including the walk to the stops, the wait for the vehicle, the boarding process, and the ride itself. A lack of adequate services and the resultant overcrowding heightens the risk of harassment. Survey findings point to the diversity of trips taken by women, reflecting women's childcare and household responsibilities. Women with disabilities face unique challenges due to the lack of access in stops and vehicles, poor last mile connectivity, and overcrowding that makes it difficult to board vehicles.

Focus group and survey participants in the study stressed the importance of safe spaces throughout the journey, with 90% of women surveyed in favour of dedicated sections for women on road-based public transport vehicles, mirroring women's carriages in Cairo's metro system. Participants called for expanded public transport fleets to address overcrowding and improve reliability. Complaint redress systems are needed to ensure that perpetrators are brought to justice. Safe, universally accessible sidewalks with adequate lighting and shop fronts that offer an "eye on the street" effect are needed to improve security during the walk to public transport stops and stations.

In the social assessment of the e-bus, all participants of FGDs were asked to address specific concerns about challenges facing women during rides of public transportation as perceived or witnessed by themselves. All participants agreed on general concerns facing women, in specific:

- Seats are not sufficient for all bus passengers, uncomfortable, and packed.
- Due to crowdedness inside buses, women face different forms of physical harassment and insults;
- Lack of seats allocated for women and also lack of specified partitions for women;
- Lack of separate entrance and exit doors in buses to eliminate physical contact and touching;

[19] Meshwary, A study about women's experience in Greater Cairo's public transportation system, a study prepared by Amira Badran, Salma Mousallem and Yasmine Sabek, UN Habitat; Carolyne Mimano, Christopher Kost, Mariam Sorour, and Nour El Deeb, ITDP, Cairo, May 2021.

Extra challenges for women associated by children, elderly, persons with disabilities, and luggage or carriages;

- Misbehavior of some passengers, e.g., shouting, verbal insults, and altercations;
- Injuries caused by sudden bus stops and sometimes moving while doors are still open; and
- Theft of personal belongings inside the bus.

4.11.3 Persons with Disabilities

Transportation is essential for people of all ages and backgrounds to live a fulfilling and satisfying life. Public transport can facilitate access to the community and improve social participation and integration. However, people with disabilities may encounter barriers throughout the entire travel chain, which can affect their satisfaction. These barriers may be perceived depending on the nature of the disability. Few studies have identified such barriers and facilitators experienced by people with disabilities.

A study on accessibility of transport for persons with disabilities in Egypt[20] pointed clearly in regard to public transportation to socio-economic policies and infrastructural development policies. The article emphasized that though efforts and consideration of the governmental policies to support persons with disabilities, particularly in the sector of public transportation; many people are still deprived from decent access to public transportation. Addressing Cairo, as an example, there is still a lack of bus stops enhancement, e.g., accessible sidewalks and accessible metro stations that should be developed to meet the needs of persons with disabilities. Whereas the government has already planned to develop smart transport in the New Administrative Capital, the main part of Greater Cairo still requires more attention, especially in geographical areas where many underprivileged citizens live. The article has listed a number of policy recommendations to address the lack of accessibility of transportation in Egypt and complement existing efforts.

In the social assessment for the e-bus project, all participants of FGDs were asked to address specific concerns about limitations of people with disabilities during rides of public transportation as perceived or witnessed by themselves. All participants agreed general concerns facing women, in specific:

- Difficulty in access, e.g., ascending to and descending from bus, especially when persons with disabilities are not accompanied;
- Bus drivers sometimes do not stop for pick-up when persons with disabilities are waiting on the station/stop of the bus;
- Lack of seats allocated for persons with disabilities and/or deficit of commitment to allocated seats; and
- Lack of space inside buses for wheelchairs.

4.11.4 Elderly Persons

Focus Group Discussion (FGDs) included a few elderly participants (60+) within the men's and women's groups. A dedicated group for elderly individuals was not made possible. However, participants in all groups were asked to discuss challenges and constraints facing elderly persons in public transport buses, based on their own experiences or observations. Key concerns mirrored those of individuals with limited mobility, including high bus stairs, insufficient seating for elderly passengers, and inadequate space for wheelchair users

4.11.5 Conclusions

All participants have agreed on a number of challenges that face them during using CTA buses, as follows:

1 Discomfort mainly due:

[20] Accessibility of Transport for persons with disabilities in Egypt, an article prepared by Ahmed Hamdy under Alternative Policy Solutions, a non-partisan, public policy research project at the American University in Cairo, April 2022.
https://aps.aucegypt.edu/en/articles/781/accessibility-of-transport-for-persons-with-disabilities

- Difficulty in ascending and descending buses (first step is too high for passengers, especially if having dependent persons or any luggage with them);
- Lumpen condition of bus seats (old and tight);
- Crowdedness, especially if causing any physical touching;
- Noise; and
- Mobile vendors inside the bus.

2 Unsafety mainly due:

- Lack of separate doors for bus entry and exit (the back door is not functioning most of the time);
- Drivers drive very quickly in an unsafe way that threats children's and elderly safety;
- Drivers sometimes do not fully stop when passengers are ascending and descending buses;
- Poor condition of stations and roads near the station;
- Buses stop too much and suddenly;
- Sexual harassment against women along all ages;
- No space for bags or any baggage;
- Lack of sufficient lighting inside buses;
- Exposure to thefts; and
- Exposure to bad manners (indecent talks and/or swearwords).

Challenges for **young population** include more specific aspects, such as:

- Bus drivers do not stop on the side of the road;
- Discomfort of vehicles and seats;
- Irregularity of buses;
- Crowdedness; and
- Conductors do not give the cash change back.

Challenges for **persons with reduced mobility/disabilities** include the following:

- The cost of living with a disability is five time higher than basic living services and costs of normal persons;
- Buses allocated for persons with limited mobility or disabilities in Egypt[21] are very limited; though being very useful to help persons to get into and out of the bus;
- Unsafety because impatience of drivers to move before they completely get into and out of the bus;

Sudden stops imply high risk on all passengers and causes heavy injuries, not only for person with disabilities, but also for infants, elderly, and pregnant women (most of participants in the group might travel with their children or parents);

- Participants with reduced mobility have requested CTA to admit the "comprehensive services card" to exempt them from paying 50% of fare (as per law 10/2018); sometimes they are asked to pay or full fare if bus conductors did not recognize the card; and
- Drivers do not stop at the stations allocated for persons with disabilities.

Within the passenger survey for the E-bus project, respondents when asked to rate each issue regarding public transport modes survey respondents were using, most respondents stated that "their trip taking too long" is a major problem. Also reported frequently as a major problem, is the number of transfers and the trip being too expensive for them. Seeing that "trip is uncomfortable" and "trip doesn't take me to my exact destination" are reported as top two in the "somewhat a problem" ranking, it can be argued that users need more direct, comfortable services. This can be achieved by examining people's geographic travel patterns on a micro level and cross-comparing with the existing

[21] Buses with three doors that slope to the right side to facilitate entry and exit of people with limited mobility capacity; the door in the middle is allocated for persons with disabilities and mobility restrictions.

public transport network. Also integrated ticketing can lower expenses and the burden of transfers for the users.

Cost is the top consideration for users followed by journey time and accessibility, where accessibility is defined as "transport services proximity to origin and/or destination". It's confirmed through different questions that affordability and travel time are the top priorities for users in the GCR. However, when asked to prioritize three considerations only, it's apparent from that women prioritize personal security over other attributes. Accessibility is the second top priority for women. The surrounding environment and the physical effort needed during the access and egress of services, especially if there are children or heavy objects carried, can have more effect on women users.

There is a noticeable similarity between males and females' perceptions on women's challenges in PT. Sexual harassment and lack of seating/discomfort are the top two choices for both genders. However, there is a small discrepancy between the third biggest challenge where males assumed it to be "Travelling with bags, children, or elders" whereas women chose "Crime" over the former with a small margin. This shows that in terms of the broader "security" aspect, it is "sexual harassment" that is considered as top risk by women, followed by crime.

4.11.6 Recommendations

Based on the findings of the FGDs and main considerations pointed to by participants in all groups as well as subgroups, following recommendations have been approved. These include recommendations for technical bus specification, stations and roads, operation, fares, capacity building needs for drivers, behavioral change.

1 Technical Bus Specifications:

Considerations and recommendation of participants in FGDs was presented in Appendix F and was widely discussed with CTA, PCU, and TIU to 1) approve and consider different points of view of bus specification, and 2) include specifications in the bidding document. As a result of consultations with CTA, all considerations and recommendations of bus users were embedded in the specifications of the e-bus.

Main recommendations by all participants include:

- Narrow down bus steps;
- Comfortable seats;
- Decent space inside the bus "not packed";
- Provide enough spaces for luggage and carriage;
- Use alarm buttons and cameras to control physical/sexual harassment and thefts inside buses (emergency buttons);
- Establish speed control/limit system;
- Install alarm ring before buses move or stop; and
- Provide handles to help passengers to lean on, especially during sudden movement and stops.

Main recommendations by women, including those pregnant or accompanied by children/girls include:

- Provide special spaces for strollers and baby baggage;
- Specify seats for pregnant women and/or women with infants;
- Afford enough space between seats;
- Allow separators between seats/sections;
- Air conditioning;
- Easy to open windows;
- Use fire-fighting extinguishers
- Use waste baskets inside the bus;
- Special buses for school pupils and university students;
- Ensure an effective mechanism for grievances to enable following up on the complaint;
- Apply sudden inspection on drivers during operation; and
- Use visual and speaking signboards inside the bus.

Special recommendation by men include:

- Allow and enforce special seats for women and elderly; and
- Prohibit street vendors from inflowing into buses.

Special recommendation by elderly include:

- Specify and prioritize seats for elderly; and
- Allow time for safe entry and exit of the bus.

Special recommendation by persons with disabilities:

Several recommendations were raised within all FGDs regarding persons with disabilities, these include:

- Narrow down steps;
- Install easy-to-use ramps for wheelchairs;
- Allocate comfortable seats;
- Provide special spaces inside the bus for wheelchairs;
- Use visual and specking signboards for persons with different disabilities; and
- Develop a mechanism or support system to provide needed assistance for passengers with special needs.

FGD with persons with disabilities pointed to number of specifications for each type of disability as follows:

- Speaking announcements for people with sight disabilities;
- Alarm button for people hearing and speaking disabilities to draw drivers and controllers' attention that they need to descend and need the driver to properly stop for them;
- Have a written route on the bus to help people with hearing disabilities to know the direction;
- Provide Braille maps of routes in station to help people with visual disabilities with directions;
- Install hydraulic ramps for persons with mobility disability (not only for wheelchairs only, but for persons using crutch(s) as well); and
- Apply international standards and specifications in bus design as is without modification, especially for ramps' specs.

During FGD with persons with disabilities at National Council for Persons with Disabilities (NCPD), they confirmed main findings derived from FGDs, but elaborated in more detail on the following:

- Special spaces for persons with disabilities like Mwasalat Misr and the airport bus is needed to be available in all buses;
- Allocate seats for elderly or persons with disabilities and make it obvious and clear to all passengers using different kinds of signs inside the bus; and
- Use belts for wheelchairs inside the bus.

2 Stations and Roads

This aspect is out of the scope of the ToR of this assignment, but it might be useful to be put into consideration for CTA in the future. Participants of FGDs recommended the following:

- Upgrade stations and provide seats and shade for passengers;
- Rehabilitate pavement to enable using lower bus step; and
- Upgrade roads and lighting to improve safety, especially at night.

3 Operation Logistics

This aspect is out of the scope of the ToR of this assignment, but it might be useful to be put into consideration for further WB projects with CTA, or for CTA operation management for the e-bus project. Participants of FGDs recommended the following:

- Arrange distribution of e-buses versus old buses on the same stations to ensure equality of access to e-buses;
- Organize bus frequency for different types of buses on the same route to avoid prolonged waiting time for either those who prefer to ride e-bus or those who avoid it due to financial reasons;

To ensure that cameras work properly;

- Establish monitoring systems for bus routes and stops;
- Monitor and evaluate passengers' satisfaction in general, and regarding service fare in specific;
- Launch a grievance channel for e-bus complaints, including cost of service.
- Employ an announced/published time plan for buses;
- Use display maps to allow passengers to plan their rides; and
- Apply separate doors for entry and exit.

4 Fares

Recommendations are meant to consider passengers' demands and in specific low-income groups. Main recommendations emphasize the following:

- Establish round-tickets for buses and other means of transportation (metro, monorail… etc.);
- Introduce yearly and bi-annual abonnements for passengers;
- Apply different fairs according to distance (like the metro system);
- Use ticket machines (because sometimes the driver himself is conducting tickets, which is unsafe and time-consuming).
- Exempt passengers with disabilities from any fares upon showing their "Integrated Services' Card[22]";
- Exempt elderly (age 60+) from 50% of bus fare upon date of birth shown in their personal IDs; and
- Exempt school students of different educational institutions from 50% of bus fees upon showing their student IDs.

5 Capacity Building of Drivers and Conductors

Participants of FGDs highlighted the following:

- Control unneeded/unplanned/sudden bus stops;
- Instruct drivers to stop in stations close to the sidewalk/pavement;
- Introduce a system for cash change;
- Conductors should be able to drive in case of any emergency happens to drivers;
- Prepare and train drivers and conductors on different contingencies, and especially minor repairs;
- Provide personal skills (general behavior modification, humanitarian approach to deal with elderly and persons with disabilities, stress management …etc.);
- Apply medical check-ups and random drug tests on regular basis (every three months);
- Train drivers and conductors on the new e-bus because it is different than old buses
- Train drivers on defensive driving; and
- Train drivers, conductors, and workers on basic first aid principles.

6 Societal Behavioral Change

It is highly recommended that the GCCC project, in its behavioral change component, include a sub-component focused on behavioral change towards persons with disabilities, alongside other environmental aspects related to climate change. This recommendation was reinforced during consultation activities. Additionally, raising awareness about the right to a safe environment for women in public transport is another critical issue to address.

The table below shows the social requirements and how this is considered in the design

[22] This card system is launched by the Ministry of Social Solidarity to help provide Egyptian citizens with disabilities access to services across various sectors, including health, education, rehabilitation, work, and transportation. (CAPMAS statistics show that 2.7% of Egyptians have a severe disability, which many public and private spaces mostly don't account for. The ministry aims to register 2.7 million people with disabilities to the integrated card system by 2023).

Table 4-8 Social Requirements and Design

Requirement	Design Considerations
Provision of high number of vehicles on the same line to avoid crowdedness	Install a passenger counting system to monitor and manage capacity.
Special places inside the vehicles for women and elderly	Include clearly marked areas with signs and symbols for women and elderly passengers.
Vehicles with lower / more comfortable steps	Design buses with low and wide steps for easy boarding.
Comfortable seats	Install cushioned, ergonomic seats for passenger comfort.
More room for strollers and baby baggage	Provide spaces for strollers and baby bags.
Use alarm buttons and cameras to control physical/sexual harassment & thefts inside the buses (emergency buttons)	Equip buses with emergency buttons and surveillance cameras.
Establish speed control /limit system	Include a speed limiter system to ensure safe driving.
Install alarm ring before buses move of stop	Use audible alarms (white noise) to notify passengers when buses start or stop.
Allocate seats for the elderly, persons with disabilities, pregnant women, and women with infants	Have priority seating areas labeled with clear signs for the elderly, persons with disabilities, pregnant women, and women with infants
Airconditioning	Provide air conditioning, heating systems, and proper ventilation for passenger comfort.
Easy maneuverable windows	Install easily operable and durable windows.
Provide fire extinguishers for use	Place accessible fire extinguishers in the bus.
Use waste baskets inside the bus	Design interiors to include waste bins and prevent litter accumulation.
Use visual and speaking signboards inside the bus	Install visual screens and audio systems for passenger information and announcements.
Allow time for safe entry and exit of the bus Training programs to: (for drivers) to drive safely; make a full stop in each station; deal with PRM	Provide drivers with cameras for better visibility and training on braking systems for safe operations. Implement operational support systems and advanced braking mechanisms.
Provide special spaces inside the bus for wheelchairs	Create designated spaces with support bars for wheelchair users.
Use visual and speaking signboards for persons with different disabilities	Install systems for visual and audible announcements to assist passengers with disabilities.
Develop a mechanism or support system to provide needed assistance for passengers with special needs	Include stop buttons that alert drivers and staff to assist passengers with special needs.
Use belts for wheelchairs inside the bus	Equip wheelchair spaces with safety belts and support bars for stability.
Employ an announced/published time plan for buses	Use audio systems to announce and display time schedules.
Use display maps to allow passengers to plan their rides	Install digital screens to show route maps and travel planning information.

Use ticket machines	Include self-service ticketing machines inside buses.
Instruct drivers to stop in stations close to the sidewalk/pavement	Provide buses with mechanisms to ensure proper alignment with sidewalks for safer boarding and exiting.

5 Analysis of Project Alternatives

The analysis of the project alternatives forms an integral part of the ESIA study as it helps determining the optimum technical, economic and political options with maximized positive environmental, social and gender impacts and reduced or mitigated negative impacts. This analysis evaluates whether there are viable alternatives to the proposed development which can fulfill the same function while minimizing, reducing if not eliminating the negative environmental, social and gender impacts to meet the national and international standards and requirements.

As discussed in Chapter 2, section 2.2, the Electric Bus (e-Bus) Demonstration Project consists mainly of 3 main components as presented below:

- A Depot Selection and Retrofitting of one of the existing diesel bus depots in Greater Cairo including installation of charging stations at the bus depot and/or construction of new facilities to accommodate the charging infrastructure and maintenance workshops for the electric buses.
- Routes Selection: A number of routes serving the selected depot will be studied and chosen for the e-bus operation and replacing the diesel buses.
- Electric Bus (e-bus) and Chargers Procurement: The project involves the acquisition of a fleet of electric buses with certain specifications to replace traditional diesel buses in the public transport system in one of the depots in Greater Cairo.

For the selection to be optimum in serving the Project's aim of enhancing the air quality in Greater Cairo, the selection process involved analyzing all the existing and potential depots' locations, bus routes within Greater Cairo and e-bus specs as well as the diesel buses that will be replaced. This was done to ensure the maximum technical, economic, environmental, social and gender benefits within the Project's context. As part of the project's prefeasibility study, multi-criteria analysis (MCA) was performed in order to select the depot location, the e-bus routes and the e-bus specs as well as the diesel buses that will be replaced that will form the best fit for the project purposes.

5.1 No Project Alternative

Without the E-bus project, passengers will not benefit from a sustainable, efficient, advanced, and safer transport system. The urban population, which is continuously growing, will continue to endure traffic congestion, risks of traffic accidents, and unreliable public transport systems.

If a reliable and improved public transport system, such as the E-bus project, is not introduced, private passenger cars will remain the dominant mode of transportation. This reliance on private cars will further strain existing road capacity, increase pollution levels and greenhouse gas emissions, and escalate the overall cost of mobility. The E-bus services will be designed for efficiency, with buses operating on dedicated lanes and improved infrastructure. Ultimately, the absence of dedicated E-bus infrastructure would result in no improvement in the quality of public transport services, leading to adverse impacts on quality of life and the environment. The current sub-standard level of service in the public transport system would persist.

A situational analysis showing how having the E-bus System in place versus the No Project, Alternative is summarized in the following table.

Table 5-1 No project alternative analysis

Category	E-Bus Alternative	No Project Alternative
Environmental	Improving air quality as a result of eliminating emissions (GHG, BC and PM2.5) generated from the diesel buses.	Air quality remains poor with continued reliance on private vehicles, old and more polluting diesel buses, and other transport means of high BC and PM2.5 emissions.
		Continued GHG emissions from private vehicles and older buses contribute to climate change.

Category	E-Bus Alternative	No Project Alternative
	Lower noise levels compared to diesel buses, enhancing the urban environment.	Higher noise levels due to increased traffic congestion and continued use of diesel buses.
Social	Reduced travel time for commuters due to improved transit efficiency with electric buses by reducing the number of vehicles (possible model shift) as it is expected that some of cars and taxis riders will shift to ride the electric bus.	Longer travel times resulting from traffic congestion caused by private vehicles.
	Enhanced comfort for passengers with cleaner, quieter, and more modern buses.	Decreased comfort with older buses and increased overcrowding due to limited public transit options.
	Improved safety with modern electric buses equipped with advanced safety features.	Higher safety risks associated with older vehicles and congested road conditions.
	Socio-economic benefits include job creation, improved access to transportation, and reduced economic burden on individuals.	Limited socio-economic benefits due to continued reliance on private vehicles and lack of investment in public transit infrastructure.
	Positive impacts on public health through reduced exposure to air pollution.	Negative impacts on public health due to increased air pollution and associated health risks.

5.2 Bus Technology Alternative

Most common buses operate on diesel fuel that generate Hydrocarbons, Carbon monoxide, Carbon Dioxide, BC, and PM2.5 emissions. Advanced models are equipped with Diesel Particulate Filters (DPF) and Selective Catalytic Reduction (SCR) Technology. There are other more advanced technologies compared to diesel buses that operate on natural gas, diesel-electric (Hybrid), and the proposed technology (electric buses).

An overview of the characteristics of different bus technologies and the advantages/disadvantages of each is presented in the table below. Alternatives were given scores; where (4) is the highest and best score and (1) is the lowest score.

Table 5-2 Alternative Bus Technologies

Points of Comparison	Bus Type			
	Electric	**Diesel**	**Natural Gas**	**Diesel-Electric (Hybrid)**
Air Pollution	Zero tailpipe emissions; significantly lower particulate matter and NOx emissions compared to all types of buses.	The highest particulate matter and NOx emissions compared to all other types of buses.	Lower particulate matter and NOx emissions compared to diesel buses.	Lower particulate matter and NOx emissions compared to diesel buses.
	Score 4	Score 1	Score 2	Score 3
GHG Emissions	Zero direct emissions; significantly lower	The highest lifecycle GHG emissions	Lower lifecycle GHG emissions	Lower lifecycle GHG emissions

Points of Comparison	Bus Type							
	Electric		Diesel		Natural Gas		Diesel-Electric (Hybrid)	
	lifecycle GHG emissions compared to all types of buses.		compared to all types of buses.		compared to diesel buses.		compared to diesel buses.	
	Score	4	Score	1	Score	2	Score	3
Noise	Quieter operation compared to all types of buses.		Higher noise levels compared to electric buses.		Similar noise levels to diesel buses.		Similar noise levels to diesel buses.	
	Score	4	Score	1	Score	1	Score	1
Fuel Consumption	No fuel consumption; relies on electricity.		Higher fuel consumption compared to all types of buses.		Lower fuel consumption compared to diesel buses.		Lower fuel consumption compared to diesel and natural gas buses.	
	Score	4	Score	1	Score	2	Score	3
Cost	Initial purchase cost is high compared to other types while the operating costs over time due to lower fuel and maintenance costs are lower than other types		Lower initial purchase cost; higher operating costs due to fuel and maintenance expenses.		Higher initial purchase cost; moderate operating costs due to lower fuel expenses.		Higher initial purchase cost; moderate operating costs due to lower fuel expenses.	
	Score	2	Score	4	Score	3	Score	1
Overall advantages	Zero emissions, lower operating costs, quieter operation.		Widely available infrastructure, lower initial purchase cost.		Lower emissions compared to diesel, domestic fuel source.		Lower emissions compared to diesel improved fuel efficiency.	
	Score	4	Score	1	Score	3	Score	2
Overall disadvantages	Higher initial purchase cost, reliance on charging infrastructure.		Higher emissions, higher operating costs, noisier operation.		High initial purchase cost.		Higher initial purchase cost, complexity of dual power systems.	
	Score	4	Score	1	Score	3	Score	2
Total Score		26		10		16		14

Electric buses have been chosen as the preferred technology due to their numerous advantages over other alternatives. They offer zero tailpipe emissions, significantly lower lifecycle GHG emissions, and quieter operation compared to traditional diesel buses. While electric buses may have a higher initial purchase cost, they offer lower operating costs over time due to savings on fuel and maintenance. Additionally, electric buses contribute to improved air quality and public health, making them a more sustainable and environmentally friendly option for urban transit systems.

5.3 Batteries Alternative

5.3.1 Types of Batteries and their Capacities

Section 4.1.4 in Appendix L "Feasibility Study" includes the selection process of the type of batteries and capacities and the following was concluded:

Table 5-3 Comparison between the different types of batteries

Feature	Lithium Ferrous Phosphate (LFP)		Lithium-Titanate (LTO)		Nickel Manganese Cobalt Lithium-Ion (NMC)	
Charging Time	Moderate (1-2 hours)		Very Fast (10-20 minutes)		Moderate (1-2 hours)	
	Score	2	Score	3	Score	1
Use Cases	Electric vehicles, grid storage		Heavy-duty applications, fast charging		Consumer electronics, electric vehicles	
	Score	3	Score	1	Score	2
Environmental Impact	Less toxic materials		Less toxic materials		Contains more toxic elements like cobalt	
	Score	3	Score	2	Score	1
Cost	Moderate cost		High cost		Moderate to high cost	
	Score	3	Score	1	Score	2
Total Score		11		7		6

LFP batteries offer a longer lifecycle with more charge/discharge cycles and enhanced thermal stability, which prevents breakdown at higher temperatures which is a critical factor in warmer climates like Cairo's. Additionally, LFP batteries are more cost-effective over time due to their durability and lower maintenance requirements. These characteristics make LFP batteries a superior choice for electric buses in environments with high temperatures and the need for reliable, long-term performance.

For the energy assessment, we considered two scenarios based on battery autonomy: one with a 315-kWh battery and the other with a 380-kWh battery. However, the 380-kWh scenario was chosen due to its superior efficiency and alignment with the current offerings of industry manufacturers.

5.3.2 Batteries Disposal Alternatives

The batteries' average life span is 8 years 100,000 miles, after that the batteries are considered as type of hazardous waste; mainly, e-waste. Thus, the disposal of batteries must be managed and handled in an environmentally safe and proper manner.

Taking into account that the performance of batteries starts to reduce over time to reach 80% after around 8 years. Accordingly, batteries that have reached end of life (EoL) should be disposed as per the following alternatives:

- First, e-buses with less battery capacity can be used on bus routes with less demanding daily mileage, in a process of progressive electrification of the bus fleet.
- Then, batteries can be used (after checking) in other applications, 2nd life scenario, such as stationary storage on buildings to store solar panels energy
- Recycled by vehicle manufacturers / sent back to the international suppliers in accordance with national and international legal requirements.
- Disposed by qualified renewable resources companies.
- Disposed through a license hazardous waste contractor as hazardous waste contractors do recycle to extract the valuable materials

However, the best scenario was found to be recycling by vehicle manufacturers / sending back to the international supplier due to the manufacturers' expertise in safely managing hazardous materials, recovering valuable resources, and ensuring compliance with national and international environmental regulations, in this approach, the e-bus supplier is fully responsible for battery replacement and disposal, eliminating the need for on-site temporary storage of traction batteries at the depot. Replaced batteries will be directly transferred to the supplier's local service point, which is also responsible for their end-of-life treatment, However, if needed, traction batteries can be temporarily stored in the air-conditioned battery rooms at the depot, in addition to auxiliary batteries (12V), before being sent to the supplier. Additionally, using the batteries in a second life scenario and then sending to the supplier may limit the number of bidders.

5.4 Depot and Routes Alternatives

Multi Criteria Analysis (MCA) was implemented to make a fact-based assessment of the best routes and depots in Cairo's transport network for this pilot project for electric buses deployment.

The analysis was achieved through utilizing the most recent available data. Data sources included data received from the World Bank, the CTA, air emissions data from published EEAA air quality monthly reports and existing Geographic Information System (GIS) data from Transport for Cairo (TfC) database.

Appendix M Service & Operational Plan includes More details about MCA for depots and routes

Based on the ranking summary of the preliminary selected depots proposed by the CTA at the early stage of the project, it was concluded that Badr Land and Imbaba depot were the highest ranked options along the other depots.

Routes Scenarios

With regards to the selection of the 5 routes, it was based on mainly technical considerations and not many E&S considerations, as the consultant did not find major differences between those routes from the E&S perspective. Moreover, it was agreed with GCCC as part of Contract Amendment #3, there is no need to re-perform the Stated Preference Surveys and Focus Group Discussions for Al-Ameriyah Depot in the analysis.

5.4.1 Depot Location Scenarios

1 Badr Land Scenario

The development of a depot in Badr involves comprehensive design and construction activities, including procurement and supervision, which falls outside the current project scope, budget, and timeline.

2 Imbaba Depot Scenario

Although it was highly recommended for its existing infrastructure and strategic location, it was rejected due to political concerns regarding potential relocation.

Accordingly, the CTA proposed four (4) different depots from those studied earlier. The new four (4) depots were Al-Ameriyah, Al-Matariyah, Al-Basatin, and Helwan. CTA confirmed that those depots will be eligible for this implementation project due to sovereign decision involving a potential relocation of all other depots outside of Cairo.

3 Distribution of Buses among the 4 Depots Scenario

The CTA proposed distributing the e-buses among the four (4) depots, namely Al-Ameriyah, Al-Matariyah, Al-Basatin and Helwan, as an alternative solution. However, this option was deemed unfeasible due to budgetary constraints.

Due to its placement within a densely populated residential and service area. With this strategic positioning ensures that the project will serve a large number of citizens across various age groups, maximizing its impact and accessibility, Al-Ameriyah Depot and routes have been selected for the project implementation.

5.5 Decommissioning Alternatives

As previously mentioned, the depot contains four (4) underground diesel tanks, each with a capacity of 35 m³, owned by Misr Petroleum Company. The following two scenarios have been proposed for handling these tanks:

5.5.1 Scenario 1: Neutralize and Maintain Underground Tanks

In this scenario, the underground diesel tanks would undergo a thorough neutralization and cleaning process as they will be filled with clean sand from the inside. The above-ground tank room will be filled with sand and concrete, to mitigate environmental risks. The tanks would remain underground. This approach aims to minimize disruption to the site while ensuring environmental safety. Additionally, this will reduce the amount of hazardous waste generated by removing these tanks and the contaminated soil.

5.5.2 Scenario 2: Neutralize, Extract, and Transport Tanks

This scenario involves neutralizing the underground diesel tanks and then extracting them from the site. The tanks would be carefully removed and transported to designated facilities for proper disposal or recycling. This method prioritizes the complete removal of the underground diesel tanks and includes soil decontamination to address any residual environmental concerns from oil spills or leaks. This approach creates space for potential redevelopment or alternative land use but is expected to generate a large amount of hazardous waste (contaminated soil) that will require safe disposal in a hazardous landfill such as El Nasriah Center, Alexandria Governorate and the 10th of Ramadan Integrated Waste Management Facility (currently under construction). Additionally, Civil Defense approval will be required for this method, which may increase site disruption duration.

Below is a comparison between both scenarios across various parameters:

Table 5-4 Scenarios 1 and 2 for dealing with the underground diesel tanks

Parameter	Scenario 1: Neutralize and maintain		Scenario 2: Neutralize, Extract, and Transport	
CAPEX	Lower initial CAPEX due to reduced labor and materials costs		Higher initial CAPEX due to excavation, transport, and disposal costs	
	Score	2	Score	1
Amount of Waste Generated	Minimal waste generated, primarily clean sand		Significant hazardous waste generated (contaminated soil)	
	Score	2	Score	1
Safety	Lower risk due to minimal disruption of existing tanks		Higher safety risks due to extraction and transport activities	
	Score	2	Score	1
Duration	Shorter duration as tanks are not removed		Longer duration due to extraction and soil decontamination processes.	
	Score	2	Score	1
Approvals from Authorities Needed	Minimal approvals required		Requires extensive approvals from Civil Defense and environmental authorities.	
	Score	2	Score	1
Environmental Impact	Limited impact as tanks remains underground		Greater potential impact due to soil disturbance and transport activities	
	Score	2	Score	1

Parameter	Scenario 1: Neutralize and maintain		Scenario 2: Neutralize, Extract, and Transport	
Future Site Usability	Limited flexibility for future site use as tanks remain		Greater flexibility for redevelopment or alternative land use	
	Score	1	Score	2
Total Score	13		8	

5.5.3 Recommendation:

Based on the scoring, Scenario 1: Neutralize and Maintain Underground Tanks is the recommended option due to its lower cost, reduced waste generation, shorter duration, and lower safety risks. Moreover, it was reported by Misr Petroleum that 90% of similar cases, underground diesel storage tanks are neutralized and buried using sand.

5.6 Depot Layout Alternatives

Section 5.1 in Appendix L Feasibility Study includes the selection process of the depot layout and different alternatives

5.6.1 Selected Depot Layout – As Agreed with the CTA

The Consultant added some recommendations for practical practices regarding the depot layout suggested by the CTA as follows:

- Add the necessary electrical rooms.

Electrical locals	**4 each local has 2 transformers**
Surface area (per local)	~131m²
Zone implantation	One in northwest, in a CTA workshop One in northeast, next to the emergency issue One in southeast, next to the entrance

- Reduce bus charging activities in front of the maintenance shops, and next to the entrance/exit areas.
- Add the firefighting and domestic water tank.

The following figure presents the final selected and agreed on depot layout with the CTA. and in Appendix D3-2 However, this chosen layout «final version» might be subject to some small adjustments. This may be subject to minor evolutions, notably during the Design phase with the Contractor.

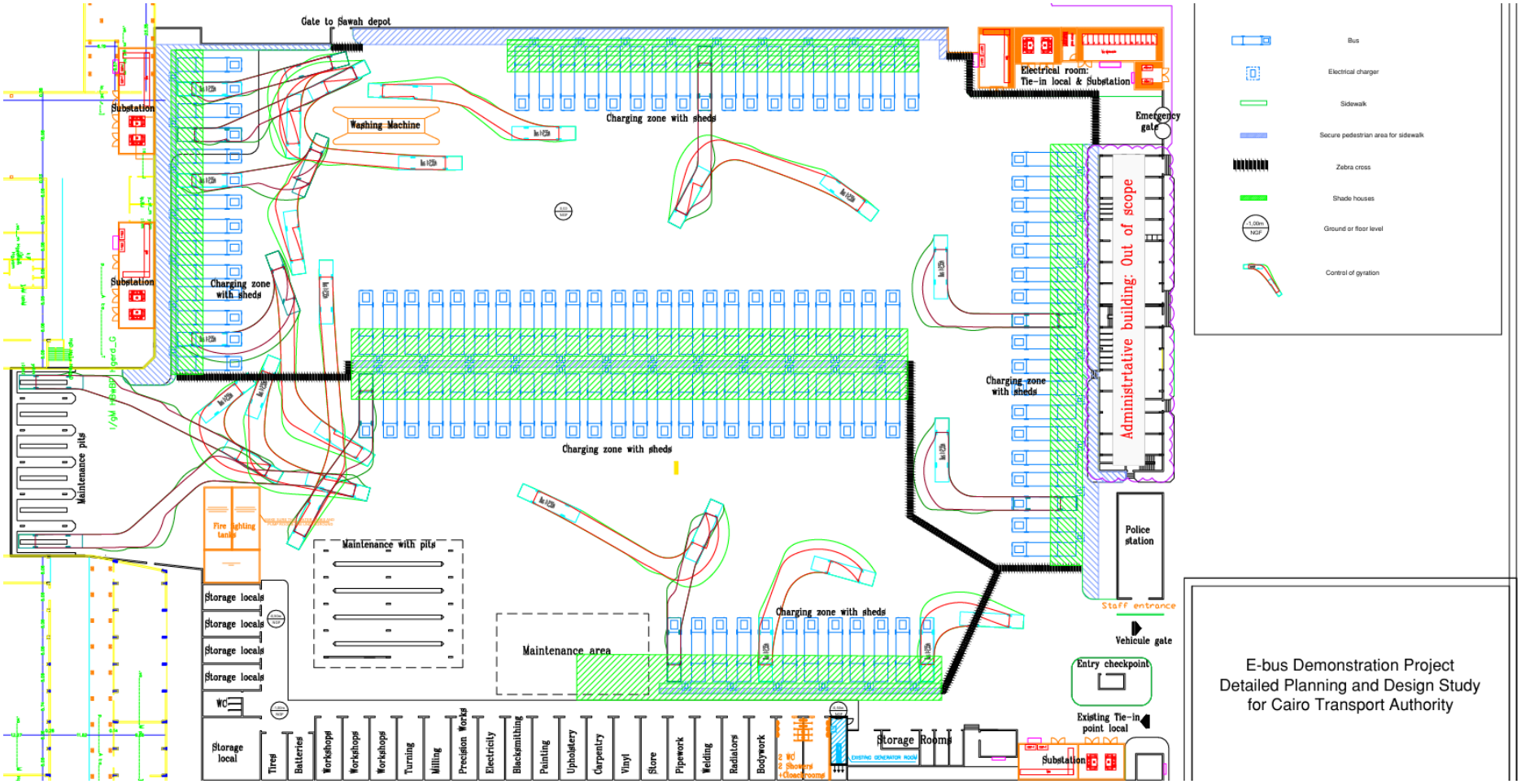

Figure 5-1 Preliminary Approved Layout

6 Identification and Assessment of the Potential Environmental, Social and Gender Impacts

6.1 Overview

The impact assessment is categorized according to the WB ESSs and considers risks and direct and indirect impacts on ES receptors. The classification of ES receptors according to WB ESS and associated risks and impacts are presented in the table below.

Table 6-1 Classification of ES receptors according to WB ESS and associated risks and impacts

WB ESS		ES Receptors	Direct and Indirect Risks and Impacts on ES Receptors
ESS1	Assessment and Management of Environmental and Social Risks and Impacts	Environmental and social aspects that are listed in the triggered ESS.	Environmental and social risks and impacts associated with each stage of the project implementation as listed in the triggered ESS.
ESS2	Labor and Working Conditions	All project workers.	Direct impact: ▪ Occupational Health and Safety (OHS) hazards (electrocution, falls, etc.) ▪ Exposure to increased levels of noise and vibration ▪ Exposure to gaseous and particle emissions ▪ Heat related ailments: extreme hot temperature Risks: ▪ Complaints from workers ▪ Child labor (onsite and across supply chain of material procurement) ▪ Gender Based Violence (GBV) ▪ Spread of transmissible diseases (as COVID-19, Monkey-Pox)
ESS3	Resource Efficiency and Pollution Prevention and Management	Ambient air quality	Direct impact: Degradation of ambient air quality
		Noise and vibration	Direct impacts: high levels of noise and vibration
		Soil integrity and contamination	Direct Impact: Degradation of soil integrity: contamination, physical structure due to general works Indirect impact: Soil contamination as a result of sourcing of raw materials and waste storage, oil spills and leaks such as solvents that can lead also impact groundwater quality and any future land use.
		Groundwater	Minor impact is anticipated on the groundwater quality due to potential soil contamination.
		Surface water	No impact is anticipated on the surface water quality as clarified in the baseline chapter (4), section 4.6.

WB ESS		ES Receptors	Direct and Indirect Risks and Impacts on ES Receptors
		Water availability	Direct impact: Service rupture leading to inefficient resource use. Indirect impacts: complaints from surrounding communities due to shortage in water supply.
ESS4	Community Health and Safety	Community	Direct impact: Increased levels of noise and vibrations, degradation in ambient air quality, Traffic congestion and road safety risk during all phases of the project
ESS6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Ecological life	No impact: There are no important or endangered flora and fauna recorded within the project site, as clarified in chapter (4), section 4.8
ESS8	Cultural heritage	Direct impact: Chance finds	
ESS10	Stakeholder Engagement and Information Disclosure	Depot workers, NCPD, passengers in 5 areas along Al-Ameriyah routes	Direct Impact: Relocation of labor force and operation malfunction

6.2 Methodology for Impact Assessment

The impacts were assessed on the basis of:

- EEAA General Guidelines for Environmental Impact Assessment (EIA), issued in 2009
- National laws and regulations
- National codes and standards for design
- WB Good practice notes
- WB ESS
- WBG EHS General Guidelines

The legislative context of the assessments undertaken is provided in Chapter 3.

Qualitative assessment of impacts and risks on each receptor under each project component and phase was based on:

Describing e-bus demonstration project's components and activities throughout the decommissioning, construction, and operation and maintenance phases

- Identifying the national and international requirements applicable to the project.
- Baseline identification of sensitive receptors
- Expert judgment/experience and stakeholder consultations
- Rating the impacts using evaluation matrix that follows rating method for severity and frequency of impacts as illustrated in the following section.

6.2.1 Evaluation Matrix

A simple rating method has been applied to identify the significance of the impacts. Each impact was given a rank for severity (S) and frequency of occurrence (F). Ranks for severity and frequency were given on a scale from 1 to 5, as shown in the tables below.

Table 6-2 Scale used in Severity Ranking of Impacts

1	2	3	4	5
Insignificant	Minor	Moderate	Major	Catastrophic

Table 6-3 Scale used in Frequency Ranking of Impacts

1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost certain

To determine the severity rank, four parameters were considered, as follows:

- **Scale:** How widespread will the impact be? Considerations can include e.g., area affected by land pollution impact, number of people affected by health impact, etc.
- **Difficulty in changing the impact:** How difficult will it be to reverse or mitigate the impact? Considerations can include e.g. availability of technology to change impact, level of complexity of available technology, capacity to apply available technology, existence of constraints to change impact, etc.
- **Cost of changing the impact:** How much will it cost to change the impact? Cost in relation to the means of change considered in the above parameter.
- **Effect on public image:** To what degree does the impact affect the public image of the enterprise (positively for positive impacts and negatively for negative impacts)?

Similarly, for the frequency rank, two parameters are considered:

- **Probability:** What is the probability of occurrence of the impact?
- **Duration:** How long will the impact last?

The risk level category is determined by multiplying the frequency rating times the severity rating. The table below shows the significance ranking matrix.

Table 6-4 Significance ranking matrix

Risk Score	**Risk Level Category**	**Frequency of Scenario**				
1 to 4	**Low**					
5 to 10	**Moderate**					
11 to 18	**Substantial**	**Rare (1)**	**Unlikely (2)**	**Possible (3)**	**Likely (4)**	**Almost Certain (5)**
19 to 25	**High**					
Severity	**Catastrophic (5)**	Moderate	Moderate	Substantial	High	High
	Major (4)	Low	Moderate	Substantial	Substantial	High

Risk Score	Risk Level Category	Frequency of Scenario				
1 to 4	Low					
5 to 10	Moderate					
11 to 18	Substantial	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)
19 to 25	High					
	Moderate (3)	Low	Moderate	Moderate	Substantial	Substantial
	Minor (2)	Low	Low	Moderate	Moderate	Moderate
	Insignificant (1)	Low	Low	Low	Low	Moderate

6.3 Identified Positive Impacts

6.3.1 Positive Impacts During Decommissioning and Construction Phase

1 Job Creation

Several employment opportunities will be provided. During the decommissioning phase, about 115[23] people will be employed. The workforce will include supervisors, engineers, skilled and unskilled laborers. For the semiskilled and unskilled workers, the Contractor might employ people from the communities which live around the project area as a way of making sure that the project benefits the people community members in the project area. Some of the unskilled labor force is expected to be day-labor; thus, the contractor will prepare a local hiring plan, which primarily relies on engagement with the local labor office; additional entities include community liaison desks, or through local Nongovernmental organizations (NGOs), local advertisements.

During the construction phase, about 500[24] people will be employed. The workforce will include supervisors, skilled and unskilled laborers. For the semiskilled and unskilled workers, the Contractor might employ people from the communities which live around the project area as a way of making sure that the project benefits the people community members in the project area. Workers will be trained and increase their experience and know-how of infrastructure projects.

2 Environmental Rehabilitation

- The removal and elimination of the current fueling station, oil transformer and the diesel buses maintenance workshops inside the workshop will contribute to environmental rehabilitation by remedying existing pollution sources and preventing further contamination of the site.
- Additionally, the neutralizing of the underground four (4) diesel tanks will eliminate hazards associated with fuel storage, by eliminating the spills/leaks risk to soil and groundwater leading to their contamination.
- Moreover, the decommissioning of the current washing area of very old technology that consumes large amounts of water, causing a waste of resources and replacing with new buses washing technology will lead to water conservation and better used water treatment and recycling.

[23] Estimated based on similar activities
[24] Estimated based on similar activities. To be confirmed with the Contractors at later stage

3 Provision of Market for Supply of Material

Providing indirect opportunities by increasing the economic activities through the following supply chain:

- Providing a market for materials suppliers that will be used during the decommissioning and construction phases.
- Providing transportation, shipping and warehousing services for the project
- Providing food and cleaning services.

4 Positive Impacts During the Depot Operation Phase

- The project will enhance environmental conditions at the depot by removing pollution sources such as fueling stations and maintenance workshops. Diesel tanks will be neutralized, filled with sand, and then will be either extracted or buried in place based on Mis Petroleum decision and in both scenarios, this will prevent leaks and protect the soil and groundwater from contamination. Additionally, fuel pumps will be removed to avoid potential spills.
- New bus-washing technology will minimize water usage and wastewater generation through improved water treatment and recycling methods. At least 70% of wastewater will be recycled for washing, conserving water resources.
- The introduction of electric buses will improve the status of CTA workers during operation and maintenance phase. Capacity building will be provided to CTA workers to effectively operate and maintain the e-buses.
- Technological advancement via the procurement and installation of advanced equipment such as mobile chargers, and heavy maintenance equipment demonstrate a commitment to technological advancement and operational efficiency.

6.3.2 Positive Impacts During the Electric Buses Operation

- **Reduction in Greenhouse Gas Emissions:** Electric buses produce zero tailpipe emissions, significantly reducing GHG compared to diesel buses. The transition to electric buses on the five selected routes, replacing 75 fossil fuel-powered buses and anticipating a 20% modal shift, will reduce GHG emissions by around **2944.2** tons of CO2 per year (44.3% of current baseline emissions in the 5 selected routes). Although electric buses do not emit pollutants, the project's GHG calculations account for emissions from the power plants producing the electricity used to charge these buses.
- **Improved Ambient Air Quality:** By eliminating harmful pollutants like BC and PM2.5, electric buses contribute to better air quality, reducing the incidence of respiratory illnesses. The replacement of 75 fossil fuel buses on five selected routes will reduce PM2.5 emissions by **0.043** tons/year and BC emissions by 0.15 tons/year (92.6% reduction from current BC carbon emissions in the 5 selected routes).
- **Reduced Traffic Noise:** Electric buses operate more quietly than diesel buses, reducing noise pollution in urban areas and contributing to a more pleasant environment and can alleviate stress and annoyance associated with excessive traffic noise, improving the overall quality of life for residents and commuters.
- **Traffic Flow Optimization:** Electric buses will help optimize traffic flow by reducing the number of private vehicles on the road, alleviating congestion, and improving urban traffic conditions. By providing reliable and efficient public transportation options, electric buses encourage modal shifts away from single-occupancy vehicles, ultimately reducing congestion and improving traffic flow in urban areas.
- **Improvement of Quality of Life:** Electric buses will improve passengers' quality of life through enhanced comfort, safety, and reduced travel times. Features such as air-conditioning, reduced noise, Wi-Fi, comfortable seating, and accessibility for persons with reduced mobility or health problems will positively impact passengers' physical and psychological well-being.

- **Rehabilitation of CTA Workers and Drivers:** The project will build both technical and non-technical capacities among CTA workers and drivers, improving their professional status during the operation and maintenance phases.
- **Market Expansion:** The shift to electric buses will stimulate market growth and diversification, fostering the development of a diverse supplier ecosystem and encouraging innovation in the electric vehicle industry.
- **Economic Savings:** Over their lifecycle, electric buses offer economic advantages through lower operating and maintenance costs, reduced fuel expenses, and simplified maintenance requirements. These savings can be redirected towards other essential services and infrastructure projects. Additionally, reduced traffic congestion will lead to economic gains through improved productivity and reduced travel times.

6.4 Identified Negative Impacts and Risks

Negative impacts and risks that are expected to arise from the project activities during the project implementation phases including decommissioning, construction and operation phases are discussed in the following subsections.

6.4.1 Decommissioning and Construction Phase

The table below shows the impact assessment during the depot decommissioning and construction phases.

Table 6-5 Impact assessment during preconstruction and construction phases

Decommissioning and Construction Phases					
I	**Aspect**	**Air Quality (code : AQ1)** **Relevant ESSs: ESS1, ESS2, ESS 3, ESS 4**			
	Description	**Gaseous emissions:** are expected from machinery used for decommissioning and construction activities (e.g., excavator and wheel loader); including CO_2, NOx, CO, PM. HC, CO and SO_2 from diesel combustion in construction equipment and existing oil type transformer, exhausts of vehicles used to transport workers, raw materials (cables, pipes, etc.), waste and other basic equipment. **Dust emissions:** are expected to occur due to the on-site excavation and demolition activities in addition to the movement of the construction vehicles and loading/unloading of material (e.g., sand, asphalt and cement, etc.) and waste.			
	Direct Impacts	Emissions will be temporarily as they will exist only during decommissioning and construction periods. As indicated in the baseline chapter, PM10 and TSP were found to be below the permissible levels at point (3) located outside the depot. Therefore, the sensitivity of the air shed as a receptor is considered to be moderate. As the site is surrounded by residential, commercial and industrial area, the increase in particulate matter and gaseous emissions will affect primarily construction workers working near the equipment and the citizens as the nearest residential area is about 42 m away from the depot on the north side.			
	Indirect Impacts	No indirect impacts have been identified.			
	Source	Decommissioning and construction work including demolition, excavation, and construction activities (e.g., loading/unloading and storage of fine materials) generating dust and particulate matter, as well as emissions from heavy machinery, vehicles, and equipment used on-site.			
	Receptors	Ambient air quality, decommissioning and construction workers, nearby citizens and surrounding activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term, Reversible			

2	**Aspect**	**Noise and Vibration (code: NV1)** **Relevant ESSs: ESS1, ESS 2, ESS 4**			
	Description	As indicated in the baseline chapter, the noise level is in compliance with the permissible level. Noise will be generated from the existing oil type transformer, equipment and machinery operating on-site. Vibration will be generated by heavy machinery, pile driving, and excavation activities.			
	Direct Impacts	Increased levels of noise and vibration will impact workers, nearby citizens and the surrounding activities.			
	Indirect Impacts	Continuous vibrations could also contribute to structural fatigue in older or poorly maintained buildings within the surrounding area.			
	Source	Operation of heavy machinery such as excavators, bulldozers, and cranes. Demolition activities involving the use of jackhammers, crushers, etc.			
	Receptors	Construction workers, nearby residents and other surrounding activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term, Reversible			
3	**Aspect**	**Soil, geology and topography (code: SGT1)** **Relevant ESSs: ESS1, ESS 3**			
	Description	Depot site is covered with concrete. However, due to the presence of four (4) underground diesel tanks, soil is expected to be contaminated from potential leakage/ spills. Potential contamination due to outsourcing of raw materials Soil potential contamination from improper storage of waste generated from construction activities and chemicals handing and/or storage Soil potential contamination from improper disposal of wastewater Soil erosion due to exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. Soil erosion may lead to an increase of dust emissions.			
	Direct Impacts	Soil contamination from potential spillage and improper handling of chemicals and/or waste and wastewater, lubricants and fueling activities. Generation of mud (solid waste)			
	Indirect Impacts	No indirect impacts have been identified.			
	Source	Spills/leaks from the existing underground diesel tanks, sand filling of diesel tanks, construction vehicles' movement and materials and improper chemicals/waste temporary storage on site.			
	Receptors	Soil quality			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Short-term, Irreversible			

<table>
<tr><td rowspan="8">4</td><td>Aspect</td><td colspan="4"><u>Water bodies and Groundwater (code WB1)</u>
Relevant ESSs: ESS1, ESS 3, ESS 4</td></tr>
<tr><td>Description</td><td colspan="4">The nearest surface water body to the depot is Ismailia canal which 1.6 km away. Accordingly, no impact is expected.
The depot site is situated within the Nile Delta aquifer system, characterized by highly productive quaternary deposits of sand and gravel interbedded with clay with depths typically ranging from 10 to 50 meters below ground level and below 5 m in some places near to the Nile River. The aquifer's significance lies in its role in supporting local water demands. The construction and decommissioning phases are unlikely to impact the groundwater; however, potential fuel/chemicals spills/leakes and/or improper wastewater discharge could lead to groundwater contamination.</td></tr>
<tr><td>Direct Impacts</td><td colspan="4">No impact is expected om Ismailia canal.
Accidental fuel/chemicals spills/leakes and/or improper wastewater discharge could lead to groundwater contamination.</td></tr>
<tr><td>Indirect Impacts</td><td colspan="4">Improper decommissioning of fuel storage tanks or handling of waste can leave residual contamination that gradually seeps into the aquifier.</td></tr>
<tr><td>Source</td><td colspan="4">Decommissioning and construction activities</td></tr>
<tr><td>Receptors</td><td colspan="4">Surface and groundwater quality</td></tr>
<tr><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td>3</td><td>3</td><td>9</td><td>Moderate</td></tr>
<tr><td>Impact assessment</td><td colspan="4">Negative, Moderate; Short-term, Reversible</td></tr>
<tr><td rowspan="2">5</td><td>Aspect</td><td colspan="4"><u>Resource efficiency and pollution generation (code: RP1)</u>
Relevant ESSs: ESS1, ESS3</td></tr>
<tr><td>Description</td><td colspan="4">Energy: Increase in energy consumption for transportation of materials and the use of decommissioning and construction equipment to prepare the site (e.g., trucks, loaders, etc.)
Water: Increase in consumption of water for decommissioning and construction activities including that water needed for the hydrostatic testing of the pipes.
Raw materials: Use of asphalt, ready mix concrete, soil, pipes, pumps, cables, ducts, sand used for neutralizing diesel tanks, switchgears, and light bulbs
Scrap and waste (hazardous and non-hazardous) generation:
Wet utilities: pipes that may be damaged by accident
▪ Dry utilities: damaged cables and ducts, broken LED lamps
▪ Hazardous wastes: contaminated soil, diesel tanks (in case it will be removed), empty containers (paint, solvents, chemicals), spent oil, oil and fuel spills cleanup kit/material, waste asphalt and residue of chemicals used in neutralizing diesel tank.
▪ Non - hazardous solid waste: construction and demolition waste including packaging materials, empty containers not used to store chemicals/oils, etc.
▪ Refuse such as metal scrap, wood, etc.
▪ Municipal waste from workers activities at sites: organic waste, paper, empty cartons, plastic and sewage from workers
Wastewater resulted from hydrostatic testing that will be subjected to analysis to check if it includes chemicals</td></tr>
</table>

<table>
<tr><td></td><td>Direct Impacts</td><td>Increased use of resources: increased water and fuel consumption as well as the demand for wastewater treatment facilities to dispose of sewage from workers. However the consumption of water and fuel during construction is relatively low and is not expected to affect the surrounding communities.
Air pollution is due to exhaust emissions from equipment and vehicles used.
Emissions of GHGs due to fuel combustion used for operation machinery and vehicles.
Improper raw materials handling and storage and mismanagement of the waste generated including construction and demolition and potential uncontrolled disposal causing pollution in surrounding areas and associated impacts such as visual disturbance, odor, attraction of insects and rodents and even open burning
Improper handling of wastewater can cause soil contamination causing impacts on human health, local environment.</td></tr>
<tr><td></td><td>Indirect Impacts</td><td>No indirect impacts have been identified.</td></tr>
<tr><td></td><td>Source</td><td>▪ Increase in energy consumption for operation of equipment and vehicles
▪ Increase in water consumption for construction work including hydrostatic testing of the pipes and by workers at the site
▪ Increase in raw material consumption including ready mix concrete, pipes, cables and ducts, chemicals (paints, solvents and chemicals used in neutralizing diesel tank), etc.
▪ Increase in wastewater generation
▪ Increase in hazardous and non-hazardous waste generation</td></tr>
<tr><td></td><td>Receptor</td><td>Local environment, surrounding community, workers</td></tr>
<tr><td></td><td>Significance</td><td><table><tr><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr><tr><td>4</td><td>3</td><td>12</td><td>Substantial</td></tr></table></td></tr>
<tr><td></td><td>Impact Assessment</td><td>Negative, Substantial; Short-term, Reversible</td></tr>
<tr><td>6</td><td>Aspect</td><td><u>Natural Disaster Risk / Emergency situations (code: NDR1)</u>
Relevant ESSs: ESS1, ESS 2</td></tr>
<tr><td></td><td>Description</td><td>The common natural disasters that may affect the depot are the common natural disasters that attack Egypt which are mainly heavy rains and heat waves
Additionally, various emergency situations could arise. These include electrical fires, explosions of batteries equipment malfunctions, and chemicals / fuel / oil leak and/ spills.
in regard to the neutralization of underground diesel storage tanks. As the final decision will be most probably in-place burial or removal which could lead to potential hazards if not properly managed.</td></tr>
<tr><td></td><td>Direct Impacts</td><td>Heat waves can directly impact workers' health and increase strain on water and energy, Additionally, heat waves may affect the performance of the equipment.
Heavy rains can directly impact workers' performance and also may affect the performance of the equipment
Chemical/oil/fuel leaks and/or spills: can lead to hazardous conditions for workers and working place.
Equipment failures: Malfunctions in equipment or machinery can result in accidents or injuries.
Risk of explosion due to residual fuel vapors during tank decommissioning which may lead to physical injuries to workers and nearby communities from unforeseen accidents.</td></tr>
<tr><td></td><td>Indirect Impacts</td><td>Increase in cost and delays in time schedule.</td></tr>
</table>

	Source	Natural elements: temperature, rain, wind, dust, operational failures (equipment, fires, spills, leaks) and human error. Neutralization of underground diesel tanks. Presence of residual fuel vapors and flammable materials.			
	Receptor	Workers and construction materials Nearby communities and residents.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		5	2	10	Moderate
	Impact Assessment	Negative, Moderate, Short-term, irreversible			
7	**Aspect**	**Occupational Health and Safety (code: OHS1)** **Relevant ESSs: ESS1, ESS 2**			
	Description	• Construction activities include demolition, site clearing, use of heavy machinery, laying out cables and pipes, working at heights for lighting, concentration of workers and potential spread of infectious diseases			

<table>
<tr><td></td><td>Direct Impacts</td><td colspan="4">Potential impacts on the health and safety of workers can result from dust and gaseous emissions, increased noise and heat levels from machines and vehicles. Moreover, poor management of solid waste and wastewater generated will cause health problems as they play a role in the increase of pests and diseases. Other site accidents may result from slipping during any of the construction activities and/or from vehicles movement in the site.

Main construction site hazards identified by the Occupational Safety and Health Administration (OSHA), Injuries from minor to fatal, including worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue, striking by moving objects

▪ Excavation and Trenching – OSHA has recognized excavation and trenching as the most hazardous construction site operation
▪ Fall - falling from scaffolding more than 2m or a steady ladder at a distance of more than 6m are among the most serious hazards at the site of construction and the most common, Additionally, dropped objects also pose a significant risk. Tools, materials, or debris falling from height can cause serious injury to workers below.
▪ Heavy construction equipment. The main causes of such accidents include the injury of workers when the equipment is returning reverse or when the direction of the equipment is changed or when the brakes do not work properly due to lack of regular inspections and preventive maintenance, Additional factors contributing to accidents include the absence of a designated segregation area for workers and vehicles, poor positioning of the banksman, and the presence of unlicensed operators or untrained banksmen.
▪ Electricity line workers, electricity technicians and electricity engineers are constantly exposed to electricity and face daily risks especially when working near water, Additionally, using electric power tools expose users and adjacent workers to electric hazards
▪ Ergonomics Hazards: repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction and decommissioning site
▪ Inadequate working conditions: workers may encounter inappropriate working conditions or risk of complaints that are not appropriately addressed such as confined spaces
▪ Psychological hazards such as stress, fatigue, and mental health challenges arising from high-pressure work environments, long hours, or lack of support should be considered as significant factors contributing to worker well-being and safety.
▪ Hot work activities such as welding, cutting, and grinding pose risks of fire, explosions, and exposure to harmful fumes.
▪ The use of cranes, hoists, and other mechanical lifting equipment presents the risk of dropped loads, equipment failure, or operator error.</td></tr>
<tr><td></td><td>Indirect impacts</td><td colspan="4">Injuries can impact the livelihood of the worker and/or the site crew</td></tr>
<tr><td></td><td>Source</td><td colspan="4">Decommissioning and construction activities</td></tr>
<tr><td></td><td>Receptors</td><td colspan="4">Workers</td></tr>
<tr><td></td><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td></td><td>5</td><td>3</td><td>15</td><td>Substantial</td></tr>
<tr><td></td><td>Impact assessment</td><td colspan="4">Negative, Substantial; Short-term, Irreversible</td></tr>
<tr><td>8</td><td>Aspect</td><td colspan="4"><u>Labor Force Relocation (code: LFR1)</u>
Relevant ESSs: ESS 1 , EES2, ESS10</td></tr>
</table>

	Description	The relocation of labor force is not a physical relocation per se. CTA confirmed that all employees, admins, engineers, technicians, drivers, conductors, and service workers will be transferred to the neighboring depots, namely: Al Sawah and Al Matariyah. Buses are supposed to operate on same existing routes but from the neighboring depots during decommissioning instead. This matter should not imply any significant social risks if well managed timely ahead of evacuation and decommissioning. Passengers will not be affected in this regard.			
	Direct Impacts	Relocation of CTA staff from Al-Ameriyah depot to El Sawah and Al-Matariyah depots			
	Indirect impacts	Moving the logistics and staff			
	Source	Decommissioning and Construction activities			
	Receptors	CTA staff at Al-Ameriyah Depot			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate, Short-term, Reversible			
9	**Aspect**	**Community Health and Safety (Code: CHS1)** **Relevant ESSs: ESS 1, ESS 4 , ESS10**			
	Description	Construction activities may result in an increase in movement of heavy vehicles for the transport of construction materials and equipment During excavation activities, existing underground infrastructure that serve the area may be broken			
	Direct Impacts	The impacts of the decommissioning and the construction work on public health are dust, gas emissions, noise, and health risks from poor waste disposal, which could affect the community surrounding the depot. CHS1 expected impacts are as follows: Risks may arise from unauthorized access to the construction site, particularly by members of the local community such as children or individuals unfamiliar with site hazards. This can result in accidental contact with hazardous materials (e.g., fuels, chemicals), exposure to unstable excavations, or interaction with incomplete structures, increasing the likelihood of injuries, falls, or entrapment incidents in addition to the risk of explosion due to potential fuel residues in underground diesel storage tanks, pressurized gas pipelines, or electrical faults, which could pose hazards if not properly neutralized and handled according to safety protocols. Traffic-related accidents and injuries to local communities Complaints from the surrounding community.			
	Indirect impacts	Accidents and injuries can affect the livelihood of local communities.			
	Source	Construction activities			
	Receptors	Surrounding community			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate, Short-term, Reversible			
10	**Aspect**	**Temporary Labor Influx (code: TLI)** **Relevant ESSs: ESS1, ESS2 and ESS4**			

	Description	Hiring workers from outside the project area might result in unfavorable impacts on the available resources and it may also result in inconvenience to the local communities, particularly in the areas where communities are conservative or not accustomed to having outsiders. (e.g., pressure on accommodation, food, risk of communicable diseases, health care and medication and potable source of water).			
	Direct Impacts	Accessibility to the land/resources/structures, security concerns			
	Indirect impacts	Conflicts and disputes			
	Source	Temporary labor influx risks as a result of construction activities.			
	Receptors	Construction workers			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact assessment	Negative, Moderate, Short-term, Reversible			
11	**Aspect**	**Child Labor (code: CHLI)** **Relevant ESSs: ESS1, ESS 2**			
	Description	There is a potential risk of child labor under subcontractors or service providers during the construction phase. Child labor poses significant risks to children's health, safety, and development, as they may be exposed to hazardous working conditions, physical injuries, exhaustion, and mental strain, impeding their long-term growth and education.			
	Direct Impacts	Exposure to unsafe working conditions Fatigue and stress, hindering their physical and mental development. Disruption in the child's education is due to long working hours or dangerous work environments.			
	Indirect impacts	The presence of child laborers in hazardous environments can create moral and ethical dilemmas for other workers and supervisors, potentially leading to workplace tensions.			
	Source	Hiring children during construction phase			
	Receptors	Working children			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	1	4	Low
	Impact assessment	Negative, Insignificant, Short-term, Reversible			
12	**Aspect**	**Culture Heritage (code: CHI)** **Relevant ESSs: ESS1, ESS 8**			
	Description	Although it's unlikely to find artifacts in the project area especially that the excavation is not deep and that the depot is an existing depot, it is important that the contractor prepares and implements chance finds procedure.			
	Direct Impacts	Chance finds			
	Indirect impacts	Not expected			
	Source	Excavation works during the decommissioning and the construction activities			
	Receptors	Cultural heritage			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	1	4	Low

	Impact assessment	Negative, Low, Short-term, Reversible			
13	**Aspect**	**Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH) (code: GB&SE1)** **Relevant ESSs: ESS1, ESS 2, ESS4 , ESS10**			
	Description	The labor-intensive nature of construction and decommissioning phases typically involves a male-dominated workforce, which can increase interaction between workers and the local community. The scale of labor influx combined with the absorptive capacity of the local community indicates a heightened risk of GBV and SEA-SH incidents. Women and girls in the community, as well as female workers on-site, are particularly vulnerable.			
	Direct Impacts	▪ Sexual Harassment: Women in the local community and within the workplace may face sexual harassment from construction workers, particularly in and around worker accommodations. ▪ Exploitative Sexual Relationships: Power imbalances during employment or community interactions may result in exploitative sexual relationships, including those based on economic dependency. ▪ Discrimination: Women may encounter unequal employment opportunities, lower wages, and unsafe workplace conditions compared to their male counterparts.			
	Indirect impacts	Addressing GBV incidents can place an additional burden on local health and social services, which may already be limited in capacity.			
	Source	Construction Workers			
	Receptors	Women and Girls in the Local Community			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	1	4	Low
	Impact assessment	Negative, Low, Short-term, Reversible			
14	**Aspect**	**Road Safety (Code: RS1)** **Relevant ESSs: ESS 4, ESS10**			
	Description	The decommissioning and construction phases will involve a significant increase in traffic, particularly from heavy trucks transporting materials, construction equipment, and waste.			
	Direct Impacts	▪ Increased risk of accidents due to heavy vehicle movement within and around the construction site. ▪ Traffic congestion affecting local communities, businesses, and emergency services. ▪ Potential collisions with pedestrians, cyclists, and vehicles, particularly in areas with limited road space.			
	Indirect impacts	Community concerns and grievances about road safety, accessibility, and disruptions.			
	Source	Transport of construction materials, excavation equipment, and waste disposal trucks.			
	Receptors	Pedestrians, local residents, businesses, and road users in the vicinity of the project site.			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact assessment	Negative, Moderate, Short-term, Reversible			

6.4.2 Operation and Maintenance Phase

The table below shows the impact assessment during the operation and maintenance phase.

Table 6-6 Impact assessment during operation phase of the depot

Operation and Maintenance Phase of the depot					
1	**Aspect**	**Air Quality (code : AQ2)** **Relevant ESSs: ESS1, ESS2, ESS3, ESS 4**			
	Description	Gaseous emissions: emissions of CO2, NOx, CO, PM, HC, SO2 from diesel combustion in case of operating the backup generators. No gaseous emissions will be emitted from dry type transformers.			
	Direct Impacts	Gaseous emissions are expected to be temporary, only in the case of backup generators and maintenance activities (using lubricants). It's anticipated that the emission of pollutants will not exceed the critical permissible concentration.			
	Indirect Impacts	No indirect impacts.			
	Source	Operation of backup generators and during maintenance activities of the e-buses.			
	Receptors	Nearby residential area			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	Low
	Impact Assessment	Negative, Low; long-term, Reversible			
2	**Aspect**	**Noise and Vibration (code: NV2)** **Relevant ESSs: ESS1, ESS 2, ESS 4**			
	Description	Noise and vibration during the operation in the depot can arise from maintenance activities, and the dry transformers.			
	Direct Impacts	Level of noise will be local and not expected to be high.			
	Indirect Impacts	No indirect impacts have been identified.			
	Source	Maintenance workshops, washing equipment, the dry transformers and chargers			
	Receptors	Workers, drivers, riders/passengers and nearby residents			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	Low
	Impact Assessment	Negative, Low; Short-term, Reversible			
3	**Aspect**	**Soil geology and topography (code: SGT2)** **Relevant ESSs: ESS1, ESS 3, ESS4**			
	Description	Potential soil contamination from accidental spills/leakage of lubricants and chemicals used in bus maintenance and washing, leaks from wastewater network.			

Operation and Maintenance Phase of the depot					
	Direct Impacts	Accidental spills during maintenance, improper disposal of hazardous materials, runoff during washing or firefighting Improper disposal of cleaning agents or chlorination residues during underground tank maintenance could lead to soil or water contamination.			
	Indirect Impacts	Soil contamination could impact human health in the local environment.			
	Source	Leakage in wastewater network, leakage of oil from backup generators and possible leakage of chemicals and lubricants that are used in the depot			
	Receptors	Soil, topography in the site routes, drivers			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact Assessment	Negative, Moderate; Long-term, Reversible			
4	**Aspect**	**Water Bodies and Groundwater (code WB2)** **Relevant ESSs: ESS1, ESS 3, ESS 4**			
	Description	The nearest surface water body (Ismailia canal) is 1.6 km away. So, no significant impact is expected on surface water bodies. Spills or leaks of hazardous materials (e.g., lubricants, and chemicals used in bus maintenance) could infiltrate through the soil and reach the groundwater, posing a risk of contamination.			
	Direct Impacts	Improper disposal of cleaning agents or chlorination residues during the underground tank maintenance could lead to soil or water contamination, However, this impact is unlikely due to the isolation of the depot floor after retrofitting, Additionally, during the construction phase, any groundwater encountered will be appropriately managed through dewatering practices.			
	Indirect Impacts	Over time, small leaks and spills could lead to the buildup of contaminants in the aquifer, especially in areas with slow groundwater movement.			
	Source	Maintenance activities and waste generation.			
	Receptors	Groundwater and surface water			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact Assessment	Negative, Moderate; Long-term, Reversible			
5	**Aspect**	**Resource efficiency and pollution generation (code: RP2)** **Relevant ESSs: ESS1, ESS2, ESS3, ESS4**			
	Description	Significant increase in electricity consumption (up to 8 MVA). Hazardous waste generation expected (wires, transformer coils, spills, batteries, cleaning agents). Treatment of the wastewater generated from E-bus washing will generate sludge.			
	Direct Impacts	Increase in energy consumption, Improper raw materials handling,			

Operation and Maintenance Phase of the depot					
		Pollution from waste Spill of detergents and chemical used in bus washing machine			
	Indirect Impacts	Increase of hazardous waste/sludge			
	Source	Increase of resources consumption Raw materials handling and storage Hazardous and non-hazardous waste generation Sludge from bus washing machine			
	Receptors	Local environment, surrounding community, depot workers			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	4	12	Substantial
	Impact Assessment	Negative, Substantial; Long-term, Irreversible			
7	**Aspect**	**Natural Disaster Risk / Operational Emergencies Situations (code: NDR2)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	The natural disaster risk that are expected to affect the operation of the depot are heat waves and heavy rains, Additionally, some operational emergencies situations may occur such as: Electric bus batteries during charging can fail or overheat, leading to a thermal runaway event, where the battery overheats and potentially ignites. Chemical spills of hazardous materials such as cleaning agents, or coolant fluids used in bus maintenance. Fire outbreaks due to electrical faults in charging stations or faulty wiring,			
	Direct Impacts	Heat waves: can directly cause softening of pavement, which can then be substantially damaged by vehicle circulation. Additionally, heat waves will increase the energy consumed by the depot and the e-bus because of the Air conditioner (AC) will be operating most of the day. With regards to the e-buses, this might affect the batteries drainage time and the frequency to recharge the batteries. Also, Heat waves can cause short circuits inside the charging system inside the depot. Heavy rains: Can directly cause short circuits for the chargers and can cause accidents for workers inside the depot Operational emergencies situations: Fire hazards due to short circuits, equipment malfunction and release of toxic fumes from batteries, C Combining firefighting and domestic water supplies in a single underground tank can affect water quality			
	Indirect Impacts	Increase in maintenance cost and strains on e-buses			
	Source	Natural elements: temperature, rain, wind,			
	Receptors	Infrastructure material (e.g., roads, buses, chargers and batteries)			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	2	8	Moderate

Operation and Maintenance Phase of the depot					
	Impact Assessment	Negative, Moderate, Long-term, Irreversible			
8	**Aspect**	**Occupational Health and Safety (code: OHS2)** **Relevant ESSs: ESS1, ESS 2**			
	Description	Involves various activities that pose potential health , safety risks to the workforce. These risks include exposure to electric shocks, hazardous substances, physical injuries, ergonomic issues, fire hazards and accidents related to bus operations and maintenance.			
	Direct Impacts	Electric shocks from high-voltage systems Battery-related incidents such as leaks or fires Physical injuries during maintenance and operation			
	Indirect Impacts	Livelihood impacts as a result of sickness and injuries.			
	Source	Operation/maintenance activities			
	Receptors	Workers			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact Assessment	Negative, Substantial; Long-term, Irreversible			
9	**Aspect**	**Labor Force Behavior (LFB1)** **Relevant ESSs: ESS1, EE2, ESS10**			
	Description	The transition from diesel and natural gas buses to electric buses introduces operational challenges, including the need for drivers and maintenance staff to adapt to new technologies and operational practices. Insufficient training or inadequate behavior could result in safety risks, operational inefficiencies, and negative passenger experiences			
	Direct Impacts	Operational inefficiencies and safety risks.			
	Indirect impacts	Reduce passenger satisfaction and low ridership rates			
	Source	Operation and Maintenance Activities			
	Receptors	Bus users			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial, Long-term, Irreversible			
10	**Aspect**	**Community Health and Safety (Code: CHS2)** **Relevant ESSs: ESS1, ESS 4 , ESS10**			
	Description	The operation of the depot involves several activities, including bus operations, and charging infrastructure which might pose potential health and safety risks to the community in case of deficiency in the operation system.			

Operation and Maintenance Phase of the depot					
	Direct Impacts	No direct impacts are expected during the operation phase of the depot rather than potential deficiency in the system that might cause fire risk. Increased noise from depot operations (e.g., workshop activities) might affect nearby residents. Complaints from the surrounding community.			
	Indirect impacts	No significant impact is expected.			
	Source	E-bus charging stations, maintenance areas,			
	Receptors	Surrounding community			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	1	4	low
	Impact assessment	Negative, low, long-term, Irreversible			
11	**Aspect**	**Road Safety (Code: RS2)** **Relevant ESSs: ESS 4, ESS10**			
	Description	The depot operation will involve frequent movement of electric buses and staff.			
	Direct Impacts	Risk of collisions between buses, pedestrians, and maintenance vehicles within the depot. Traffic bottlenecks due to buses entering and exiting the depot at peak hours.			
	Indirect impacts	Disruptions to surrounding businesses and residents due to depot-related congestion.			
	Source	Frequent bus movements, maintenance activities, and entry/exit points of the depot.			
	Receptors	Surrounding community			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact assessment	Negative, Moderate, long-term, Irreversible			

Table 6-7 Impact assessment during operation phase of E-buses

Operation and Maintenance Phase of the E-buses		
1	**Aspect**	**Air Quality (code : AQ2)** **Relevant ESSs: ESS1, ESS2, ESS3, ESS 4**
	Description	Minimal dust emissions expected during the operation of the e-buses on the selected routes
	Direct Impacts	No direct emissions are released from the e-buses
	Indirect Impacts	While the e-buses themselves do not emit pollutants during operation, indirect impacts are associated with the energy required to charge the buses. If the electricity used to charge the e-buses comes from fossil fuel-based power plants,
	Source	Wheels of electric buses

Operation and Maintenance Phase of the E-buses					
		Charging of buses			
	Receptors	Nearby residential area			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	4	8	Low
	Impact assessment	Negative, Low; Long-term, Reversible			
2	**Aspect**	**Noise and Vibration (code : NV2)** **Relevant ESSs: ESS1, ESS 2, ESS 4**			
	Description	E-buses are quieter compared to diesel buses; operational activities within the depot and routes expected to be within accepted limits.			
	Direct Impacts	Low-level noise expected came from buses.			
	Indirect Impacts	No indirect impacts have been identified.			
	Source	E-buses operation			
	Receptors	Drivers, riders/passengers, residents			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	Low
	Impact assessment	Negative, Low; Long-term, Reversible			
3	**Aspect**	**Water Bodies and Groundwater (code WB2)** **Relevant ESSs: ESS1, ESS 3, ESS 4**			
	Description	The operation of e-buses, given their nature, is unlikely to have a significant impact on any water bodies. This nature of bus operations limits any potential impact.			
	Direct Impacts	No significant impact is expected.			
	Indirect Impacts	No significant impact is expected.			
	Source	Bus operation			
	Receptors	Groundwater and surface water			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		1	1	1	Low
	Impact assessment	Negative, Low; Long-term, Reversible			
4	**Aspect**	**Resource efficiency and pollution generation (code: RP2)** **Relevant ESSs: ESS1, ESS2, ESS3, ESS4**			
	Description	There will be a significant increase in the overall electricity consumption during operation of the e-buses due to charging			

Operation and Maintenance Phase of the E-buses					
		Heat waves may lead to an increase in energy consumption of the e-buses' batteries which will require recharging more often than the designated time for recharging. Moreover, it could affect the condition of the tires, which will require replacement. ▪ Non-hazardous waste and scrap: ▪ Broken/unused parts, pipes ▪ Tires ▪ Spare parts ▪ Wastewater: Failure in sewage piping network ▪ Municipal solid waste			
	Direct Impacts	The primary direct impact will be the increased demand for electricity to power the e-buses, which could strain the local power grid. Additionally, improper handling and disposal of materials related to the operation, such as worn tires and waste generated during maintenance, can contribute to environmental pollution.			
	Indirect Impacts	Increase greenhouse gas emissions if the electricity is sourced from fossil fuels.			
	Source	Increase of resources consumption Raw materials handling and storage Hazardous and non-hazardous waste generation			
	Receptor	Local environment, surrounding community and employees.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	4	12	Substantial
	Impact Assessment	Negative, Substantial; Long-term, Irreversible			
5	**Aspect**	**Natural Disaster Risk/ Operational Emergencies Situations (code: NDR2)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	The main expected natural disaster risks that are expected to affect the operation of the buses are heat waves and heavy rains, Additionally, some operational emergencies situations may occur: Electric bus batteries can fail or overheat, leading to a thermal runaway event, where the battery overheats and potentially ignites			
	Direct Impacts	Heat waves: Potential damage to e-bus batteries and increase energy consumption for cooling systems and decrease the lifetime of tires Operational emergencies situations: Fire hazards, release of toxic fumes from batteries and potential injury to passengers and drivers			
	Indirect impacts	Increase in maintenance cost and strains on e-buses and natural resources			
	Source	Natural elements: temperature, rain, wind, human error			
	Receptors	Infrastructure material (e.g., roads, buses, chargers and batteries)			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact Assessment	Negative, Moderate, Long-term, Irreversible			
6	**Aspect**	**Occupational Health and Safety (code: OHS2)**			

Operation and Maintenance Phase of the E-buses					
		Relevant ESSs: ESS1, ESS 2			
	Description	Driving hazards pose significant risks to both the bus drivers, passengers and other road users during the operation of electric buses. These hazards may be resulted from driver fatigue, road conditions, poor visibility, reckless driving, mechanical failures, long driving hours, traffic congestion, and sudden stops. .			
	Direct Impacts	Accidents lead to potential injury or fatalities.			
	Indirect impacts	Livelihood impacts as a result of sickness, and injuries			
	Source	Operation activities			
	Receptors	Workers and Riders/Passengers			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Long-term, Irreversible			
7	**Aspect**	**Road Safety (Code: RS2)** Relevant ESSs: ESS 4, ESS10			
	Description	The replacement of 75 diesel buses with 98 electric buses (as 98 e-buses identified as the theoretical requirement to maintain equivalent service levels to the existing 75 buses) will result in a slight increase in traffic due to the higher number of buses operating on the same routes.			
	Direct Impacts	The addition of 23 more buses to the fleet could result in more frequent stops and starts, potentially slowing down overall traffic flow and increasing congestion. However, it is expected about 20% modal shift, where a significant portion of car and taxi users will switch to using the buses. This modal shift will lead to a reduction in the number of private vehicles on the road, which should offset the congestion caused by the additional buses. Therefore, while there may be an initial increase in traffic congestion, the overall effect on traffic flow is expected to be minimal due to the reduction in private vehicle usage.			
	Indirect impacts	Potential Delays in Public Transportation: other road users, including private vehicles and non-motorized transport, may experience delays.			
	Source	Increased Number of Buses			
	Receptors	Community and Local Residents			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	4	8	Moderate
	Impact assessment	Negative, Moderate, Long-term, Irreversible			
8	**Aspect**	**Labor Force Behavior** **Relevant ESSs: ESS1, ESS2, ESS10**			
	Description	Drivers will need to be trained to conform with the shift from fuel or diesel buses to e-buses.			
	Direct Impacts	Insufficient/inadequate technical and non-technical training in dealing with the e-bus operation			

Operation and Maintenance Phase of the E-buses					
	Indirect impacts	Operation malfunction			
	Source	Operation and Maintenance Activities			
	Receptors	Bus users, and in specific females and persons with limited mobility or disabilities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial, Long-term, Irreversible			
9	**Aspect**	**Community Health and Safety (Code: CHS2)** **Relevant ESSs: ESS 1, ESS4 , ESS10**			
	Description	The lack of drivers training or driver behavior during the shifting from diesel and natural gas buses to E-buses might cause traffic accidents and increase risks to community and passenger safety.			
	Direct Impacts	Traffic Accidents and Pedestrian Safety: in case of improper driver selection. Complaints from the surrounding community.			
	Indirect impacts	Increased Traffic Congestion: Higher bus frequency could lead to congestion, impacting local traffic flow and increasing accident risks.			
	Source	E-buses			
	Receptors	Surrounding community and riders/passengers			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Long-term, Irreversible			
10	**Aspect**	**Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH) (code: GB&SE2)** **Relevant ESSs: ESS 1 , ESS10**			
	Description	The intensive ridership of e-buses can increase interaction between males and females indicates a heightened risk of GBV and SEA-SH incidents. Women and girls in the public transportation means are particularly vulnerable.			
	Direct Impacts	Sexual Harassment and gender-based violence from male e-bus users towards female riders.			
	Indirect impacts	Unsafe environment for women and girls inside e-buses			
	Source	Male riders and Drivers			
	Receptors	Female e-bus users			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate, Long-term, Reversible			

Operation and Maintenance Phase of the E-buses					
Relevant ESSs: ESS1, ESS2, ESS3, ESS 4	Description	Minimal dust emissions expected during the operation of the e-buses on the selected routes			
	Direct Impacts	No direct emissions are released from the e-buses			
	Indirect Impacts	While the e-buses themselves do not emit pollutants during operation, indirect impacts are associated with the energy required to charge the buses. If the electricity used to charge the e-buses comes from fossil fuel-based power plants,			
	Source	Wheels of electric buses Charging of buses			
	Receptors	Nearby residential area			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	4	8	Moderate
	Impact assessment	Negative, Moderate; Long-term, Reversible			
2	**Aspect**	**Noise and Vibration (code: NV2)** **Relevant ESSs: ESS1, ESS 2, ESS 4**			
	Description	E-buses are quieter compared to diesel buses; operational activities within the depot and routes expected to be within accepted limits.			
	Direct Impacts	Low-level noise expected came from buses.			
	Indirect Impacts	No indirect impacts have been identified.			
	Source	E-buses operation			
	Receptors	Drivers, riders/passengers, residents			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	Low
	Impact assessment	Negative, Low; Long-term, Reversible			
3	**Aspect**	**Water Bodies and Groundwater (code WB2)** **Relevant ESSs: ESS1, ESS 3, ESS 4**			
	Description	The operation of e-buses, given their nature, is unlikely to have a significant impact on any water bodies. This nature of bus operations limits any potential impact.			
	Direct Impacts	No significant impact is expected.			
	Indirect Impacts	No significant impact is expected.			
	Source	Bus operation			
	Receptors	Groundwater and surface water			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		1	1	1	Low

Operation and Maintenance Phase of the E-buses					
	Impact assessment	Negative, Low; Long-term, Reversible			
4	**Aspect**	**Resource efficiency and pollution generation (code: RP2)** **Relevant ESSs: ESS1, ESS2, ESS3, ESS4**			
	Description	There will be a significant increase in the overall electricity consumption during operation of the e-buses due to charging Heat waves may lead to an increase in energy consumption of the e-buses' batteries which will require recharging more often than the designated time for recharging. Moreover, it could affect the condition of the tires, which will require replacement. ▪ Non-hazardous waste and scrap: ▪ Broken/unused parts, pipes ▪ Tires ▪ Spare parts ▪ Wastewater: Failure in sewage piping network ▪ Municipal solid waste			
	Direct Impacts	The primary direct impact will be the increased demand for electricity to power the e-buses, which could strain the local power grid. Additionally, improper handling and disposal of materials related to the operation, such as worn tires and waste generated during maintenance, can contribute to environmental pollution.			
	Indirect Impacts	Increase greenhouse gas emissions if the electricity is sourced from fossil fuels.			
	Source	Increase of resources consumption Raw materials handling and storage Hazardous and non-hazardous waste generation			
	Receptor	Local environment, surrounding community and employees.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	4	12	Substantial
	Impact Assessment	Negative, Substantial; Long-term, Irreversible			
5	**Aspect**	**Natural Disaster Risk/ Operational Emergencies Situations (code: NDR2)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	The main expected natural disaster risks that are expected to affect the operation of the buses are heat waves and heavy rains, Additionally, some operational emergencies situations may occur: Electric bus batteries can fail or overheat, leading to a thermal runaway event, where the battery overheats and potentially ignites			
	Direct Impacts	Heat waves: Potential damage to e-bus batteries and increase energy consumption for cooling systems and decrease the lifetime of tires Operational emergencies situations: Fire hazards, release of toxic fumes from batteries and potential injury to passengers and drivers			
	Indirect impacts	Increase in maintenance cost and strains on e-buses and natural resources			
	Source	Natural elements: temperature, rain, wind, human error			
	Receptors	Infrastructure material (e.g., roads, buses, chargers and batteries)			

Operation and Maintenance Phase of the E-buses					
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact Assessment	Negative, Moderate, Long-term, Irreversible			
6	**Aspect**	**Occupational Health and Safety (code: OHS2)** **Relevant ESSs: ESS1, ESS 2**			
	Description	Driving hazards pose significant risks to both the bus drivers, passengers and other road users during the operation of electric buses. These hazards may be resulted from driver fatigue, road conditions, poor visibility, reckless driving, mechanical failures, long driving hours, traffic congestion, and sudden stops. .			
	Direct Impacts	Accidents lead to potential injury or fatalities.			
	Indirect impacts	Livelihood impacts as a result of sickness, and injuries			
	Source	Operation activities			
	Receptors	Workers and Riders/Passengers			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Long-term, Irreversible			
7	**Aspect**	**Road Safety (Code: RS2)** Relevant ESSs: ESS 4, ESS10			
	Description	The replacement of 75 diesel buses with 98 electric buses (as 98 e-buses identified as the theoretical requirement to maintain equivalent service levels to the existing 75 buses) will result in a slight increase in traffic due to the higher number of buses operating on the same routes.			
	Direct Impacts	The addition of 23 more buses to the fleet could result in more frequent stops and starts, potentially slowing down overall traffic flow and increasing congestion. However, it is expected about 20% modal shift, where a significant portion of car and taxi users will switch to using the buses. This modal shift will lead to a reduction in the number of private vehicles on the road, which should offset the congestion caused by the additional buses. Therefore, while there may be an initial increase in traffic congestion, the overall effect on traffic flow is expected to be minimal due to the reduction in private vehicle usage.			
	Indirect impacts	Potential Delays in Public Transportation: other road users, including private vehicles and non-motorized transport, may experience delays.			
	Source	Increased Number of Buses			
	Receptors	Community and Local Residents			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	4	8	Moderate
	Impact assessment	Negative, Moderate, Long-term, Irreversible			
8	**Aspect**	**Labor Force Behavior**			

Operation and Maintenance Phase of the E-buses					
		Relevant ESSs: ESS1, ESS2, ESS10			
	Description	Drivers will need to be trained to conform with the shift from fuel or diesel buses to e-buses.			
	Direct Impacts	Insufficient/inadequate technical and non-technical training in dealing with the e-bus operation			
	Indirect impacts	Operation malfunction			
	Source	Operation and Maintenance Activities			
	Receptors	Bus users, and in specific females and persons with limited mobility or disabilities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial, Long-term, Irreversible			
9	**Aspect**	**Community Health and Safety (Code: CHS2)** **Relevant ESSs: ESS 1, ESS4 , ESS10**			
	Description	The lack of drivers training or driver behavior during the shifting from diesel and natural gas buses to E-buses might cause traffic accidents and increase risks to community and passenger safety.			
	Direct Impacts	Traffic Accidents and Pedestrian Safety: in case of improper driver selection. Complaints from the surrounding community.			
	Indirect impacts	Increased Traffic Congestion: Higher bus frequency could lead to congestion, impacting local traffic flow and increasing accident risks.			
	Source	E-buses			
	Receptors	Surrounding community and riders/passengers			
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Long-term, Irreversible			
10	**Aspect**	**Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH) (code: GB&SE2)** **Relevant ESSs: ESS 1 , ESS10**			
	Description	The intensive ridership of e-buses can increase interaction between males and females indicates a heightened risk of GBV and SEA-SH incidents. Women and girls in the public transportation means are particularly vulnerable.			
	Direct Impacts	Sexual Harassment and gender-based violence from male e-bus users towards female riders.			
	Indirect impacts	Unsafe environment for women and girls inside e-buses			
	Source	Male riders and Drivers			
	Receptors	Female e-bus users			

Operation and Maintenance Phase of the E-buses					
	Significance	Severity	Frequency	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate, Long-term, Reversible			

6.4.3 Impact Rating Summary

The following table shows a rating summary of the environmental and social impacts resulting from decommissioning, construction and maintenance and operation phases.

Table 6-8 Environmental, social and gender impact rating summary

Phase	Receptor/ EHS Aspect	Impact Rating			
		Low	Moderate	Substantial	High
Decommissioning and Construction	Air Quality		√		
	Noise and Vibration		√		
	Soil, geology and topography			√	
	Water bodies and groundwater		√		
	Resource efficiency and pollution prevention			√	
	Natural disaster risks / working Emergency Situations		√		
	Occupational Health and safety			√	
	Labor force relocation		√		
	Community Health and Safety		√		
	Labor Influx		√		
	Child Labor	√			
	Cultural Heritage	√			
	Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment	√			
	Road Safety		√		
Operation and Maintenance of the Depot	Air Quality	√			
	Noise and Vibration	√			
	Soil, geology and topography		√		
	Water bodies and groundwater		√		
	Resource efficiency and pollution prevention			√	
	Natural disaster risks/ emergency operational situations		√		

Phase	Receptor/ EHS Aspect	Impact Rating			
		Low	Moderate	Substantial	High
	Occupational Health and safety			√	
	Labor Force Behavior			√	
	Community Health and Safety	√			
	Road Safety		√		
Operation and Maintenance of the E-buses	Air Quality		√		
	Noise and Vibration	√			
	Water bodies and groundwater	√			
	Resource efficiency and pollution prevention			√	
	Natural disaster risks / emergency operational situations		√		
	Occupational Health and safety			√	
	Road Safety		√		
	Labor Force Behavior			√	
	Community Health and Safety		√		
	Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH)		√		

7 Environmental and Social Management Plan (ESMP)

7.1 Implementation Arrangement for the Project

The e-bus project, which falls under Component 3 of GCCC will be executed in accordance with the Environmental and Social Commitment Plan (ESCP) (available here). The ESCP outlines specific responsibilities, roles, and mitigation measures aimed at managing environmental and social (E&S) risks during the decommissioning, construction, and operational phases of the project. The following outlines the E&S-specific implementation arrangements:

7.1.1 Project Coordination Unit (PCU):

The PCU is responsible for the overall coordination of the project's implementation, including the E&S requirements. It oversees and ensures compliance with the E&S obligations stipulated in the ESCP. The PCU includes an **Environmental Specialist**, **Social Development and Gender Specialist**, and **Health and Safety Specialist** who are responsible for:

- Reviewing and approving all E&S documentation prepared by the contractors, such as the Environmental and Social Management Plan (ESMP), Occupational Health and Safety (OHS) Plans, and the Traffic Management Plan, etc.
- Conducting regular site inspections to monitor the compliance with E&S requirements, including but not limited to environmental protection measures, worker safety, hazardous materials handling, and waste management.
- Ensuring that all project activities are conducted in line with the applicable World Bank Environmental and Social Standards (ESSs) and the national laws and regulations.
- Technical Implementation Unit (TIU):
- The TIU will be responsible for supervising the day-to-day project implementation. In terms of E&S oversight, the TIU's key responsibilities include but not limited to the following:
- Supervising private contractors to ensure that E&S measures from the ESMP and ESCP are implemented effectively.
- Ensuring that all the necessary permits, approvals, and clearances (e.g., construction permits, environmental approvals) are obtained and maintained.
- In coordination with the PCU Conducting regular site inspections to monitor compliance with E&S requirements, including but not limited to environmental protection measures, worker safety, hazardous materials handling, and waste management.
- Ensuring proper record-keeping of all E&S documentation, including monitoring reports, incident reports, and corrective action plans.
- **Non-Compliance Management**: Any identified non-compliance or E&S risks will be escalated to the TIU to take corrective action.

7.1.2 Contractor Obligations:

All contractors hired by the TIU/PCU for the decommissioning, construction, and operation phases will be required to comply with the E&S provisions outlined in the GCCC Project plans as SEP, LMP, SEA/SH Action Plan, ESCP and ESMP etc.

Contractors are required to develop and implement site-specific plans such as:

- **Mobilization and Demobilization Plan**: To ensure that all E&S permits and clearances are in place prior to commencing activities.
- **Traffic Management Plan**: To minimize traffic disruption and ensure community safety during the construction phase.
- **Resource Efficiency Plan**: To optimize the use of energy, water, and raw materials while minimizing waste generation.

- **Waste Management Plan**: For both hazardous and non-hazardous waste generated during decommissioning and construction, ensuring safe disposal practices in line with national regulations and ESS3.
- **Chemicals and Hazardous Substances Management Plan**: For handling and storage of hazardous materials such as oils, lubricants, and fuels, to prevent environmental contamination.
- **Occupational Health and Safety Plan (OHS)**: Addressing worker safety, including prevention of accidents and ensuring adequate safety measures during construction and operation.
- **Emergency Preparedness and Response Procedures**: Ensuring emergency response capabilities for natural disasters, spills, fires, and accidents.
- **Community and Worker Grievance Redress Mechanism (GRM)**: To handle complaints related to E&S issues, including gender-based violence (GBV) and other labor-related concerns, in compliance with ESS2 and ESS10.
- **Staffing for E&S Compliance**: the contractor(s) must employ qualified E&S personnel, including:
- **Environmental Specialist**: to implement the environmental requirements, e.g., resources consumption, waste management, and pollution control, ...etc.
- **Social Development and Gender Specialist**: to implement requirements to mitigate social , GBV and SEA/SH risks.
- **Health and Safety Specialist**: To ensure compliance with OHS standards, including trainings and capacity buildings, safety gear, and hazard prevention…etc.

The contractor is responsible for the compliance of the workers and subcontractors and primary service providers and suppliers with the ESMP. The contractor will report to the PCU and the TIU on implementation of the ESMP. **Appendix N includes the Qualifications of Specialists Hired by the Contractor.**

7.1.3 Consultant:

- Supervise works and ensure compliance with Environmental and Social Framework (ESF) of the World Bank as pertaining to the project as well as the prepared ESIA.
- Support the implementation of Grievance Redress Mechanism in compliance with the Environmental and Social Commitment Plan of the project.

7.2 Capacity Building for CTA:

The Capacity Building program for the CTA aims to equip personnel with the skills and knowledge needed to effectively manage and sustain the e-bus project. It focuses on areas such as e-bus technologies, maintenance, and battery disposal, as well as managerial practices, public transport planning, and service quality. The program also addresses disaster response, safety for vulnerable users, and environmental awareness, with an emphasis on reducing emissions. Ultimately, the goal is to ensure the successful implementation of the e-bus system, promoting sustainability, operational efficiency, and safety.

7.3 Environmental and Social Management Plan

The environmental and social management plan describes the process for implementation of measures to avoid, mitigate, reduce or offset significant impacts identified during decommissioning, construction, and operation and maintenance (O/M) phases of the project.

For each identified significant impact and set of mitigation measures, the description of the implementation process includes defined responsibilities for implementing the measures, and monitoring plan, specifying methods for monitoring, indicators to assess compliance and implementation of ESMP, including provisions outlined in instruments developed for the project for safeguarding ESS, i.e., Stakeholder Engagement Plan (SEP) (available here), Labor Management Procedures (LMP) (available here) Environmental and Social Management Framework (ESMF) (available here), and Environmental and Social Commitment Plan (ESCP)

(available here), frequency of monitoring, location, applicable project phase, estimated costs for implementation of ESMP.

Applicable phases of the project are denoted by the following: DC/C for decommissioning and construction, O/M for operation and maintenance.

The ESMP is presented in the tables below.

Table 7-1 Environmental and social management plan for the proposed project during decommissioning and construction phase

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
AQ1	**Air Quality – Dust and gaseous emissions during decommissioning and construction phase**
Mitigation measures	The contractor should assign HSE manager at all decommissioning and construction sites who will ensure the implementation of the OHS plan and the ESMP requirements in addition to adequate HSE resources and prepare and implement an Air Quality Management Plan. The plan will be reviewed and approved by the PCU. The plans should focus on both minimizing emissions at source and preventing dust blow-off through the use of screens. The plan will include the adequate mitigation measures including but not limited to: ▪ Regular maintenance of vehicles and machinery to ensure optimal performance and reduced emissions. Use of low-emission equipment if possible. ▪ Minimizing drop heights for material handling activities such as unloading of friable materials. ▪ Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content. ▪ Use ready mix concrete and asphalt whenever possible ▪ Keeping the roads damped via watering spraying to minimize dust from spraying as a result of vehicles moving. ▪ Ensuring that vehicles travel on paved routes wherever possible. ▪ Sheeting of lorries transporting friable construction materials. ▪ Enforcing speed limits on unpaved roads to be <30 km/h. ▪ Replacing older vehicles with newer, more fuel-efficient alternatives. ▪ Using low sulfur content diesel. ▪ Minimize idling time of vehicles. ▪ Open burning for clearance or of solid wastes shall be prohibited. ▪ The plan must incorporate a grievance mechanism, which will be accessible and confidential.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Visual inspections onsite ▪ Spot check measurements of ambient air quality ▪ Review of maintenance records of machinery- according to reference testing methods (e.g., US EPA) ▪ Recording and documentation of complaint ▪ Results of monitoring to be drafted in monthly report for submission to TIU
Monitoring frequency	▪ Daily inspections onsite of weather conditions and operating machinery, soil conditions ▪ Prior to procurement of machinery onsite: verification of maintenance records ▪ Monthly: ambient air quality measurements at 3 locations: onsite, at the residential area, and downwind
Monitoring Indicators	▪ Weather conditions: visual ambient dust levels; windy conditions ▪ Operating vehicles and machinery: dust generation and black exhaust emissions

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Dust levels generated during construction activities (earthworks) ▪ Onsite ambient air quality compliance with WB and national limits for NOx, SOx, CO, PM ▪ Compliance for machinery inspection records
Monitoring location	▪ Construction site and surrounding at 3 locations: onsite, selected point in the residential area, downwind (refer to baseline locations) ▪ Machinery, equipment, and vehicles exhaust
Responsibility and Staffing Requirement for Mitigation	▪ A supervision consultant will supervise the construction activities including the E&S and OHS measures. ▪ The contractor shall also contract air quality measurement specialist or environmental specialist. ▪ The contractor shall hire environmental health and safety specialist/project site engineer and social development specialist for reporting on grievances
Estimated cost (EGP)	▪ Included in the construction contractor cost
NV1	**Noise and Vibration during decommissioning and construction phase**
Mitigation measures	The following mitigation measures will be applied to reduce the impact of noise during both decommissioning and construction phase.: ▪ Avoid demolition and construction work in the evening. ▪ Restricting the movement of lorry cars to prevent noise in the early morning and late evening periods. ▪ All machines and vehicles must be stopped when not in use. ▪ Prior to contractor procurement, evaluation of noise level of the decommissioning and construction equipment should be conducted especially for the activities with expected high noise and vibration such as crushers. The equipment with the least noise level possible in terms of cost and technology level should be selected. ▪ The contractor should prepare and implement a Noise and Vibration Management Plan. The plan should include the approach to noise and vibration management at the site such as those mentioned in the above bullet points. The plan should also include monitoring of noise and vibration levels to confirm the effectiveness of measures implemented. The plan must incorporate a grievance mechanism, which will be accessible and confidential. With regards to OHS, the following will be implanted: ▪ The contractor must train all workers before starting demolition and construction work on the danger of noise and how to avoid them. ▪ Safety induction training should be delivered to all workers in the hiring phase. This orientation should cover all the hazards might be exist on site includes excessive noise hazards. ▪ Provide workers in areas of activities with high noise levels with earplugs. ▪ Reduce workers' exposure times to noise, so that they do not exceed the safety limits stipulated in the Egyptian environmental law in addition to WB Standards. ▪ Heavy equipment operators must have valid operating license. Also, drivers must have professional license not private based on the class of the vehicle.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
Residual impact	Negative, low, short term
Methods of monitoring	▪ Inspection of operating machinery and vehicles onsite for proper functioning ▪ Inspection of proper PPE use ▪ Noise and vibration measurements compliance with local limits as per Law 4/1994 amended by law 9/2009 and amended ER no 2466/2024. and the WBG General Guideline, (Chapter 3, section 3.3) ▪ Check community GM register
Monitoring frequency	▪ Daily inspection of operating machinery onsite ▪ Monthly ambient noise and vibration measurements
Monitoring Indicators	▪ Noise level below permissible levels ▪ Maintenance records for equipment and inspection of proper noise enclosure fitting ▪ Time logs for work/construction activities ▪ Number of grievances
Monitoring location	Depot
Responsibility and Staffing Requirement for Mitigation	▪ A supervision consultant will supervise the construction activities including the E&S measures. ▪ Contractor shall also contract noise and vibration measurement company. ▪ Contractor shall hire: Environmental health and safety specialist/project site engineer, and social development specialist for reporting on grievances related to complaints on noise and vibration
Estimated cost (EGP)	Included in the construction contractor cost
SGT1	**Soil, geology, and topography during decommissioning and construction phase**
Mitigation measures	▪ Schedule decommissioning and construction activities to avoid rainfall and high wind periods to the extent practical. ▪ Sequence decommissioning and construction activities so that the soil is not exposed for long periods of time. ▪ For the raw materials, the source / quarries shall be licensed and commercially operating ▪ Misr Petroleum should develop and implement a Soil remediation Plan as a result of removing the 4 underground diesel tanks, according to the requirements of the Environmental national legislations and ensure obtaining the Civil Defense Approval in case of removing the tanks. ▪ Use appropriate lining and containment systems when neutralizing and cleaning underground diesel tanks to prevent chemical seepage into the soil. ▪ Use offsite equipment fueling and oil stations as much as possible ▪ Include spill kit on site to control, contain and clean up any potential spill. ▪ Ensure safe and proper handling and storage of Chemicals on site as per their materials safety data sheets (MSDS). ▪ Maintain soil cohesiveness (by wetting disturbed areas and by avoiding unnecessary traffic on construction sites). ▪ Cover on-site stockpiles of spoils and fill.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Reduce the amount of import or export of soil required. ▪ Provide temporary cover such as mulch or plastic when extended exposure is unavoidable.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Visual inspection of site: backfilling and restoration ▪ Inspection of vehicles, equipment and machinery used and associated maintenance records ▪ Regular soil sampling
Monitoring frequency	▪ Daily visual inspection ▪ Monthly for the maintenance reports, accidental spills/leaks reports
Monitoring Indicators	▪ Controlled equipment uses during works ▪ Erosion and cracking of soil
Monitoring location	▪ Onsite and surrounding
Responsibility and Staffing Requirement for Mitigation	▪ A supervision consultant will supervise the construction activities including the E&S measures. ▪ Contractor shall hire: Environmental health and safety specialist/project site engineer, and social development specialist for reporting on grievances related to complaints on noise and vibration
Estimated cost (EGP)	▪ Included in the construction contractor cost
WB1	**Water Bodies and Groundwater (WB1)**
Mitigation measures	In addition to the previous mentioned mitigation measures that will be applied to reduce, if elimination cannot be achieved, the negative impact regarding the Soil, Geology, and Topography the contractor shall also: ▪ Perform borehole drilling to determine groundwater depth, subsurface conditions, and soil stratification. ▪ Assess the potential for dewatering during excavation activities and its impact on surrounding groundwater. ▪ Develop a dewatering plan, if required, that ensures minimal disruption to the aquifer. ▪ Record all findings, including groundwater depth, flow direction, and quality, in regular monitoring reports. ▪ Share these reports with relevant stakeholders, including local water authorities and environmental agencies.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Groundwater level measurement ▪ Analysis of collected groundwater samples ▪ Conduct borehole drilling to observe groundwater conditions and record depth.
Monitoring frequency	▪ Conduct groundwater depth and quality assessments before construction/decommissioning begins. ▪ Weekly Monitoring during high-impact activities such as excavation or dewatering.
Monitoring Indicators	▪ Groundwater Depth ▪ Water Quality

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
Monitoring location	▪ Depot
Responsibility and Staffing Requirement for Mitigation	▪ Construction contractor shall hire environmental management specialist/site engineer
Estimated cost (EGP)	▪ Included in the construction contractor cost
RP1	**Resource Efficiency and Pollution Prevention: Energy, Water, Raw Materials, and Waste/Scrap Management**
Mitigation measures	**A) <u>Resource Efficiency</u>** The contractor shall prepare and implement a Decommissioning and Construction Resource Efficiency Plan This plan will include: Detailed measures to ensure efficient use of raw materials: ▪ Training to workers should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled and stored ▪ Obtain raw materials such as sand, concrete, pipes, pumps, cables, ducts, switchgears, asphalt and light bulbs, etc. from registered and authorized sources complying with the national and internal standards and requirements. ▪ Proper handling of raw materials to minimize waste ▪ Proper testing and checking of the raw material to make sure they are in good condition and would work properly (such as inspection of HDPE pipes, bricks are not broken) Effort, care, and sufficient time to inspect pipes, valves, and special parts before installation will save considerable time to repair defects that might appear during installation and after testing. Inspection must be carried out by and under the supervision of an implementation engineer to inspect for any apparent hairline fractures or cracks in the body or ends of the pipes. ▪ Reuse and recycle materials when feasible ▪ Monitor consumption to make sure the raw materials are used efficiently Detailed measures to ensure efficient energy use: ▪ Optimize fuel consumption in construction equipment (opt for newer more efficient equipment when possible) ▪ Conduct regular maintenance of equipment based on manufacturer recommendation ▪ Minimize idling time ▪ Workers will be trained and increase their experience and know-how of operating machinery and vehicles ▪ Switch off the equipment and vehicles when not in use Detailed measures to ensure efficient water use: ▪ Details on water supply locations within the project area so that it doesn't affect water availability for the residents. ▪ Detail measures to ensure efficient water usage in project construction activities such as undertaking regular leak checks, repair or replacement of faulty plumbing encountered and monitoring of construction water usage.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	B) <u>Pollution Prevention: Waste/Scrap</u> The contractor shall prepare and implement a Waste Management Plan (WMP), and Hazardous Waste and Material Management Plan (HAZMAT). The plans will be reviewed and approved by the PCU. The plan will include the adequate mitigation measures including but not limited to: ▪ The contractor will obtain official permits from the local authorities for the disposal of waste (construction wastes landfills, hazardous wastes landfills, etc.) prior to the commencement of construction activities. ▪ Wastes will be segregated and temporarily stored safely in the waste skips of sufficient volume at the allocated areas for waste storage on the premises of the construction site in a way that doesn't cause further traffic disruption. ▪ Waste will be covered to avoid the pollution of the ambient air by dust dispersion. ▪ Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes. ▪ Consignments for waste disposal will be recorded in terms of weight, destination and person responsible. ▪ Waste collection should occur daily, and it should be transported to the approved and safe disposal locations via adequately equipped trucks. The supervisor has to make sure that this process occurs without any hazards or problems. ▪ This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites. I. <u>Non-hazardous (domestic) waste disposal</u> ▪ The proposed Solid Waste Management Plan for the safe disposal of domestic waste should include, but not be limited to: ▪ The non-hazardous wastes (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by means of the approved contractor. ▪ The non-hazardous waste will be transported off-site for recycling or final disposal by a licensed contractor and supervisor will be responsible for the disposal procedure and the conditions of the trucks. ▪ This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites. II. <u>Hazardous waste generation</u> Hazardous waste is limited to contaminated soil, spent lubricating oil, contaminated spill kits, empty paint cans. The proposed Hazardous Waste Management Plan for the safe disposal of such waste shall be including, but not limited to: ▪ According to Article 33 of Law 4/1994, the contractor is required to keep records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such waste. ▪ Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled and stored to minimize the amount of waste generated from improper handling and storage (e.g., potential spills/leaks). MSDSs should be readily accessible to employees in their local language. II. <u>Wastewater</u>

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	During decommissioning and activities will be mainly the domestic wastewater that will be discharged into the existing sewage network. ▪ The wastewater from the hydrostatic testing of the pipes will be used for multiple tests to conserve water and minimize discharges. After completing the tests, water will be pumped back to wastewater trucks and will be discharged to the nearest wastewater treatment plant. The hydrostatic testing wastewater will be prohibited to be mixed with the domestic wastewater. It is not expected to be contaminated as the chemicals added to the water will be environmentally friendly. The final safe disposal of the wastewater generated from the construction activities (domestic and hydrostatic water test) will be the construction contractor's responsibility.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Site and surrounding visual inspection ▪ Review the ER ▪ Review the waste and the scrap receipts/ records ▪ Review of grievances
Monitoring frequency	▪ Daily visual inspection of site and surrounding and temporary waste storage area ▪ Weekly inspection of waste registers/receipts ▪ Weekly for the complaints
Monitoring Indicators	▪ Implementation of waste management plan including verification of records of delivery at final disposal sites, waste generated, contract validity with authorized waste collection contractor. ▪ Implementation of water management plan and energy management plans ▪ Maintenance checks ▪ Number of grievances/complaints
Monitoring location	▪ Project site and surrounding (incl. any dedicated temporary waste storage areas) ▪ Databases and record keeping files
Responsibility and Staffing Requirement for Mitigation	▪ A supervision consultant will supervise the construction activities including the E&S measures. ▪ contractor (DC/C), environmental and social development/communication specialists
Estimated cost (EGP)	▪ Contractor hiring of environmental specialists for development of waste, energy and water management plans ▪ Contract with disposal site; estimated waste generation and transfer to disposal site costs
NDR1	**Natural Disaster Risks / Emergency Situations**
Mitigation measures	The contractor shall prepare and implement an Occupational Health and safety Management Plan including an emergency response plan that provide site-specific procedures during decommissioning and construction activities, so workers know what is expected and what to do in natural disasters and in the event of an emergency situations due to work. The plan shall be able to manage emergency

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	events mainly heavy rains and heat waves by prevention, mitigation, preparedness, response and recovery and includes protocols for dealing with fires, chemical spills, equipment failures, and natural disasters. The plan shall take into consideration the following: ▪ Hazard identification/assessment ▪ Emergency response to respond to different risks including natural disasters ▪ Emergency resources ▪ The emergency spillage contingency plans ▪ Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated ▪ Provision for rescue and contact, if necessary, with the emergency services ▪ Communication systems ▪ Administration of the plan ▪ Emergency response procedures include a firefighting plan that includes creating firebreaks and emergency evacuation routes, fire detection systems and firefighting equipment (fire extinguishers, hoses, etc.) at key points. Train workers on fire response protocols and ensure regular fire drills. ▪ Ensure that emergency exits, routes, and assembly points are clearly marked. ▪ Post visible emergency exit maps and routes throughout the site, including marked locations of firefighting equipment and first-aid stations. Other Mitigation measures: ▪ Conduct a comprehensive risk assessment before the start of decommissioning, evaluating explosion risks and defining proper mitigation measures. ▪ Ensure tanks are completely degassed and purged of residual fuels before any excavation or disposal activities. ▪ Implement controlled ventilation and inerting procedures (e.g., nitrogen purging) to prevent vapor buildup inside tanks. ▪ Deploy gas detection systems to continuously monitor the presence of flammable vapors. ▪ Avoid scheduling construction activities during bad weather conditions (e.g.: dust storms – heavy rains – heat waves….etc.). ▪ Provide shaded rest areas for workers. ▪ Provide proper containment and spill kits for hazardous substances. Train workers on handling hazardous materials and emergency spill response. ▪ Implement regular inspection and maintenance schedules for machinery to prevent malfunctions and reduce risk.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Supervision and reporting of fuel removal and tank decommissioning process by specialized hazardous materials teams. ▪ Availability and Adequacy of Emergency Response Plan

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Clarity and Accessibility of Emergency Evacuation Routes
Monitoring frequency	Daily
Monitoring Indicators	• Weather forecast • Number of fuel vapor concentration exceedances detected. • Number of fire or explosion incidents reported.
Monitoring location	Onsite and surrounding
Responsibility and Staffing Requirement for Mitigation	▪ A supervision consultant will supervise the construction activities including the E&S measures. ▪ Private contractor (DC/C), environmental management specialist and OHS specialist
Estimated cost (EGP)	Included in the construction contractor cost
OHS1	**Occupational Health and Safety**
Mitigation measures	The contractor shall develop and implement an OHS plan. The plan shall include at the minimum the following mitigation actions to avoid such hazards: Physical Hazards: ▪ The OHS plan must include procedures for managing risks associated with moving equipment, ensuring safety guards, proper training, and supervision during operations. ▪ Monitoring and controlling noise levels should be enforced to ensure compliance with allowable thresholds. Ear protection should be mandatory in high-noise zones, and vibration exposure should be minimized through equipment design or scheduling work to avoid long-term exposure. ▪ Safety measures must be implemented, including insulation and proper grounding of electrical equipment, regular inspections, and training workers in handling electrical components. ▪ Eye protection (e.g., safety goggles) must be provided and used in areas where dust, chemicals, or welding are present. ▪ Hot work permits must be issued for activities involving welding or other high-heat operations, ensuring proper ventilation, fire extinguishers, and training on fire hazards. ▪ Traffic management procedures should ensure the safe operation of industrial vehicles within the site, with specific lanes for pedestrians and vehicles and clear signage. Drivers must be licensed and trained in safe vehicle operation. ▪ Extreme temperatures, such as heat waves, require mitigation measures including proper hydration, rest breaks, shaded areas, and heat-resistant PPE. ▪ Proper training on manual handling techniques must be provided to avoid strain or injury from repetitive tasks or heavy lifting.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Fall protection measures such as harnesses, guardrails, and proper scaffolding should be in place for any work at heights over 2m, with regular inspections of equipment. ▪ Adequate lighting must be provided to ensure visibility, especially in work areas where precision is necessary and to reduce the risk of accidents in low-light conditions. Chemical Hazards: ▪ Ensure that air quality monitoring is conducted regularly, especially in enclosed spaces. Measures should be taken to control dust and emissions, including the use of ventilation systems and respiratory protection. ▪ Fire prevention strategies should include training on handling flammable materials, maintaining fire extinguishers, and ensuring proper storage of hazardous substances. Emergency response drills for fire events should be held regularly. ▪ MSDSs must be accessible to all workers, and training on the safe handling of these materials should be mandatory. Spill containment and neutralization procedures must be in place. Personal Protective Equipment (PPE): ▪ The contractor must ensure the provision of appropriate PPE based on the identified hazards. This includes gloves, helmets, ear protection, and respirators, depending on the task. Regular checks on the condition and suitability of PPE should be conducted to maintain safety standards. Special Hazard Environments: ▪ Confined spaces should be managed through work permits, with monitoring systems for oxygen levels, ventilation, and standby rescue teams for emergencies. Implementation and Communication: ▪ The OHS plan must include a clear policy statement on OHS principles, ensuring the commitment to safety laws and regulations. This should outline the safety performance procedures and how contractors and workers will observe safety practices. ▪ A comprehensive risk management system will evaluate hazards linked to decommissioning and construction, including risks related to tank handling and hazardous material spills. ▪ Training and Competency Programs will be mandatory for all employees to ensure they recognize hazards, know how to safely use equipment, and are prepared to respond to emergencies. ▪ Emergency Response Plans (ERP) will cover potential emergency situations such as fires, chemical spills, and equipment malfunctions, with provisions for evacuations, first aid, and regular emergency drills. ▪ The plan must incorporate a grievance mechanism, which will be accessible and confidential, taking into account workers' grievances, including gender-sensitive concerns and considerations for people with disabilities. Monitoring and Review: ▪ Any incidents or accidents should be thoroughly investigated to identify root causes and corrective actions. ▪ Monitoring and review of safety performance will include periodic audits and safety inspections, particularly for high-risk activities like tank decommissioning.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ The plan will maintain detailed records of training, incident reports, audits, and OHS performance, ensuring compliance and the opportunity for continuous improvement. ▪ Both scenarios (In-Place Burial and Tanks Removal) should be incorporated into the OHS risk register. This will involve identifying specific hazards associated with each scenario, such as risks of soil contamination, fire, or accidents during tank handling. ▪ Verify that the sub-contractor(s) acts responsibly as subcontractors should submit their own OHS plan based on its scope. Also, insurance statement should cover subcontractor workers by number not by names. Contractor and sub-contractors to hire people who are covered by social insurance including work related accidents (injuries and fatalities) and have legal documents in place (even daily workers), in addition to mitigate the health and safety risk on all types of workers.
Residual impact	Negative, moderate, short term
Methods of monitoring	▪ Visual inspection for proper use of PPE, emergency preparedness, adequate signage for meeting point etc. and fencing ▪ Visual inspection for good housekeeping and storage of hazardous materials and equipment ▪ Verification of training records including daily induction for general construction related risks and hazards, proper use of PPE ▪ Inspection of complaints and grievance reports and register ▪ Inspection of employment contracts ▪ Records about occupational injuries and infectious diseases among workers ▪ Inspection of insurance policies and attendance sheets
Monitoring frequency	▪ Daily site inspection and surrounding ▪ Weekly inspection of training records ▪ Daily vehicles inspection
Monitoring Indicators	▪ Occupational health and safety incident reports ▪ Medical reporting on received cases ▪ Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs ▪ Clear and accessible grievance channels to all workers, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints ▪ Internal grievance logs ▪ Number and type of workplace complaints received and resolved ▪ Response timeline for resolution of complaints ▪ CDA approval on firefighting system for the developers ▪ Vehicles inspection records ▪ Number of Job Hazard Analysis ▪ Number of Toolbox Talks- on the job training

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Number of Permit to work issued/ closed ▪ Number of unsafe actions/ conditions ▪ Number of checklists completed ▪ Number of trainings delivered ▪ Number of safety induction against workforce ▪ Number of medical checkup and drug test ▪ Number of safety signs and guidance ▪ Number of welfare facilities ▪ Number of OHS supervisors ▪ Number of safety audits against OHS plan ▪ Number of safety breaches by ISC and closed by the contractor
Monitoring location	• Construction site, • Databases/register for vehicles inspection, grievances, incident/accidents, medical check-up, training
Responsibility and Staffing Requirement for Mitigation	▪ DC/C-Contractor is responsible for implementing the plan and handling workplace grievances of direct workers internally through direct supervisors or managers depending on the nature of complaint. ▪ DC/C-Contractor is responsible for handling grievances for contracted workers; staffing should include occupational health and safety and social development specialists. ▪ A supervision consultant will supervise the construction activities including the OHS measures
Estimated cost (EGP)	Contractor cost
CHS1	**Community Health and Safety**
Mitigation measures	To mitigate site traffic impacts, the following mitigation measure are proposed: ▪ The contractor will develop and implement a Traffic Management Plan (including routes and alternative routes, truck movements and transport of workers). ▪ The access roads for construction material and workers shall be determined prior to construction in coordination with the traffic department in Al-Ameriyah, Zeitoun district. ▪ The contractors and the site supervisor should choose a location for temporary storage of construction materials, equipment, tools, wastes and machinery before construction so as not to cause further traffic disruptions due to routes blockages. ▪ Minimizing pedestrian interaction with construction vehicles. ▪ Construction work should be avoided at the traffic peak times whenever possible. ▪ Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions. ▪ Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Using locally sourced materials, whenever possible, to minimize transport distances. Locating worker accommodation close to project sites and arranging worker bus transport to minimize external traffic. ▪ Improving driving skills and requiring licensing of drivers. ▪ Adopting limits for trip duration and arranging driver rosters to avoid overtiredness. ▪ Use of speed control devices (governors) on trucks, and remote monitoring of driver actions, if possible. ▪ Approval from the traffic department should be obtained by the contractor prior to the construction preparation ▪ The contractors should make sure that the employed drivers of construction machinery (such as trucks and loaders) have received sensitization/training on safety utilization of their machines in order to minimize accidents risks. ▪ Unusual traffic delays or accident caused during construction, or any complaints received should be reported in the monthly report prepared by the construction supervisor To mitigate site trespassing impacts, the following mitigation measure are proposed: ▪ The construction site to be fenced and guarded by security personnel in order to prevent any unauthorized access to the site ▪ Develop and implement a well communicated and accessible grievance mechanism for community members to address any complaints ▪ Develop communication channels with surrounding communities including informal settlers and recruit workers from them to establish rapport For all phases: ▪ Implement LMP paying particular attention to code of conduct and risks related to GBV, SEA and SH especially in vicinity of existing community near to the project site, prevention of COVID-19 or any other pandemic spread. ▪ Train workers on implementing the code of conduct ▪ Implement SEP and all provisions relevant to project grievances ▪ Prepare and implement a Community Health and Safety Management Plan including provisions in SEP (e.g., sharing Information with community regularly), description of communication and coordination mechanisms to engage with community, e.g., detours during work, equipment mobilization etc., job hazard analysis for all project activities ▪ Establish clear and accessible Grievance mechanism for community members to address any complaints The project will establish a grievance mechanism for workers and community members, ensuring anonymity, confidentiality, and accessibility for all, including people with disabilities. The mechanism will be gender-sensitive, with special considerations for handling grievances related to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH). The grievance mechanism will be regularly communicated to all stakeholders and will provide a clear, transparent process for addressing and resolving complaints A GRM to the different GRM methodology and channels that will be applied in case of receiving any grievances.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	Receiving and handling of the grievances and complaints will take place at the level of the parties concerned with project implementation, and at the central level represented by the PCU when grievances are escalated to them. Contractor is responsible for handling the grievances of contracted workers. Staffing of GRM should include an Operational Health and Safety specialist as well as Social Development specialists. GRM channels will be developed and disclosed to the public once ready, for the time being the complainers can use: ▪ Unified government complaints system (all government agencies involved in the implementation of the project are connected to the government complaints system) through: ▪ Hotline: 16528 ▪ The electronic portal for the unified government complaints system (www.shakwa.eg) ▪ WhatsApp numbers (01555516528 - 01555525444) ▪ The websites of Cairo Governorates, Ministry of Transport, and CTA
Residual impact	Negative, low short term
Methods of monitoring	▪ Inspection of community grievance log ▪ Reviewing community consultation reports ▪ Reviewing interviews with community members ▪ Inspection of proper safety signage, fencing delimiting construction site, detour signage ▪ Inspection of training records of security workers ▪ Inspection of outreach meeting minutes
Monitoring frequency	▪ Daily safety inspection of site and surrounding ▪ Weekly inspection of records reports, grievance logs
Monitoring Indicators	▪ Number of reported complaints from the community including surrounding industries ▪ Contractor's response measures to complaints
Monitoring location	▪ Site and surrounding, ▪ Databases and record keeping locations
Responsibility and Staffing Requirement for Mitigation	▪ Private contractor (DC/C); Contractor will hire OHS and social development specialists. ▪ The contractor is responsible for implementing the plans and resolving any concerns or complaints raised in the workplace. Yet, as needed, if complaints received are beyond their capacity, they should be escalated to the PCU or the TIU (it depends on the nature of the complaint). ▪ The contractor is responsible for resolving any concerns or complaints raised in the workplace (DC/C)
Estimated cost (EGP)	Contractor cost / Project cost
CH1	**Cultural Heritage**
Mitigation measures	Steps to be included in the chance finds procedure include:

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained. ▪ Notify the relevant authorities of the find. ▪ Document and record any chance find which may occur.
Residual impact	Negative reduce the severity of the impact of CH1 to **lower than before**, short term
Methods of monitoring	Verification of approvals from formal authorization or guidance from relevant cultural heritage authorities, such as the Ministry of Tourism Incident reports if any (formal documentation prepared by the contractor in case of any unplanned discoveries (chance finds) during excavation or construction.)
Monitoring frequency	• As needed during decommissioning and construction
Monitoring indicators	Number of incident reports
Monitoring location	Project site
Responsibility and Staffing Requirement for Mitigation	• The contractor shall hire environmental and social development specialist
Estimated cost (EGP)	• Contractor cost / Project cost
LFR1	**Labor Force Relocation**
Mitigation measures	CTA to prepare a comprehensive decommissioning plan. This plan will outline the specific actions to mitigate potential risks and ensure a smooth transition for the workforce. The decommissioning plan should include detailed procedures for the `process, including timelines, communication strategies, and logistical support. It should also address the management of employee concerns, the continuity of operations during the transition, and the monitoring of impacts post-relocation. Additionally, the plan should identify the roles and responsibilities of all stakeholders, including the contractor, the depot management, and the affected employees. By preparing and implementing this decommissioning plan, the contractor will help to ensure that the relocation is conducted efficiently, with minimal disruption to both the workforce and depot operations, thereby mitigating potential social and operational risks associated with this aspect. Other mitigation measures:

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ Ensure timely and transparent communication with all affected employees about the relocation process, timelines, and expectations. This includes providing detailed information on the new work locations and any changes in job responsibilities. ▪ Provide logistical support for the transfer, such as transportation arrangements to the new depots if necessary. This could include organizing group transport. ▪ Conduct consultation sessions with employees to address any concerns or suggestions they may have about the relocation. ▪ Establish accessible, clear, and anonymous grievance mechanisms for employees. ▪ Develop and implement corrective actions if any unforeseen issues arise during or after the relocation process.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Daily Activities ▪ Grievance mechanism. ▪ Employee Feedback Survey: collects employees' experiences, concerns, and satisfaction levels regarding the relocation process to identify issues and improve support. It is conducted before, during, and after the relocation to monitor and address potential challenges. ▪ Incident Reports
Monitoring frequency	▪ Weekly
Monitoring indicators	▪ Occupational health and safety incident reports ▪ Timeliness and completeness of communication. ▪ No accidents ▪ Surveys ▪ Clear and accessible grievance channels to all workers, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints ▪ Internal grievance logs ▪ Percentage of grievances resolved against received
Monitoring location	▪ Depot
Responsibility and Staffing Requirement for Mitigation	▪ CTA
Estimated cost (EGP)	Project cost
TLI1	**Temporary Labor Influx**
Mitigation measures	▪ The project will prioritize the hiring of local workers to reduce the number of laborers coming from outside the project area. This approach will help to minimize pressure on local resources such as accommodation, food supplies, healthcare, and potable water.

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
	▪ All workers, including those from outside the area, will be required to sign a code of conduct that clearly defines acceptable behavior and the consequences of violating community norms. This will include respect for local culture, adherence to safety and health protocols, and anti-harassment policies. ▪ Accommodation and Services: Where temporary labor is necessary, contractors will be required to provide appropriate accommodation and services for their workers, ensuring that workers do not depend on local resources. These accommodations will meet minimum standards for sanitation, health, and safety to avoid putting a strain on local infrastructure. ▪ Health screenings and communicable disease prevention measures will be put in place to minimize the risk of diseases spreading to local communities. Regular health checks will be mandatory, and appropriate medical facilities will be provided to handle any healthcare needs for the labor force. ▪ Regular engagement with local communities will be conducted to ensure that they are informed about the project and its labor requirements. Grievance mechanisms will be established for community members to raise concerns or issues regarding the presence of non-local workers.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Site Inspections ▪ Health Checks ▪ Grievance Mechanisms ▪ Code of conduct ▪ Consultation activities report ▪ Inspect workers' accommodation
Monitoring frequency	Weekly
Monitoring indicators	▪ Internal grievance logs ▪ Percentage of local workers hired compared to the total workforce. ▪ Compliance with accommodation standards (sanitation, safety, and health conditions). ▪ Number of health screenings conducted and follow-ups on communicable diseases. ▪ Number of grievances submitted by community members and resolution times.
Monitoring location	Depot – workers accommodation
Responsibility and Staffing Requirement for Mitigation	The contractor shall hire social development specialist
Estimated cost (EGP)	Project cost
CHL1	**Child Labor**

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
Mitigation measures	▪ Contractors and subcontractors must comply with Egyptian labor laws and international standards prohibiting child labor. Contracts must include clauses banning child labor. ▪ No person under the minimum age of 18 will be employed by the contractor or subcontractors, as specified in the Labor Management Procedures (LMP), due to the hazardous nature of the work. ▪ A robust age verification system will be implemented before hiring any worker, including temporary and subcontracted laborers. Verification methods may include checking official documents (birth certificate, national ID), obtaining medical practitioner confirmation, written parental/guardian consent, or community verification where official documents are unavailable. ▪ Regular unannounced inspections of work sites will be conducted to ensure compliance with labor laws and prevent any cases of child labor. ▪ An accessible and anonymous grievance mechanism will be in place for workers to report any violations related to child labor, ensuring confidentiality and protection against retaliation.
Residual impact	Negative, lower significance, short term
Methods of monitoring	▪ Site Inspections ▪ Grievance Mechanisms ▪ Worker verification records
Monitoring frequency	Weekly
Monitoring indicators	▪ Internal grievance logs ▪ Number of child labor violations identified
Monitoring location	Depot
Responsibility and Staffing Requirement for Mitigation	The contractor shall hire social and gender development specialists
Estimated cost (EGP)	Project cost
GBV&SEI	**Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH)**
Mitigation measures	▪ All workers, including subcontractors, must sign a code of conduct that explicitly prohibits GBV and SEA-SH. ▪ Conduct mandatory training for all workers on acceptable behavior, anti-harassment policies, and respect for local culture. ▪ Ensure the grievance mechanism is confidential, accessible to women and girls, and includes provisions for addressing GBV complaints.
Residual impact	Negative, lower significance, short term
Methods of monitoring	▪ Worker code of conduct compliance, ▪ Grievance Mechanisms ▪ Worker verification records

CODE	Environmental and Social Component During the Decommissioning and the Construction activities
Monitoring frequency	Weekly
Monitoring indicators	▪ Grievance logs ▪ Number of GBV/SEA and SEH identified
Monitoring location	Depot and surrondings
Responsibility and Staffing Requirement for Mitigation	The contractor shall hire social and gender development specialists
Estimated cost (EGP)	Project cost
RS1	**Road Safety**
Mitigation measures	▪ Develop and implement a Traffic Management Plan (TMP) with clear traffic control measures. ▪ Schedule vehicle movements during off-peak hours to minimize congestion. ▪ Install traffic signs and speed limit indicators at key locations near the construction zone. ▪ Deploy trained traffic marshals to guide vehicles and pedestrians safely. ▪ Ensure the grievance mechanism is confidential, accessible to community and includes provisions for addressing road safety complaints.
Residual impact	Negative, low, short term
Methods of monitoring	▪ Grievance Mechanisms ▪ On-site traffic inspections and real-time monitoring of vehicle movements. ▪ Review of incident reports
Monitoring frequency	Weekly
Monitoring indicators	▪ Grievance logs ▪ Number of reported traffic incidents or near-miss accidents.
Monitoring location	Depot and surroundings
Responsibility and Staffing Requirement for Mitigation	The contractor
Estimated cost (EGP)	Project cost

Table 7-2 Environmental and social management plan for the proposed project during operation and maintenance phase of the depot

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
SGT2	Soil, geology, and topography during operation and maintenance phases
Mitigation measures	▪ The depot floor to be of impermeable layer to prevent potential and/or accidental spills and leakage from reaching the soil and the groundwater. ▪ Develop and implement a Spill Prevention and Response Plan. ▪ Equip the site with spill kits and train staff on spill response procedures. ▪ Ensure proper disposal of hazardous and non-hazardous waste materials. ▪ Use designated areas for waste storage, away from soil and water sources. ▪ Implement a waste segregation system to manage hazardous materials separately. ▪ Store chemicals and hazardous materials in designated, contained areas according to their MSDS with appropriate labeling. E-buses washing area to be including drainage system that shall be designed as per codes and standards to washing wastewater in a way that it won't cause soil erosion, pavement cracks as a result of water seeping under the pavement. The following mitigation measures shall be considered in the design of e-buses' washing water to minimize impacts on the soil and depot floor: ▪ Surface channels should have adequate capacity for the design runoff volume and should be located and shaped in a manner that doesn't present a traffic hazard. ▪ Channels should have lining, when possible, based upon design velocity criteria. Appropriate linings to control erosion.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Inspection of vehicles, equipment and machinery used and associated maintenance records
Monitoring frequency	▪ Daily visual inspection ▪ Monthly for the maintenance reports, accidental spills/leaks reports
Monitoring Indicators	▪ Controlled equipment uses during works ▪ Erosion and cracking of soil
Monitoring location	Onsite and surrounding
Responsibility and Staffing Requirement for Mitigation	CTA will be responsible for monitoring the activities during the operation of the depot and after the completion of GCCC project.
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
WB2	**Water Bodies and Groundwater**
Mitigation measures	The mentioned mitigation measures to mitigate risks of Soil, Geology, and Topography should be followed to mitigate also any risks related to the groundwater.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
Residual impact	Negative, low, long term
Methods of monitoring	▪ Inspection of vehicles, equipment and machinery used and associated maintenance records
Monitoring frequency	▪ Daily visual inspection ▪ Monthly for the maintenance reports, accidental spills/leaks reports
Monitoring Indicators	▪ Controlled equipment uses during works ▪ Erosion and cracking of soil
Monitoring location	Onsite and surrounding
Responsibility and Staffing Requirement for Mitigation	CTA will be responsible for monitoring the activities during the operation of the depot and after the completion of GCCC project.
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
RP2	**Resource Efficiency and Pollution Prevention: Energy, Water, Raw Materials, and Waste/Scrap Management**
Mitigation measures	**A) <u>Resource Efficiency</u>** **Electricity Consumption** ▪ Ensure there is an effective maintenance plan in place for all the utilities. The plan should include maintenance schedule and regular inspection, waste management plan for the proper recycling or disposal of spare parts by certified contractors. ▪ Design buildings and workspaces to maximize the use of natural light, reducing the need for artificial lighting during the day **Water Consumption** ▪ Install low-flow fixtures and fittings in restrooms and wash areas. ▪ Monitor water consumption, for example for buses cleaning to ensure that no excess water is being wasted. ▪ Use water-efficient bus washing systems, such as high-pressure, low-volume nozzles, and automated washing machines with water recycling capabilities. About 70% of wastewater will be reused for washing. ▪ Regular maintenance to ensure efficient operation of the washing systems, which means efficient water consumption. ▪ Schedule bus washing during off-peak water usage times to reduce strain on the water supply system. Washing shall be done after the e-bus return from their trips at the end of the day and after the daily inspection. ▪ Water leakage from pipe networks takes place as a result of the presence of weak joints or fittings or as a result of high-water pressure. Accordingly, water leakage can be controlled by improving pipe resistance (fittings and joints) and reducing water pressure. In most networks, active pressure control for loss minimization, through the reduction of excess water pressure is essential. There are a number of methods for regulating pressure. Pressure is controlled by systems using valves such as pressure reducing valves (PRV) and variable speed pumps (VSP). VSPs include Variable Speed Drive (VSD). The VSD regulates the rotational

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	speed of the pump's motor by changing the frequency of the input power. Changing the speed of the electric motor can change the hydraulic performance of the pump (such as power consumption, outlet flow, and pressure). In addition, to ensure leakage is avoided and flow is smooth, pressure gauges should be installed to monitor the pressure inside the network. ▪ Network optimization will be applied as the pipes size will deliver the highest pressures and flows according to mass conservation law A1V1=A2V2. Additionally, there will be run of hydraulic simulation of the network to investigate its performance. For example, enlarging pipe diameters can increase pressures, it reduces flow velocity. Thus, network optimization is very important to obtain the best results. **Spare Parts and Raw Materials** ▪ Source materials locally and consider eco-friendly alternatives to reduce environmental impacts, whenever possible. ▪ Implement regular inventory to record the types, quantities and expiry dates of chemicals stored. ▪ Apply a return policy for unused items/chemicals before their expiry date, whenever possible. ▪ Ensure that all chemicals are stored according to their MSDS. ▪ Implement a robust inventory management system to track and control spare parts usage, ensuring that only necessary parts are ordered and used. ▪ Use just-in-time (JIT) inventory practices to reduce excess stock and minimize waste. ▪ Recondition and refurbish used parts whenever possible instead of replacing them with new ones. **B) <u>Pollution Prevention</u>** The CTA shall prepare and implement the Environmental Register (ER) and Waste Management Plan (WMP). The ER shall be developed as per the requirements of Annex 3 of the ER of the Egyptian Environment Protection Law No. 4/1994 and its amended ER no 2466/2024. including, but not limited to the following: ▪ Name and address of establishment ▪ Name and job title of person in charge of filling in the Register. ▪ Period covered by the current data. ▪ Type of activity and nature of raw materials and production during the corresponding time period. ▪ Laws governing the establishment. ▪ Special conditions set by the EEAA for the establishment. ▪ Statement of the types of emissions, the rates of discharge (per hour/ day/ month/ year), and method of disposal thereof. ▪ Rates at which tests are conducted on each type of emission emanating from the establishment. ▪ Extracted materials after treatment processes. ▪ Extent of efficiency of treatment method. ▪ Date and signature of officer in charge. The WMP plan will include the adequate mitigation measures including, but not limited to:

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	▪ Obtaining official permits from the local authorities for the disposal of waste generated from the depot activities and e-bus cleaning. ▪ Waste segregation and temporarily safe storage of waste generated in labeled waste skips of sufficient volume at allocated areas for waste storage in a safe and proper way. ▪ Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes. ▪ Consignments for waste disposal will be recorded in terms of types, weight, destination and person responsible. ▪ Waste collection should occur daily, and it should be transported to the approved and safe disposal locations via adequately equipped trucks as coordinated with WMRA. The supervisor has to make sure that this process occurs without any hazards or problems. **I. <u>Non-hazardous (domestic) waste/scrap disposal</u>** The proposed WMP for the safe disposal of non-hazardous waste/scrap should include, but not be limited to: ▪ The non-hazardous waste (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by means of the approved and licensed waste contractor in close coordination with WMRA and Al-Ameriyah district. ▪ The non-hazardous waste will be transported off-site, and the site supervisor will be responsible for the safe disposal procedure and the conditions of the trucks. ▪ Scrap will be segregated and, labeled and sold via auctions to certified scrap contractors ▪ The certified scrap contractors will be responsible for the safe transportation procedure of the scrap outside the depot with close coordination with the CTA and the conditions of the trucks. ▪ According to Article 33 of Law 4/1994, the contractor is required to keep records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such waste. ▪ The sludge generated from the bus washing process will be analyzed after treated to determine its classification as either hazardous or non-hazardous waste. Based on this classification, it will be managed accordingly and disposed of through licensed waste management contractors, ensuring compliance with environmental regulations and preventing potential soil contamination. **II. <u>Hazardous waste generation and disposal</u>** Hazardous waste is limited to spent lubricating oil/lubricants, spill kits, empty paint cans. The proposed Hazardous Waste Management Plan for the safe disposal of such waste shall be including, but not limited to: ▪ According to Annex 8 of the Executive regulations of the waste Management law, the contractor is required to keep records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such waste. ▪ Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled and stored. MSDSs should be readily accessible to employees in their local language.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	▪ Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated. **II. <u>Wastewater</u>** During the operation and maintenance phase, the wastewater generated will primarily consist of domestic wastewater, which will be discharged into the existing sewage network. Additionally, the wastewater from e-bus washing activities will amount to approximately 150 liters per bus per wash per day. About 70% of this wastewater will be treated and reused for subsequent washing processes. The final discharge from the washing area will be directed through the drainage system linked to the existing sewage network connected to the public network, on condition that the treated WW complies with the permissible limits of decree 44 of the year 2000 concerning the discharge of industrial WW to the sewage system
Residual impact	Negative, low, long term
Methods of monitoring	▪ Review of maintenance records for buses (up to code etc.) ▪ Review the ER ▪ Review the waste and the scrap receipts/ records ▪ Review of grievances
Monitoring frequency	▪ Daily visual inspection of site and surrounding and temporary waste storage area ▪ Weekly inspection of waste registers/receipts ▪ Weekly for the complaints
Monitoring Indicators	▪ Implementation of waste management plan including verification of records of delivery at final disposal sites, waste generated, contract validity with authorized waste collection contractor. ▪ Implementation of water management plan and energy management plans ▪ Maintenance checks ▪ Number of grievances/complaints
Monitoring location	▪ Project site and surrounding (incl. any dedicated temporary waste storage areas) ▪ Databases and record keeping files
Responsibility and Staffing Requirement for Mitigation	CTA will be responsible for monitoring the activities during the operation of the depot and after the completion of GCCC project.
Estimated cost (EGP)	▪ CTA hiring of environmental specialists for development of waste, energy and water management plans ▪ Contract with disposal site; estimated waste generation and transfer to disposal site costs Included in the CTA operation and maintenance cost

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
NDR2	**Natural Disaster Risks / Emergency Situations**
Mitigation measures	The CTA shall prepare and implement an Occupational Health and safety Management Plan including an emergency response plan that provides site-specific procedures, so workers know what is expected and what to do in the event of an emergency. The plan shall be able to manage emergency events by prevention, mitigation, preparedness, response and recovery. The plan shall take into consideration the following: ▪ Hazard identification/assessment ▪ Excessive Heat Waves and rain ▪ Emergency resources ▪ Emergency plans will include specific procedures for natural disasters such as earthquakes, floods, and storms. ▪ Thermal runaway mitigation measures will include fire-resistant battery enclosures and thermal insulation to prevent overheating caused by natural disasters. ▪ The emergency spillage contingency plans ▪ Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated ▪ Provision for rescue and contact, if necessary, with the emergency services ▪ Communication systems ▪ Administration of the plan ▪ Emergency response procedure ▪ Communication of the procedure ▪ Including evacuation routes and procedures. ▪ Provide guidelines for immediate first-aid treatment for injuries / accidents sustained during emergencies ▪ Include the location of first aid kits and assign trained personnel to provide medical assistance until professional help arrives. ▪ Maintain readily accessible fire extinguishers, spill containment kits, personal protective equipment (PPE), and other emergency tools. Other mitigation measures: • Conduct risk assessments and update disaster preparedness plans regularly. ▪ Create firebreaks around the depot to prevent the spread of fires. ▪ Collaborate with local authorities and emergency services for coordinated disaster response efforts. ▪ A new technology for washing buses will be utilized which will minimize the amount of water used and accordingly the amount of wastewater generated by better used water treatment and recycling. About 70% of wastewater will be reused for washing. ▪ Develop water conservation strategies and contingency plans for water shortages. ▪ Create firebreaks around the depot to prevent the spread of fires. ▪ Thermal runaway mitigation measures will include fire-resistant battery enclosures and thermal insulation to prevent overheating.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	▪ Regular maintenance and inspection of the battery systems will be performed to ensure they are functioning within safe operational limits. ▪ In case of battery failure or overheating, an emergency shutdown procedure will be put in place to isolate the battery and prevent further damage or fire. ▪ Hazardous materials used in bus maintenance (e.g.: coolants, cleaning agents) will be stored in designated areas with proper containment systems to prevent spills from spreading. ▪ Charging stations and electrical systems will be equipped with fire suppression systems (such as fire extinguishers, foam, or water-based systems) designed to handle electrical fires. ▪ For combining firefighting and domestic water supplies in a single underground tank to prevent mixing, a system will be implemented where, after a certain water level is reached, the domestic water pump will stop functioning, ensuring only the firefighting pump remains operational. This setup, which is standard practice in similar projects across Egypt, helps mitigate issues such as water contamination, ensures proper pressure and flow for both firefighting and domestic use, and reduces maintenance complications.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Periodic checks of the emergency response plan implementation, ▪ A system for reporting any incidents, including near misses, spills, chemical emergencies, and natural disaster events. ▪ Communication System Checks ▪ Maintenance Logs Follow up the following: ▪ Cables conditions ▪ Remote Terminal Unit (RTU) ▪ Fire Alarm Control Panel ▪ Accident and Incident report
Monitoring frequency	▪ Daily ▪ Monthly for the maintenance reports and accident & incident report
Monitoring indicators	▪ Weather forecast ▪ Battery status ▪ Signal strength ▪ Fault signals (open circuits, short circuits)
Monitoring location	Onsite
Responsibility and Staffing Requirement for Mitigation	CTA will be responsible for monitoring the activities during the operation of the depot and after the completion of GCCC project.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
OHS2	**Occupational Health and Safety**
Mitigation measures	Workers are exposed to different hazards including heat, electric field and confined spaces. The CTA shall develop and implement an Occupational Health and Safety (OHS) plan. The plan shall include at the minimum the following mitigation actions to avoid such hazards: • Presence of remarkable sidewalk for safe pedestrian walk inside the depot • Erect clear signs along the sidewalk for the pedestrians' safety • Provide pedestrian gates spate from the vehicle gates Other mitigation measures: • **Posted Speed Limits:** - Internal roads inside the depot: Maximum 30 km/h. - Within the depot: Maximum 20 km/h. • **Traffic Management:** - Erect clear signs indicating the buses and passenger cars lanes inside the depot as well as pedestrian sidewalk. • **Training and Awareness:** - Training should include basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disasters. • **Working Conditions:** - Ensure adequate temperature and lighting inside the depot workshops. • **First Aid:** - Qualified first-aid should be provided at all times inside the depot. • **Personal Protective Equipment (PPE):**

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	- Active use and regular maintenance of PPEs (e.g., protective gloves against heat, safety shoes, shielding materials in electric and magnetic field areas). • **Safety Measures:** - Permit-required confined spaces should have permanent safety measures for venting, monitoring, and rescue operations. - Workplaces must be equipped with collective and individual protection means, primary firefighting equipment, and communication and signaling equipment. • **Fire Safety:** - Ensure fire extinguishers are well maintained, ready to use and distributed adequately. - Obtain Civil Defense Approval (CDA) to ensure an efficient firefighting system. • **Handling Hazardous Materials:** - Training should include information from Material Safety Data Sheets (MSDSs) for hazardous materials to minimize waste from improper handling and storage. MSDSs should be readily accessible in the local language. - Incorporate response activities for spills, releases, or other chemical emergencies. - The project will establish a grievance mechanism for workers, The grievance mechanism will be regularly communicated to all stakeholders and will provide a clear, transparent process for addressing and resolving complaints
Residual impact	Negative, moderate, long term
Methods of monitoring	▪ Records about occupational injuries and infectious diseases among workers ▪ Inspection of insurance policies and attendance sheets ▪ Compliance Checks ▪ Grievance mechanism.
Monitoring frequency	▪ Daily site inspection and surrounding ▪ Weekly inspection of training records
Monitoring indicators	▪ Occupational health and safety incident reports ▪ Medical reporting on received cases ▪ No accidents ▪ Number of Job Hazard Analysis

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	▪ Number of Toolbox Talks- on the job training ▪ Number of Permit to work issued/ closed ▪ Number of unsafe actions/ conditions ▪ Number of checklists completed ▪ Number of trainings delivered ▪ Number of safety induction against workforce ▪ Number of medical checkup and drug test ▪ Number of safety signs and guidance ▪ Number of welfare facilities ▪ Number of OHS supervisors ▪ Number of safety audits against OHS plan ▪ Number of safety breaches by ISC and closed by the contractor ▪ Clear and accessible grievance channels to all workers, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints ▪ Internal grievance logs ▪ Number and type of workplace complaints received and resolved ▪ Response timeline for resolution of complaints ▪ CDA approval on firefighting system for the developers
Monitoring location	▪ Depot
Responsibility and Staffing Requirement for Mitigation	▪ CTA is responsible for handling workplace grievances for all types of workers during operation. ▪ CTA is typically responsible for ensuring that the Occupational Health and Safety (OHS) plan is developed, approved, and monitored. This includes overseeing the implementation of the mitigation measures and ensuring that contractors and other stakeholders adhere to safety standards.
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
LFB2	**Labor Force Behavior**
Mitigation measures	CTA to: ▪ Ensure timely and transparent communication with all affected employees about the repositioning process, timelines, and expectations. This includes providing detailed information on the new work tasks and any changes in job responsibilities. ▪ Train maintenance staff on e-bus diagnostics, battery management systems (BMS), and handling high-voltage components. ▪ Conduct regular performance reviews for maintenance staff. ▪ Develop and implement corrective actions if any unforeseen issues arise during or after the repositioning process. ▪ Ensure an accessible and anonymous grievance mechanism for workers to report any difficulties in work.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
Residual impact	Negative, moderate, long term
Methods of monitoring	▪ Conduct regular performance reviews for employee and maintenance staff. ▪ Consultation Records: Maintain detailed records of all consultation sessions held with employees, including attendance, key issues discussed, and agreed-upon actions. ▪ Number of incidents due to dealing with chargers / washing machine or any new technology
Monitoring frequency	▪ Weekly
Monitoring indicators	▪ Internal grievance logs ▪ Percentage of drivers and maintenance staff who have completed required training programs. ▪ Number of operational incidents linked to inadequate training or driver behavior. ▪ Number and type of workplace complaints received and resolved ▪ Response timeline for resolution of complaints
Monitoring location	▪ Depot,
Responsibility and Staffing Requirement for Mitigation	▪ CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost system
CHS2	**Community Health and Safety**
Mitigation measures	CTA to: ▪ Equip charging stations and maintenance areas with automatic fire detection and suppression systems. This includes the use of fire-resistant materials, fire alarms, and extinguishers designed specifically for electrical fires. ▪ Training of drivers on defensive driving practices ▪ Conduct routine checks and maintenance of charging infrastructure, cables, and connectors to ensure they are in good working condition. ▪ Train workers and staff on emergency response procedures, including handling electrical fires and using firefighting equipment. ▪ The project will establish a grievance mechanism for workers and community members, ensuring anonymity, confidentiality, and accessibility for all, including people with disabilities. The mechanism will be gender-sensitive, with special considerations for handling grievances related to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH). The grievance mechanism will be regularly communicated to all stakeholders and will provide a clear, transparent process for addressing and resolving complaints
Residual impact	Negative, low, long term
Methods of monitoring	▪ Perform scheduled tests of alarms and extinguishers.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
	▪ Maintain detailed logs of all inspections, tests, and maintenance activities to track compliance and identify areas needing attention. ▪ Conduct regular visual inspections and operational tests on all charging infrastructure components, including cables and connectors. ▪ Incident Reporting: Establish a system for reporting and addressing any issues. ▪ Grievance mechanism.
Monitoring frequency	▪ Weekly inspections and monthly system tests for fire detection and suppression systems. ▪ Daily visual inspections and weekly diagnostic checks for charging infrastructure and equipment.
Monitoring indicators	▪ Operational status of alarms and extinguishers. ▪ Response times of suppression systems during tests. ▪ Number of faults detected in cables, connectors, and charging stations. ▪ Frequency of maintenance or repair activities. ▪ No accidents ▪ Clear and accessible grievance channels to all workers, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints ▪ Internal grievance logs
Monitoring location	▪ Depot,
Responsibility and Staffing Requirement for Mitigation	▪ CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost system
RS2	**Road Safety**
Mitigation measures	CTA to: ▪ Implement strict speed limits and install clear traffic signage inside and around the depot. ▪ Ensure adequate lighting and security cameras to enhance visibility and safety. ▪ Conduct driver training on safe depot navigation and pedestrian awareness. ▪ The project will establish a grievance mechanism for workers and community members, ensuring anonymity, confidentiality, and accessibility for all
Residual impact	Negative, low, long term
Methods of monitoring	▪ CCTV surveillance for real-time monitoring of bus movements. ▪ Incident Reporting: Establish a system for reporting and addressing any issues. ▪ Grievance mechanism.
Monitoring frequency	▪ **Daily monitoring** by depot managers and safety officers.

CODE	Environmental and Social Component During the operation and Maintenance activities of the depot
Monitoring indicators	▪ Number of reported incidents or near-miss collisions inside the depot. ▪ Clear and accessible grievance channels community, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints
Monitoring location	▪ Depot,
Responsibility and Staffing Requirement for Mitigation	▪ CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost system

Table 7-3 Environmental and social management plan for the proposed project during operation and maintenance phase of E-buses

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
AQ2	Air Quality
Mitigation measures	▪ **Energy Source Diversification:** Advocate for the use of renewable energy sources for charging stations to reduce reliance on fossil fuels. ▪ **Charging Efficiency:** Implement efficient charging practices to minimize energy consumption and emissions. ▪ **Energy Monitoring:** Install energy consumption monitoring systems to optimize charging schedules, reducing peak load and associated emissions. ▪ **Maintenance of Charging Equipment:** Regular maintenance of charging infrastructure to prevent energy loss and ensure efficient operation.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Inspection of vehicles, Emission Calculations and Energy Audits
Monitoring frequency	▪ Daily visual inspection ▪ Monthly for the Energy audits. ▪ Annual emission calculations.
Monitoring Indicators	▪ Energy Consumption ▪ GHG Emission
Monitoring location	Onsite and surrounding

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
Responsibility and Staffing Requirement for Mitigation	CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
RP2	Resource Efficiency and Pollution Prevention: Energy, Water, Raw Materials, and Waste/Scrap Management
Mitigation measures	**A) <u>Resource Efficiency</u>** **Electricity Consumption** ▪ Regular maintenance to ensure efficient operation of depot and buses, which means efficient energy use. ▪ Installation of light sensors to switch off during the day. ▪ Installation of energy-efficient lighting, heating, ventilation, and air conditioning (HVAC) systems. ▪ Improve insulation in walls, roofs, and windows to reduce heat loss in winter and heat gain in summer. ▪ Seal gaps and cracks around doors and windows to prevent air leaks. ▪ Use smart charging systems for electric buses that optimize charging times to take advantage of off-peak electricity rates. ▪ Implement demand response strategies to reduce electricity use during peak demand periods. ▪ Use energy-efficient motors and machinery. ▪ Implement energy-saving technologies such as variable frequency drives (VFDs) for motors. **<u>Spare Parts and Raw Materials</u>** ▪ Source materials locally and consider eco-friendly alternatives to reduce environmental impacts, whenever possible. ▪ Apply a return policy for unused items/chemicals before their expiry date, whenever possible. ▪ Implement a robust inventory management system to track and control spare parts usage, ensuring that only necessary parts are ordered and used. ▪ Recondition and refurbish used parts whenever possible instead of replacing them with new ones. **<u>Waste/Scrap:</u>** Tires and Renovation and maintenance materials (HDPE pipes, valves, cables) To be sold to certified recycling contractors or disposed of via license waste contractor. E-bus batteries to be recycled by vehicle manufacturers / sending back to the supplier.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Review of maintenance records for buses (up to code etc.) ▪ Review the ER

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Review the waste and the scrap receipts/ records ▪ Review of grievances
Monitoring frequency	▪ Daily visual inspection of site and surrounding and temporary waste storage area ▪ Weekly inspection of waste registers/receipts ▪ Weekly for the complaints
Monitoring Indicators	▪ Implementation of waste management plan including verification of records of delivery at final disposal sites, waste generated, contract validity with authorized waste collection contractor. ▪ Implementation of water management plan and energy management plans ▪ Maintenance checks ▪ Number of grievances/complaints
Monitoring location	▪ Project site and surrounding (incl. any dedicated temporary waste storage areas) ▪ Databases and record keeping files
Responsibility and Staffing Requirement for Mitigation	CTA
Estimated cost (EGP)	▪ CTA hiring of environmental specialists for development of waste, energy and water management plans ▪ Contract with disposal site; Estimated costs for waste generation and transportation to the disposal site. Included in the CTA operation and maintenance cost
NDR2	**Natural Disaster Risks / Emergency situations**
Mitigation measures	CTA shall prepare and implement an Occupational Health and safety Management Plan including an emergency response plan that provides site-specific procedures, so drivers know what is expected and what to do in the event of an emergency. The plan shall be able to manage emergency events by prevention, mitigation, preparedness, response and recovery. The plan shall take into consideration the following: ▪ Hazard identification/assessment ▪ Emergency resources ▪ Emergency response to respond to different risks including natural disasters ▪ Communication systems ▪ Administration of the plan ▪ Develop clear evacuation procedures for passengers in the event of an emergency, ensuring that all personnel are familiar with the emergency exits, muster points, and actions to take. ▪ Communication of the procedure

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Including evacuation routes and procedures. ▪ Including posters and labels for emergency and fire response procedures Other mitigation measures: ▪ Implementing advanced cooling systems for the e-buses and charging stations to prevent battery overheating. ▪ Ensure that air conditioning (AC) systems are functioning efficiently to prevent overheating of bus interiors and batteries during extreme heat. ▪ Provide shading for bus parking areas to minimize direct exposure to sunlight ▪ Equip buses with proper rainproofing measures. ▪ Train drivers and staff to manage operations safely during heavy rain and in wet road conditions to avoid accidents and breakdowns. ▪ Equip electric buses and charging stations with emergency shutdown systems to isolate overheating batteries and prevent fire or explosion.
Residual impact	Negative, low, long term
Methods of monitoring	▪ Cables conditions ▪ Remote Terminal Unit (RTU) ▪ Fire Alarm Control Panel ▪ Accident and Incident report
Monitoring frequency	▪ Daily ▪ Monthly for the maintenance reports and accident & incident report
Monitoring indicators	▪ Weather forecast ▪ Battery status ▪ Signal strength ▪ Fault signals (open circuits, short circuits)
Monitoring location	Onsite
Responsibility and Staffing Requirement for Mitigation	CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
OHS2	**Occupational Health and Safety**
Mitigation measures	▪ The CTA shall develop and implement an Occupational Health and Safety (OHS) plan. The plan shall include at the minimum the following mitigation actions to avoid such hazards:

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Mitigation measures for OHS shall include at the minimum: ▪ Training drivers on defensive driving practices, including maintaining safe following distances, avoiding distractions (such as mobile phone use), and adhering to traffic safety rules and regulations., and also training on traffic safety rules and measures (e.g., leave safe distance and avoid distractions with mobile phones) ▪ Set penalties for drivers who violate travel rules ▪ Ensure that all drivers of electric buses are trained in high-voltage safety. This includes recognizing hazards associated with high-voltage components and using insulated tools and equipment designed for high-voltage work. ▪ Train drivers and maintenance staff on the impacts of heavy battery weight on vehicle handling. Adjust driving techniques and maintenance procedures to account for this weight, particularly during maneuvers or emergency stops. ▪ Carry out regular maintenance and inspection of buses to ensure that mechanical failures, such as brake malfunctions, do not occur. ▪ Equip buses with advanced monitoring systems that detect mechanical issues in real-time, allowing for quick repairs before failures lead to accidents. ▪ The braking system shall be designed to offer maximum safety, with features such as (but not limited to): ▪ Compliance with international safety standards. ▪ A Halt Brake For effective immobilization. ▪ An anti-roll system to prevent unintentional vehicle movement on slopes. ▪ Install GPS tracking systems in buses to monitor and analyze driving routes, ensuring drivers follow the safest and most efficient routes. ▪ Equip buses with emergency response tools such as fire extinguishers, first aid kits, and reflective safety vests. ▪ Develop emergency response protocols for accidents or mechanical failures on the road. Train drivers and onboard staff on how to manage emergency situations, including the safe evacuation of passengers. ▪ A simple video protection system shall be installed, with an easily accessible recorder for the removal of the hard disk. ▪ Provide health checks for drivers to ensure they are fit for duty, particularly focusing on conditions like high blood pressure or vision impairments that could affect driving performance. ▪ Support the mental health of drivers through wellness programs, offering access to counseling services and stress management resources. ▪ Equip buses with three-point safety belts for the driver. ▪ Other mitigation measures: ▪ Working Conditions: ▪ Ensure adequate temperature and lighting inside the e-buses. ▪ Main roads: Maximum 80 km/h as there are no intersections or pedestrian movements. ▪ Safety Measures: ▪ E-buses should be equipped with necessary means of protection and emergency response equipment.

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ The project will establish a grievance mechanism for workers and will provide a clear, transparent process for addressing and resolving complaints.
Residual impact	Negative, moderate, long term
Methods of monitoring	▪ Vehicle Safety Inspections ▪ Accident and Incident Reporting ▪ Grievance Mechanism ▪ Driver Behavior Monitoring
Monitoring frequency	▪ Daily site inspection and surrounding ▪ Weekly inspection of training records ▪ Daily vehicles inspection
Monitoring indicators	▪ Occupational health and safety incident reports ▪ Medical reporting on received cases ▪ No accidents ▪ Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs ▪ Clear and accessible grievance channels to all workers, i.e., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints ▪ Internal grievance logs ▪ Number and type of workplace complaints received and resolved ▪ Response timeline for resolution of complaints ▪ CDA approval on firefighting system for the developers ▪ Vehicles inspection records
Monitoring location	▪ Depot, ▪ Databases/register for vehicles inspection, grievances, incident/accidents, medical check-up, training
Responsibility and Staffing Requirement for Mitigation	▪ CTA is responsible for handling workplace grievances of direct workers. ▪ O/M- TIU responsible for handling grievances for all types of workers during operation.
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
LFR2	**Labor Force Behavior**
Mitigation measures	CTA to: ▪ Provide in-depth training programs to ensure drivers are familiar with the e-bus operation, including its unique features and systems (e.g., battery management, charging protocols).

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Focus on both technical and non-technical aspects, including customer service, especially for vulnerable users (e.g., females, persons with disabilities) ▪ Set up a driver support hotline where new drivers can call in for immediate assistance or guidance when they face operational difficulties. ▪ Create a comprehensive, easy-to-follow manual for drivers outlining the key differences in operating e-buses, such as energy-efficient driving techniques, how to operate charging stations, and handling malfunctions or technical issues. ▪ Monitor buses operation using cameras. ▪ Implement regular checks to assess bus performance and ensure the technology is functioning properly. This includes monitoring for any malfunctions or issues that could impact passenger safety or comfort ▪ Set up a grievance mechanism for bus users to provide feedback on the operation, particularly on driver behavior and comfort, to identify areas for improvement.
Residual impact	Negative, Moderate long term
Methods of monitoring	▪ Driver Performance Review ▪ Passenger Feedback Collection/grievance mechanism ▪ Bus performance data, including issues such as malfunctions, breakdowns, and battery efficiency
Monitoring frequency	▪ Weekly
Monitoring indicators	▪ Driver Training Completion Rate ▪ Passenger Satisfaction ▪ Operational Issues ▪ Battery and System Performance ▪ No accidents ▪ Surveys ▪ Internal grievance logs
Monitoring location	• Depot,
Responsibility and Staffing Requirement for Mitigation	• CTA
CHS2	**Community Health and Safety**
Mitigation measures	▪ Implement comprehensive driver training programs that focus on safe driving practices, awareness of high-risk areas (e.g., schools, pedestrian crossings), and emergency response skills. ▪ Implement speed limits and traffic calming measures in areas with high pedestrian traffic to reduce the risk of accidents.

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Regularly maintain and inspect buses to ensure that tires and brake systems are in good condition, reducing dust from tire wear where Inspection should cover all functions based on pre and post checklist ▪ Ensure all buses are equipped with functional separate entry and exit doors, regularly maintained to avoid malfunctions. ▪ Train bus drivers to fully stop during passenger boarding and disembarking, ensuring passenger safety, particularly for vulnerable groups such as children, the elderly, and persons with disabilities. ▪ Install monitoring devices like cameras to monitor and deter incidents of harassment, theft, or other forms of misconduct ▪ Implement a traffic management plan to optimize bus routes and reduce unnecessary or frequent stops ▪ Introduce gender-sensitive training for drivers and conductors to help identify and prevent harassment ▪ Ensure all buses are equipped with sufficient lighting, particularly during nighttime operations, to improve safety and visibility for passengers ▪ Provide training for bus staff on how to handle cases of bad behavior and implement disciplinary actions where necessary. The project will establish a grievance mechanism for workers and community members, ensuring anonymity, confidentiality, and accessibility for all, including people with disabilities. The mechanism will be gender-sensitive, with special considerations for handling grievances related to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH). The grievance mechanism will be regularly communicated to all stakeholders and will provide a clear, transparent process for addressing and resolving complaints
Residual impact	Negative, lower significance than before, long term
Methods of monitoring	Maintain detailed records of defensive driving programs, including attendance, completion rates, and test scores. ▪ Conduct regular performance evaluations of drivers to assess adherence to safe driving practices and emergency response protocols. ▪ Monitor and analyze traffic incident reports involving buses to identify any correlation with driver behavior or training deficiencies. ▪ Gather feedback from community members and local stakeholders regarding traffic conditions and pedestrian safety near high-risk areas. ▪ Keep comprehensive maintenance logs detailing routine inspections, repairs, and replacements of tires, brake systems, and other critical components.
Monitoring frequency	• Monthly or quarterly performance evaluations. Implement In-Vehicle Monitoring System (IVMS) where: Continuous monitoring through speed monitoring devices. Continuous monitoring of traffic incidents and analysis reports.

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	Regular and ad hoc drug testing. Number of Speeding violations Grievance Mechanism: number of theft incidents and number of harassment complaints
Monitoring indicators	▪ Number of drivers trained and certified. ▪ Driver test scores and performance evaluation results. ▪ Community feedback on perceived safety improvements or concerns (users satisfaction surveys). ▪ Reporting of traffic accidents versus number of trips performed safely ▪ External grievance logs ▪ Drug test results ▪ Harsh acceleration/ deceleration report ▪ Passenger evaluation survey ▪ No. of pre-post checklist ▪ No. of trips completed safely
Monitoring location	▪ Depot,
Responsibility and Staffing Requirement for Mitigation	▪ CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
RS2	**Road Safety**
Mitigation measures	The increase in the number of e-buses and the number of the e-buses' passengers taking into consideration the model shift scenario, the CTA shall develop a traffic management and contingency plans The objective of the traffic management plan is to ensure safety and smooth traffic flows on roads. While the contingency plan shall include studying different scenarios including, but not limited to the following: ▪ Selecting e-buses with riders' capacity bigger than the current diesel buses, if possible. ▪ Increase the number of buses on the 5 selected routes by providing NG buses from other depots. This scenario shall be the last one to be considered by the CTA.
Residual impact	Mitigation measures will reduce impacts of T2 to low.
Methods of monitoring	▪ Traffic flow assessments ▪ Bus frequency

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Traffic management and contingency plans
Monitoring frequency	▪ Weekly: Monitor passenger counts, bus frequency, and traffic flow. ▪ Monthly: Review road safety records, journey times, and traffic management plan implementation.
Monitoring indicators	▪ Traffic Flow ▪ Bus Frequency ▪ Passenger Load Factor
Monitoring location	Depot: Documentation system including the developed plans Routes: applying the plans
Responsibility and Staffing Requirement for Mitigation	CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost
GBV & SEA-SH 2	**Gender-Based Violence (GBV2) and Sexual Exploitation and Abuse/Sexual Harassment (SEA-SH2)**
Mitigation measures	▪ Implement and enforce a strict Code of Conduct for drivers and all staff, outlining zero tolerance for GBV and SEA-SH. ▪ Provide training and awareness sessions for bus drivers and conductors on preventing GBV and SEA-SH, including appropriate intervention methods. ▪ Equip buses with CCTV cameras for monitoring and deterring harassment incidents, ensuring footage is regularly reviewed. ▪ Establish a dedicated, anonymous, and accessible grievance mechanism for female passengers to report incidents safely and confidentially. ▪ Conduct random inspections and monitoring to ensure compliance with safety protocols and anti-harassment measures. ▪ Strengthen coordination with law enforcement to ensure immediate response to reported cases of harassment or violence. ▪ Launch public awareness campaigns targeting all bus users to promote respectful behavior and increase awareness about GBV and SEA-SH prevention.
Residual impact	Mitigation measures will reduce impacts of GBV & SEA-SH 2 to low.
Methods of monitoring	▪ Review of CCTV footage ▪ Passenger satisfaction and safety surveys ▪ Grievance reports ▪ Training attendance records
Monitoring frequency	▪ CCTV footage review: Weekly or in response to reported incidents. ▪ Passenger surveys: Bi-annually (every 6 months). ▪ Grievance mechanism tracking: Monthly analysis of complaints and resolutions.

CODE	Environmental and Social Component During the operation and Maintenance activities of E-buses
	▪ Bus inspections and audits: Monthly or as part of routine maintenance checks.
Monitoring indicators	Number of SEA/SH complaints received
Monitoring location	Buses
Responsibility and Staffing Requirement for Mitigation	CTA
Estimated cost (EGP)	Included in the CTA operation and maintenance cost

7.3.1 ESMP Budget

Estimated costs for implementation of the ESMP include monitoring activities and institutional strengthening and capacity building activities (in the form of training) and are presented in the following table.

Table 7-4 Proposed budget for ESMP

Item	Details	Estimated Cost (EGP)
Monitoring requirements during construction and operation		
Air quality measurements	3 measurements monthly for 6 months SO2, CO, NO, NO2, NOx, O3, PM10, TSP	216 000 EGP/ 6 months
Noise and vibration measurements	3 measurements monthly for 6 months	216 000 EGP/6 months
Monitoring of vehicles	Installments of GPS to track vehicles routes and distances	5000 EGP/truck 25 000 EGP
Supervision and monitoring of implementation of ESMP during decommissioning and construction activities.	Supervision Consultant: External hire of 3 specialists by private contractor: OHS, environmental and social development specialists (Assuming 6 months DC/C/)	20 000/month per specialist 360 000 EGP/6 months
Supervision and monitoring of implementation of ESMP during operation and maintenance phase.	CTA EHS specialist (operation and maintenance) during lifetime of E-bus demonstration project Social and gender development specialist 2 professors of automotive mechanics engineering at Ain Shams University have been contracted to provide technical advice to the Technical Implementation Unit and supervise the project work.	960 000 EGP/year
Capacity building and training		
ESIA/ESMP: ES impacts and mitigation, compliance with local regulations, WB Standards, Good practice notes; Grievance mechanism process, all management plans referenced in ESMP	3 days	60 000 EGP/ 3 days

Item	Details	Estimated Cost (EGP)
Implementation of LMP (as per ESMF and present ESMP), notably, Code of Conduct; prevention of COVID, prevention of GBV	2 days	40 000 EGP/ 2 days
Implementation of SEP (referenced in ESMP)	1 day	20 000 EGP/ 1 day
Monitoring and Evaluation for Field Inspection on implementation of ESMP	1 day	20 000 EGP/ 1day
Monitoring and evaluation of progress report	1 day	20 000 EGP/ 1 day
Total Cost[25]		1 937 000 EGP for year 1

The proposed budget for the ESMP covers only a one-year implementation period. Any delays in project execution beyond this timeframe will result in additional costs, which will need to be reassessed and allocated accordingly.

7.4 Institutional Strengthening, Capacity Building, and Training for Implementation of ESMP

Monitoring and evaluation of ESMP implementation will be performed by Team Leader and Environmental and Social Focal Points/Officers of the TIU and by the Environmental and Social Specialists at the PCU. The TIU Team Leader and Environmental and Social Focal Points/Officers should be trained on principles of ESF to understand applicable ESSs to the project and associated environmental and social receptors affected by activities and related indicators to assess compliance with ESMP (and plans therein) of identified receptors, trained to conduct site visits for field monitoring using checklist, trained on preparation of monthly progress reports on implementation of ESMPs and for submission to PCU, knowledge on specified management plans consisting of emissions control plans, resources (energy, water, etc.) management plan, waste management plans, etc.

The following table defines the roles and responsibilities for the implementation of the ESMP during the decommissioning / construction and operation phases:

[25] The proposed budget for the ESMP covers only a one-year implementation period. Any delays in project execution beyond this timeframe will result in additional costs, which will need to be reassessed and allocated accordingly.

Table 7-5 Responsibilities during phases of the project

Phase	Entity	Key Responsibilities	Monitoring and Supervision	Reporting
Decommissioning/ Construction	Contractor	Implement ESMP and comply with ESSs. Develop and implement all needed management plans. Ensure all workers and subcontractors comply with the ESMP requirements.	Contractor reports to supervision consultant, then the consultant will review and send his comments to the contractor to be addressed, then the supervisor will submit the cleared report to the PCU and the TIU.	**Supervision consultant** reports to **TIU**. TIU submits reports to **PCU**.
Operation (First Year)	Consultant	Supervise works and ensure compliance with Environmental and Social Framework (ESF) of the World Bank as pertaining to the project as well as the prepared ESIA Support the implementation of Grievance Redress Mechanism in compliance with the Environmental and Social Commitment Plan of the project, LMP and GRM report of Component 3	Consultant ensures compliance with **all management plans**	**Consultant** submits reports to **TIU** and **PCU**.
Long-Term Operation	CTA	Take over operational Responsibilities after the first year. Ensure long-term monitoring of the depot and e-buses operation in compliance with the ESMP.	**CTA** manages day-to-day operations and compliance monitoring after the first year.	**CTA** reports to **PCU until completion of GCCC project**.

To strengthen the ESMP, the project can explore ways to support the CTA in establishing the GM earlier, possibly during the late construction or pre-operational phase. This could involve:

- Capacity Building & Training by Providing technical assistance to CTA on best practices for GM implementation, including digital complaint tracking and resolution mechanisms.
- Encouraging CTA to engage early with customers and stakeholders to design an accessible and effective GM.
- Establishing a preliminary grievance system during the initial deployment of buses to test and refine the mechanism before full-scale operation.

The training topics and recipients are presented in the following table. The contractor/TIU and PCU will be responsible for implementation of the ESMP by all workers.

Table 7-6 Training Plan for Implementation of ESMP

Training topic	Contractor	TIU	PCU
ESIA/ESMP: implementation of mitigation measures, compliance with local regulations, WB standards, good practice notes; grievance mechanism process, all management plans referenced in ESMP; description of roles and responsibilities	Yes	Yes	Yes
Implementation of LMP (as per ESMF and present ESMP), notably, OHS plan, code of conduct; prevention of COVID, prevention of GBV, emergency response plan,	Yes	Yes	
Implementation of SEP (referenced in ESMP); engagement plans; grievance mechanisms	Yes	Yes	
Monitoring and evaluation for field inspection on implementation of ESMP; use of ESMP compliance checklist; report drafting		Yes	
Monitoring and evaluation of progress report			Yes

Appendix P includes Indicative checklist to guide field monitoring (to be used by TIU)

7.4.1 ESMP implementation report indicative outline

According to the project ESCP, the contractor is requested to submit a monthly E&S progress report. Thus, it is required that contractors and the supervising firms to provide monthly progress reports on ESHS performance in accordance with the metrics specified in the respective bidding documents and contracts. The reports shall be reviewed and verified by the TIU and the PCU. The ESMP implementation report shall report on status of implementation of mitigation measures, compliance with local and WB regulations, where applicable, on internal and external grievances and associated response measures and time and preventative measures, any accidents and associated corrective actions, any incidents of non-compliance.

The ESMP implementation report outline includes:

- Executive summary
- Scope of the Report
- Key Activities
- Monitoring Overview
- Compliance and Corrective Actions
- A summary of complaints or grievances received and how they were addressed.
- Training and Capacity Building
- Evidence and Attachments

8 Stakeholders Consultations and Public Disclosure

8.1 Stakeholders Identification and Analysis

8.1.1 Primary Stakeholders

Primary stakeholders are the beneficiaries of a development intervention (the E-bus Project) who will be directly affected, positively or negatively. These include the following groups:

1 Bus users

Bus users are the main beneficiaries of operating E-buses. They will experience better transportation journeys; less noise and air pollution during the ride, more comfortable seats, WIFI, and air conditioning inside buses. Bus users include all passengers likely to use the E-bus. Special attention will be given to a) women, pregnant women, women with babies, children b) vulnerable groups, e.g., elderly, people with disabilities, and c) university students and school pupils who are expected to use E-buses on regular basis during the academic year.

2 Local communities

Local communities are most impacted and intended final beneficiaries of the introduction of the E-buses. They will be interested in the project's impact on air quality, noise levels, and overall quality of life, as well potentially expecting improved quality of service. However, local communities in the close vicinity of the depot are likely to be negatively affected by noise and traffic congestion, especially at the beginning and the ending of bus operating hours. CTA routes cover the entirety of the Greater Cairo Region (GCR). As such, the entire population of the GCR are potential beneficiaries of the implementation of the E-Buses. This can be narrowed down to the citizens living in the vicinity of the routes to be electrified following application of the Multi-Criteria Analysis and Route Choice.

3 Employees and Workers Unions

Employees and workers unions are primary stakeholders in the project, as they will be impacted by the introduction of the E-buses. Bus drivers in specific will be interested in the project's impact on their job security and working conditions, as well as the training needs and support provided for the transition.

4 Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs)

Organizations with direct interest in the project and which may have useful data or insight into local issues of relevance to the project. These organizations can also influence the views of others regarding the project, nationally and internationally. Representing local communities' interests and also responsible of sharing information with the community.

8.1.2 Secondary Stakeholders

Secondary stakeholders include agencies, experts, interested parties and anyone able to influence the outcome of the development, because of their ability to contribute with their knowledge or ideas to improve the design, or because of their ability to provide mitigations of environmental and social impacts, or because of their influence on the development; and also, those likely to be indirectly affected by the project. They include Central Government, line ministries, local government/authorities, implementing agencies, project staff, active Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs), private sector firms, WB and its stakeholders, pertinent development agencies, Media, and Academia. Secondary stakeholders of this project include the following groups:

1 Beneficiary Institutions

Key direct secondary stakeholders are beneficiary institutions, in specific, the Cairo Transport Authority (CTA); the Technical Implementation Unit (TIU) and Project Implementation Unit (PCU); the Client, specifically the Egyptian Ministry of Environment (MoE), and it's implementing Agency, the Egyptian Environmental Affairs Agency (EEAA); and Funding agency, the World Bank.

8.1.3 Public Officials

This group includes all those who are responsible for politically championing, funding and approving the E-Bus implementation project, as well as regulating the wider energy and transportation industries. Government officials are typically interested in the project's technical and financial feasibility, environmental impact, and any economic benefits as well as adverse consequences it might bring. Typically, city-level officials are primary stakeholders. In Egypt national-level decision makers often are primary stakeholders. The project level SEP identifies the following relevant public officials:

1 The Egyptian Cabinet and Prime Minister's (GoE-PM) office

Political priority is assigned to the electrification of transport in general, and passenger bus transport in particular, by the highest level of political decision making. This was first championed with the Executive decision to procure 140 Electric Buses for Operation at the COP27 Climate Change conference in Sharm El-Sheikh.

1 Line Ministries

Ministry of Environment - Egyptian Environmental Affairs Agency (EEAA), Responsible for developing public policies related to the protection of environment and improving its quality. In addition, it is responsible for issuing regulations for environmental determinants and monitoring their implementation. Various Ministries are involved including the following:

- Ministry of Environment (MoE), which is the political champion of the E-Bus Implementation Project;
- Ministry of Local Development (MoLD), which coordinated various Governorates to purchase the 140 E-Buses for use in COP 27 in Sharm El Sheikh;
- Ministry of Transport (MoT), which decided to operate E-Buses in its under-construction Cairo Ring Road Bus Rapid Transit (BRT) system and recently supervised the procurement of 100 E-Buses for use on the BRT;
- Ministry of Public Business Sector (MoPBS), which supervises the Armor Production and Repair Plant (Military Factory 200). It is operated in a Joint Venture (JV) with Manufacturing Commercial Vehicles (MCV) to produce E-Buses.
- Ministry of Electricity and Renewable Energy (MoERE), which manages the vertically integrated electricity sector through the state-owned Egyptian Electricity Holding Company (EEHC) and its subsidiaries. It oversees the generation, transmission, and distribution segments.
- Ministry of International Cooperation (MoIC), which manages international development cooperation and banks to allow implementation of technical / financial assistance in Egypt.
- Ministry of Planning and Economic Development (MoPED), which provides estimates of the revenues, allocations, and expenditures related to infrastructure projects (investment). This includes the annual budget of public Authorities such as the CTA.
- Ministry of Interior (MoI), and in particular local emergency services, e.g., the Egypt Fire Protection (EFP) services, Traffic Engineering Bureau (TEB), and Traffic Police (TP); all of which are part of the Ministry of Interior and located within the respective Governorate or NCDA.

2 Transport Governance Authorities

The Land Transport Regulatory Authority (LTRA) which plans, organizes, monitors, and evaluates the performance of transport activities in Egypt, including at the level of the Greater Cairo Region (GCR). The LTRA provides concessions to private sector entities (incl. Mwasalat Misr (MM)) to operate Bus

services. It is also the project manager for the MoT Cairo Ring Road BRT project. The LTRA is hosted within the MoT.

3 Local Administration Entities

- Regional level entities include the GCR which consists of the Cairo, Giza and Qalyubia governorates; and New City Development Agencies (NCDA). Each NUC is managed by a NCDA.
- Local level entities include Local Government Units (LGUs) within the targeted Governorate in the respective areas related to the project, which support the project through giving permits for electricity installation and water supply and mobilizing people to gain information about the project.

4 Public Transport Operators

Also called transit agencies or bus operating entities. They are responsible for the operation and maintenance of public transportation systems. They will be involved in the E-bus project from the planning and design stages, through to the implementation and operation of the E-buses.

5 Electric Utility Authorities

Electric utility authorities are responsible for providing the electricity needed to power the E-buses. They will be interested in the project's impact on electricity demand, spatial distribution and impact on transmission networks. They might be needed to construct supporting facilities.

6 Bus Manufacturers and Suppliers

Original Equipment Manufacturers (OEM) will be responsible for supplying the E-buses, batteries, charging equipment and infrastructure that is needed.

7 Financing Institutions

Will be providing initial funding for the E-Bus Pilot project. Enabling and proofing E-Bus Operations financial viability and potential returns on investment are key to unlocking long-term investments.

8.2 Consultation activities with stakeholders

8.2.1 Consultation activities

A variety of consultation activities has been undertaken during the project design and preparation of the ESIA with key primary and secondary stakeholders. The main aim of intensive consultation is to better understand social concerns and social inclusion risks from different perspectives. Thus, the output of consultation activities is meant to guide e-bus specifications during design to attain a higher satisfaction of users. Consultation extended over the period from January 2023 to July 2024.

1 Bus users

It was highly informative to discuss a number of topics with bus users in-depth to better understand their experiences, challenges, and recommendations for the project. A total of 16 FGDs comprising 127 participants were conducted with bus users to assess and formulate recommendations in the context of diversity, inclusiveness, and resilience considerations for the e-bus demonstration project as follows:

a) FGDS

- 15 FGDs were conducted in 5 areas along the routes of Al-Ameriyah Depot, i.e., El Daher (5 lines); Hadeyek Al Qobba (4 lines); Al Waily (3 lines); Al Azbakeya (3 lines); and Heliopolis (2 lines). Each group was limited to 8 participants to be able to focus on the groups' concerns in detail. Number of male groups in each area is 5, another 5 with females, 3 with young men, and 2 with ladies/young girls. Additionally, participants in each group were asked to discuss challenges and special considerations for women (including pregnant, with babies, and elderly), persons with

special needs (and their companions), as well as young population (school pupils and university students).
- One FGD was conducted with 7 persons with disabilities at the National Council for Persons with Disabilities (NCPD) to better articulate their concerns regarding the use of public buses and better understand how to achieve utmost inclusiveness for various types of disabilities by providing special specifications in the new e-buses.

Participants were very interactive during discussions, especially females. In addition to their basic socio-economic information, discussions covered various aspects related to:

- Practices with public transportation means;
- Preferences when choosing;
- Experience with CTA buses;
- Mobility constraints;
- Safety concerns;
- Special concerns (experienced or witnessed) related to women, persons with limited mobility or disabilities, and young riders (males and females);
- Perceptions of e-buses; and
- Proposed moderation measures.

2 Passengers' Surveys

In addition to FGDs, a passenger survey was carried out. Passengers' surveys were performed for Imbaba bus routes, and projected Badr bus routes (as given by CTA), those two depots and corresponding routes being the ones that came out of the Multi criteria Analysis (GCCC decision pursuant to MCA Phase I and Phase II presentation on 10/05/2023 meeting. Passenger interviews were conducted in a street-intercept method in selected zones surrounding the 14 surveyed CTA routes. 29 zones were selected across the GCR with 583 surveys collected from all zones. The criteria for choosing the zones were the volume of boarding & alighting clusters, driven from the onboard survey results. Areas with high boarding & alighting values were chosen for each district in our project's area of interest (Badr city, Shorouq, New Cairo, Imbaba, Nasr City, etc.) and the total number of surveys targeted (initially 500) was distributed based on the relative boarding & alighting volume between the selected zones. The survey targeted a 50/50 gender split per zone, and subsequently a 50/50 split for the total sample. No other pre-selection criteria for passengers were included. The targeted population were existing public transport users waiting at stops.

The passenger survey was divided into three components:

- Journey Details: origin and destination of their current trip, trip purpose, modes used, fare paid, access and egress time, etc.
- Passenger experience: The main portion of the survey with impressions, ratings, and preferences for public transport. Specific questions target gender and active travel aspects.
- Basic demographic information: including questions on physical challenges to accessing PT.

3 CTA Central Staff

The consultant team had regular consultation meetings with CTA staff, mainly every month during the monthly progress meeting, in addition to interval meetings or depot site visits as needed. The initial aim of meetings is to discuss depot selection and layout through a multi criteria analysis, assess CTA capacity, and exchange points of view. Meetings were attended by CTA central staff, GCCC staff, EEAA representatives, and the World Bank team (during kick-off and follow-up missions).

In broad terms, meetings intended to:

- Follow up on data collection and main challenges;
- Communicate additional required secondary data and purpose of collecting data;

- Arrange site visits to depots, and/or meetings with other stakeholders;
- Discuss any inquiries from the consultant team to undertake the analysis; and
- Follow up on deliverables.

4 Depot Manager and Supervisors

It was also important to understand depot-related aspects interconnected to the physical environment and work organization. Interviews helped to triangulate data collected from other stakeholders, especially CTA central staff. Outcome of meetings is reflected in section 4-3, the baseline section of the ESIA and the GRM document. A total of 13 Key Informant Interviews (KIIs) were conducted with CTA officers and Al-Ameriyah Depot staff, e.g., CTA central depart., CTA planning dept., CTA training depart., depot manager, depot observers, engineering depart., public relation depart., human resources depart., and deputy head of workers' syndicate. Topics with different participants covered mainly the following:

- Number of managers, employees, workers, and service workers by sex;
- Number of persons with disabilities employed at the depot by sex and level;
- Facilities and amenities inside Al-Ameriyah Depot;
- Description of workers' welfare features;
- Social services provided for workers;
- Training programs provided to depot staff;
- Capacity building needs;
- Internal grievance resolution including right to anonymous complaints; and
- Workers' rights, including right to rebel.

5 Bus Drivers

An interesting exercise was to discuss work experience and challenges with different passengers, especially those with limited mobility, and to get drivers feedback on main findings of FGDs. An interview was conducted with two drivers in the Al-Ameriyah Depot. Discussion with drivers revolved around the following topics:

- Density and nature of passengers by section and timings of the day, and changes in such patterns over weekdays and/or seasons;
- Challenges and management of passengers with reduced mobility;
- Personal perceptions of introducing e-buses, and how to maximize benefits and minimize risks;
- Personal and professional criteria for drivers' and conductors' selection on e-buses;
- Required trainings to build the capacity of drivers and conductors;
- Emergency situations and contingency management;
- Awareness raising needs for different categories of stakeholders (users and operators);
- The extent to which drivers are aware of the danger of air pollutants emanating from diesel bus exhaust on public health and the benefit of replacing them with electric buses; and
- The acceptance of bus drivers to the idea of having female colleagues (drivers).

The drivers confirmed the positive impacts of the e-bus for users and operators. They were also positive about the value of training provided to drivers by manufacturing companies based on their experience during the operation of e-buses in Sharm El Sheikh during the COP summit. Agreeing on challenges facing persons with limited mobility, they confirmed that CTA drivers have a humanitarian attitude for any person in need for support.

8.2.2 Public Consultation Meeting

The public consultation session was physically held on July 17th, 2024, at Triumph Plaza Hotel, Heliopolis. About 46 participants attended and the following table shows the distribution of

participants according to the specialty. Appendix Q shows the registered attendees and their affiliations.

Table 8-1 Distribution of attendees according to their affiliation

Distribution of participants according to their affiliation	Number	Percentage (%)
Administrative official's governorate level (MoE, EEAA, MOT ...)	14	30.4
Consultants and experts	6	13
World Bank	2	4.3
Civil society	15	32.6
Academic Institutions	1	2.2
Private sector in the transportation field	8	17.5
Total	**46**	**100**

Guests were informed of the date and venue of the public consultation session at least two weeks prior to the meeting date. Invitations were sent by the PCU in cooperation with the consulting office via WhatsApp, e-mails and phone calls.

The aim of the session is to present the results of the ESIA, with a focus on the environmental and social impacts resulting from the project, methods of mitigating negative impacts, maximizing the benefit from the positive effects, and ensuring that the parties involved are satisfied with the measures to reduce environmental and social impacts and management plan.

The following topics were presented during the public consultation session:

- Introduction about the project
- Objective of the project
- Project partners
- Project description
- Methodology of ESIA preparation
- Environmental laws applicable to the project
- Description of the environmental and social baseline
- Alternatives
- Project's environmental and social impact assessment methodology results
- Environmental and Social Management and Monitoring Plan

Most of the attendees actively participated in the session and came up with fruitful ideas for discussion. Moreover, surveys were given to the participants upon their arrival to fill in with their feedback/questions. These survey forms are attached to the study in Appendix R.

The following table provides a summary of the main comments and concerns raised during the session.

Figure 8-1 Public Consultation Meeting

Table 8-2: Key questions and comments raised during the public consultation session

Participant/ affiliation	Questions/Remarks	Response	Reflection on the project/ESIA
EEAA Consultant	1. What does this 44.3% decrease in GHG emissions represent?	• It represents the reduction of the GHG emissions in the 5 selected routes mentioned based on the replaced diesel buses and the reduction came from modal shift of cars and taxis	Project Description Chapter, Section 2.5.3.4. and chapter 6 section 6.3.2.1
Project Engineer for TPA	2. Are emissions from electricity generation taken into consideration during calculation of emission reduction?	• Yes, for electric buses as they don't produce direct emission. Calculated emissions for the electric buses came from power plants emissions to produce electricity that is used to charge the buses according to CDM methodology.	Project Description Chapter, Section 2.5.3.4. And chapter 6 section 6.3.2.1
Mwasalat Misr (private transportation Sector)	3. What is the Current Ridership methodology to calculate modal shift %?	• By Applying a certain occupancy rate per private car (section count -1000 car x occupancy rate) and there was section count for cars and taxis but it is difficult to know the exact number for shifted cars and taxis that's why we have considered different scenarios, but these numbers were obtained from the researches who ride the buses in the selected routes and counted and also from the data received from CTA.	Project Description Chapter, Section 2.5.3.4. And chapter 6 section 6.3.2.1
General Authority for Transportation Projects Planning	4. How can there be modal shift when the buses are full capacity	• It is not at full capacity	Potential Environmental and Social Impacts Chapter 6.4.2.7

Participant/ affiliation	Questions/Remarks	Response	Reflection on the project/ESIA
EEAA Consultant	5. Questioning 70% reuse of water and if there will be wastewater treatment unit used in the depot.	• 70% of the generated wastewater will be recycled after treatment to be reused in the bus washing process. This is facilitated by a wastewater treatment system that includes settling tanks, hydrocarbon separators, and biological reactors. This system ensures that wastewater is adequately treated and filtered, making it suitable for reuse in subsequent washing cycles. The remaining 30% of the wastewater, including any sludge, will be appropriately managed and disposed of according to environmental regulations, ensuring minimal environmental impact	Project description chapter Sec2.5.3.7
EEAA Consultant	6. Do you have plans for electricity cuts and why the decision to go electric at a time of electricity scarcity?	• Same as metro - no electricity cuts because it is a national project, and this had been considered in the feasibility study (cut off for 1hour).	-
Land Transport Regulatory Authority	7. What is the full capacity of the depot? 8. What will happen with the other routes that are not electrified?	• The Depot could occupy up to 110 buses. • Buses of the other routes will be operated from other depots.	Project Description Chapter Section 2.5
Arab organization for industrialization (AOI)	9. There is a module from some graduation students at the Canadian university on car washing that uses solar power 10. Model of the buses must be chosen in perfect way and to fit	• Operation of the depot with solar energy is challenging because of the large area needed to install the solar PV cells to satisfy the depot needs, the CAPEX and the maintenance cost of the system and also busses will be charged at night which means that this will request a lot of	Project Description Chapter Section 2.5.2.2

Participant/ affiliation	Questions/Remarks	Response	Reflection on the project/ESIA
	the circumstances of the paths and suggesting contacting with Armed Forces Research Authority 11. Operate the depot with the solar energy 12. Retrofitting old diesel buses to electric buses.	batteries, although renewable energy may be considered in the near future. • Locally there are companies that retrofit only small vehicles. with high cost. Also, the current buses are not equipped for handicapped people	
Transport Labor Union	13. What is the plan for workers that will lose their jobs?	• There is a full capacity building plan in the project and that was mentioned in the project potential impacts during operation. Additionally, CTA has training and rehabilitation center so as no workers will lose their jobs, but they can be moved to other depots or change their jobs as what happened to the drivers in COP 27 in Sharm El sheikh as they were trained in MCV and proved themselves during their work	Potential Environmental and Social Impacts Chapter Sec 6.4.2 Mitigation Measures Sec 6.5.2 ESMP Chapter Stakeholders Consultation and Public Disclosure Chapter sec 7.3
Mwasalat Misr (private transportation sector)	14. Does the study include the fleet management system or mobile application?	• No, but CTA has its own strategy, and the bidding package states that the buses must have a monitoring system	Project description chapter Sec 2.4.3
Mwasalat Misr (private transportation sector)	**15.** Does the study include ticketing system?	• No, but CTA is currently working on prepaid system for tickets and hired a consultant for that	Stakeholders Consultation and Public Disclosure Chapter
General Authority for Transportation Projects Planning	16. How long does the charged battery can operate?	• Charged battery can last for about 250 km which is equal to one day operation, but that may differ during summer because of air	Project description chapter Sec 2.4.3

Participant/ affiliation	Questions/Remarks	Response	Reflection on the project/ESIA
		conditioner so there are 2 operational plans one for summer and the other for winter.	Stakeholders Consultation and Public Disclosure Chapter
General Authority for Transportation Projects Planning	17. What are the battery disposal scenarios?	• It will be the supplier's responsibility to reuse it or dispose it and that will be in the contract between CTA and the supplier	Alternatives chapter Sec 5.3.2
EEAA	18. What will happen to the diesel buses?	• Good, conditioned buses will be operated from other depots and others will be scrapped.	Project Description Chapter Sec 2.5.1
General Authority for Transportation Projects Planning	19. Would the tickets be in fare and uni-price	• No decision has been made and that it will likely stay the same	Didn't affect the study
EEAA	20. What is the neutralization process of the diesel tanks? What are the chemicals that will be used? What are the safety procedures to avoid splitting? What are the insulating procedures?	• Neutralizing the tanks Misr Petroleum's responsibility; however, they decided to fill the underground diesel tanks with sand and buried them underground by trained workers and in presence of HSE officer taking all safety procedures in extinguishers without usage of chemicals and insulation.	Project Description Chapter Sec 2.5.1 Potential Environmental and Social Impacts Chapter Sec 6.4.1 Project Alternatives Chapter Sec 5.5 Mitigation Measures Chapters Sec 6.5.1
EEAA	21. What are the procedures with maintenance waste?	• Storage will be temporary as it will be separated and disposed off site via a certified waste contractor and an environmental register will be prepared for the depot which will include types	Potential Environmental and Social Impacts Chapter Sec 6.4.2

Participant/ affiliation	Questions/Remarks	Response	Reflection on the project/ESIA
		and quantities of wastes generated and their final disposal method.	Mitigation Measures Chapters Sec 6.5.2 ESMP Chapter Sec 7.3
Director of Egypt's Project for Transport Workers Training under the International Transport Federation ITF	22. Training of E-bus drivers and workers. 23. Transformational training for workers and conductors. 24. Re-positioning of workers plan	• There is a stand-alone document for training and capacity building	ESMP Chapter Sec 7.2 Potential Environmental and Social Impacts Chapter Sec 6.4.2 Mitigation Measures Sec 6.5.2 ESMP Chapter sec 7.3
General Authority for Transport Organization	25. Is there a grievance mechanism for the project? And how can people submit their complaints?	• There is a stand-alone document for GRM • Summary of GRM is also included in the ESIA	Stakeholders Consultation and Public Disclosure Sec 8.3
General Authority for Transportation Projects Planning	26. What is the ticket pricing system? And how it will be calculated? 27. Will tickets be chargeable?	• The pricing of tickets is not included in the scope of this ESIA. CTA is responsible for setting fares. Final fare price not yet determined; affordability will be considered	Covered in the consultation report
General Authority for Transportation Projects Planning	28. Is infrastructure included in funding?	• Yes	Didn't affect the study
MCV	29. Local or international bid:	• International Bid	Introduction Chapter Sec 1.1 Project Description Chapter Sec 2.1

8.3 Grievance Redress Mechanism

The GRM is a key component of stakeholder engagement, designed to address and resolve grievances and/or complaints related to the project's environmental and social impacts. The mechanism is detailed in a stand-alone document (Appendix W), which outlines its scope, procedural steps, and specifies roles and responsibilities.

The following presents the main topics of the GRM standalone document.

8.3.1 Goals of the GRM

- To ensure all project-related grievances are addressed promptly, effectively, and transparently.
- To provide a mechanism that is culturally appropriate and accessible to all affected parties without cost or retribution.

8.3.2 Roles and Responsibilities

- CTA commits to timely address grievances related to the environmental and social performance.
- Responsibilities are clearly delineated for managing complaints, especially those involving external grievances about project activities or unanticipated impacts.

8.3.3 Procedural Steps

- Communication and disclosure of GRM using publicly advertised procedures, setting out the length of time users can expect to wait for acknowledgment, response, and resolution of their grievances;
- Receipt of Grievance: Grievances can be filed by affected individuals or groups, including local communities, residents around service areas, beneficiaries, and particularly vulnerable groups such as women, youth, and persons with disabilities.
- Grievance Processing: CTA's Citizen Service Department, including its Complaint Division, handles the registration and initial assessment of grievances to determine their admissibility and scope.
- Investigation and Action: Grievances undergo verification and investigation to formulate an appropriate response. If necessary, grievances concerning complex issues like e-bus operations may require escalated actions.
- Resolution and Feedback: Grievances are resolved in a manner proportional to the assessed risks and impacts, with outcomes communicated back to the complainant.

8.3.4 Communication Channels

- The GRM utilizes various channels for submitting grievances, including in-person, phone, text message, email, or via dedicated portals on the website. CTA ensures these channels are accessible, inclusive, and capable of handling anonymous complaints.
- According to CTA PR department and supporting documents, following channels are used to receive complaints:

  CTA complaint email : khedmetmwatnen@gmail.com;

  CTA what's app number: 012731339l7-01129947162

  CTA landline: +2-23425714

  Unified Governmental Complaint System www.shakwa.eg

  Unified Governmental hotline: 16528

  Unified Governmental what's app number: 01555525444-01555516528

Additional channels may include but not limited to:

Letters;

Verbal narration from walk-in complainants;

Reports on visits to project offices and sites by project staff, independent monitors, supervision teams, government officials, or journalists interested in special groups like persons with disabilities, elderly people;

Reports of staff, consultants, PCU;
Comments or grievances from radio or television programs;
Findings of WB supervision missions;
Comment/complaint boxes inside buses and in stations;
Escalation to third party entities, e.g., Ministry of Environment, EEAA, Cairo Governor Office, or the WB Grievance Department; and
Media newscasts, newspaper articles, and other publications.

8.3.5 Implementation and Monitoring

- The GRM is subject to continuous monitoring and revision based on stakeholder feedback and the evolving needs of the project.
- CTA integrates feedback from the GRM into the project operation to enhance responsiveness and effectiveness in mitigating environmental and social risks.

9 Appendices

Appendix	Name
Appendix A	Terms of Reference
Appendix B	Service & Operational Plan
Appendix C	E-bus Specifications
Appendix D	Detailed Engineering Design Report
Appendix E	Selected Routes
Appendix F	Environmental, Social and Gender considerations in E-bus Specs.
Appendix G	Firefighting Specifications
Appendix H	Consultation Strategy Plan and Report
Appendix I	Baseline (Ambient Air Quality and Noise Levels) Measurements Analysis Report
Appendix J	Detailed Measurements' Report on Public Transport Modes in Cairo, Egypt in 2017 by EEA
Appendix K	Detailed Methodology to Calculate GHG, PM2.4 and BC Emission
Appendix L	Feasibility Study
Appendix M	Qualifications of Specialists Hired by the Contractor
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Appendix P	List of Registered Attendees to Public Consultation
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Appendix U	List of NCPD FGD Participants
Appendix V	List of Al-Ameriyah Interview Participants
Appendix W	Grievance Mechanism

9.1 Appendix A: Terms of Reference

ToR Tasks & Requirements			D6-1 ESIA Report
Tasks Number	Description	Action plan	Chapter of the report responding to ToR requests
6.1	Conduct an ESIA that complies with World Bank Environmental and Social Framework (ESF) and Environmental and Social Management Framework (ESMF) prepared for the project as a whole.	The TOR, interim reports, and deliverables for this specific task will need to be reviewed and cleared by the World Bank safeguards team.	N/A - As part of Project Management Plan process with Document Review Sheet.
		ESIA will include all infrastructure to be constructed and activities to be carried out (including rolling stock) as part of the e-bus pilot project.	Chapter 2: Project Background and Description
6.2	Following the ESF and the relevant Environmental and Social Standards (ESSs), the ESIA should identify the environmental and social impacts and risks.	Issues to be covered include but are not limited to community health and safety, land and livelihoods related risks, if any, labor issues, including working conditions, working age, insurance coverage, occupational health and safety.	Chapter 6: Identification and Assessment of Potential Environmental, Social and Gender Impacts
		The scope of the ESIA should cover the risks pertaining to both construction and operation phases.	
6.3	For addressing the identified risks and impacts, the ESIA should develop a comprehensive Environmental and Social Management Plan (ESMP) covering the mitigation measures that need to be implemented with clear roles, responsibilities, monitoring techniques and budget for implementing the ESMP.		Chapter 7: Environmental and Social Management Plan (ESMP)

ToR Tasks & Requirements			D6-1 ESIA Report
Tasks Number	Description	Action plan	Chapter of the report responding to ToR requests
6.4	The Consultant should carry out all the consultations needed (as per the principles of the ESF/ESS10 and per the developed SEP) during the cycle of the ESIA preparation. The consultation should inform the process of the impacts and risks identification. Stakeholders' views on the mitigation measure should be also incorporated in the ESIA.		Chapter 8: Stakeholders Consultation and Public Disclosure[26]
6.5	The ESIA will design as part of the mitigation measures a functional anonymous complaint mechanism to be easily accessible by e-bus demonstration route(s)/corridor(s) users		Chapter 8

Note: *As per Contract Amendment #3 signed on 21/02/2024, the scope of works has been clarified to exclude the Administrative Building from the scope of works of the study as well as of the future Contractor's Scope (and corresponding tender documents). For instance, installations upgrades such as medical clinic, toilets, changing rooms shall be considered in the Administrative Building*

[26] Public Disclosure has not been conducted yet. It will be conducted at a later stage after receiving the 1st round of comments from the WB, GCC and CTA as per the agreed-on work plan.

9.2 Appendix B: Service & Operational Plan

9.3 Appendix C: E-bus Specifications

9.4 Appendix D: Detailed Engineering Design Report

9.5 Appendix E : Selected Routes

Route Number	Route Long Name	Route Short Name	Origin	Destination	Trip length (km)	Trip duration (hour)	Number of trips per day	Number of stops	Dead Mileage Km	Km per bus per day	Total Number of buses in operation	Diesel Buses	Natural gas buses
1090	Abageyah - Al-Ameriyah	CTA 1090	Al-Ameriyah	Abageyah	15.89	1.05	128	44	1	255	15	9	6
1129	Al-Ameriyah - Moneeb	CTA 1129	Al-Ameriyah	Moneeb	23.82	1.5	92	46	1	345	15	9	6
290	Ahmed Helmy Station - Masallah Al Gadeda (Matariyah)	CTA 290	Masallah Al Gadeda (Matariyah)	Ahmed Helmy Station	13.07	0.93	102	31	1	340	15	8	7
810	Al Omraneya Al Gadida - Qism El Hadeyek	CTA 810	Qism El Hadeyek	Al Omraneya Al Gadeda	19.33	1.14	54	41	3	245	15	8	7
831	Al Zawya Al Hamra - Masakin Zeinhom	CTA 831	Al Zawya Al Hamra	Masakin Zeinhom	11.44	0.67	36	32	5	250	15	9	6

9.6 Appendix F: Environmental, Social and Gender considerations in E-bus Specs.

9.7 Appendix G Firefighting Specifications

9.8 Appendix I: Baseline (Ambient Air Quality and Noise Levels) Measurements Analysis Report

9.9 Appendix J: Detailed Measurements' Report on Public Transport Modes in Cairo, Egypt in 2017 by EEAA

9.10 Appendix K: Detailed Methodology to Calculate GHG, PM2.4 and BC Emission

9.11 Appendix L: Feasibility Study

9.12 Appendix M: Qualifications of Specialists Hired by the Contractor

Environmental specialist	▪ A professional with Post Graduate Degree in Environmental Engineering or Civil/ Mechanical/ Electrical/ or Environmental Science ▪ 5+ years of experience as environmental specialist ▪ Related experience in infrastructure projects. ▪ The specialist should have environmental management experience in ESIAs, QRAs, soil and water analysis ▪ Have the ability to prepare & implement Resources Management Plan. ▪ Visual inspections onsite, spot check measurements of ambient air quality, and noise and vibrations measurements, review of maintenance records of machinery- according to reference testing methods (e.g., US EPA) ▪ Experience with waste management and traffic management plans ▪ Outstanding analytical abilities and problem-solving skills ▪ Excellent knowledge in national environmental legislation and ▪ WB Environmental & Social Standards ▪ Experience in national and regional projects related to Civil works would be advantageous ▪ Experience in national and regional projects related to electric works would be advantageous ▪ Strong analytical, planning and project management skills. ▪ Good spoken and written English language skills is required.
Social and Gender Development Specialist	▪ A professional with Post Graduate Degree in social sciences or a related field ▪ 5+ years of experience as social development specialist ▪ Related experience in infrastructure projects. ▪ Have good supervisory and management skills. ▪ Problem solving and decision making ▪ The specialist should be experienced in monitoring, and evaluation. ▪ The specialist should have the ability to comply with grievance mechanism system including reporting and documenting any grievances ▪ The specialist should have a good experience in labor management plans ▪ Good knowledge in national environmental legislation and WB Environmental & Social standards ▪ Good spoken and written English language skills is required.
Health and Safety specialist	▪ Minimum bachelor's degree in engineering ▪ A safety procedures certificate, OSHA certification ▪ Minimum of 8 years of experience as a health and safety specialist/officer ▪ Related experience in infrastructure projects. ▪ Should have significant experience in developing and complying with labor management plan including provision of HSE training, emergency preparedness and response plan for all phases of the project under their control ▪ Have the ability of recording and documentation of complaint, create a risk assessment (Qualitative/Quantitative) ▪ Good knowledge in national environmental legislation and WB Environmental & Social standards ▪ Must have good Project management skills ▪ Proven experience in appraising and supervising projects; ▪ Excellent verbal and writing communication skills ▪ Good spoken and written English language skills is required.

9.13 Appendix N: Capacity Building Report

9.14 Appendix O: Indicative checklist to guide field monitoring (to be used by TIU)

Code	Field monitoring of implementation of ESMP	Compliance / Non-compliance	Corrective actions	Comments
AQ1	Air Quality – Dust and gaseous emissions			
	▪ Are there any visible sources of uncontrolled emissions? ▪ Is there an emissions control plan? ▪ Are air quality measurements compliant with permissible levels and have measurements been done according to standards (e.g., US EPA)? ▪ Is all machinery deployed to the field up to code? ▪ Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences? ▪ Are aforementioned elements reported in the contractor's monthly ES progress report? ▪ Are there onsite environmental and social development specialists?			
NV1	Noise and vibration			
	▪ Are there any sources of uncontrolled and/or unnecessary noise and vibration (e.g., machinery running when not needed etc.)? ▪ Are all workers onsite operating machinery wearing appropriate noise reduction PPE? ▪ Are noise and vibration measurements compliant with permissible levels? ▪ Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences? ▪ Are equipment maintenance records up to date? ▪ Are activities generating high levels of noise and vibration limited to morning schedules and minimal duration (where possible)? ▪ Are aforementioned elements reported in the contractor's monthly ES progress report?			
SGT1	Soil, geology, and topography			
	• Are there visual disturbances to the topsoil caused by heavy machinery?			

Code	Field monitoring of implementation of ESMP	Compliance / Non-compliance	Corrective actions	Comments
	• Is there a soil decontamination plan referenced in the ESMP developed and implemented for the site? • Is machinery used up to code and maintenance according to schedule? • Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences?			
Rp1	Resource efficiency and pollution prevention: energy, water, raw materials, and waste management			
	• Are all plans referenced in the ESMP developed and implemented? Plans: waste management plan, resources (energy, water, etc.) management plan covering all project phases including special emergency plans (e.g., in cases of short circuits)? • Have approvals from entities responsible for existing utilities (i.e., EEAA, civil defense authority, EDC, Al-Ameriyah district and WMRA) been obtained? • Are there reported grievances? • Is the site well maintained and abiding to good housekeeping practices? • Are temporary waste storage areas well maintained? • Are there leaks and sources of soil contamination?			
NHR1	Natural disasters risks			
	• Is work avoided during extreme hot weather, intense storms and heavy rains? • Are there reported incidents of heat related stress? • Is there an ERP developed and approved and communicated to workers? • Is equipment properly stored during extreme weather events (shielded from heat and wet conditions)?			
OHS1	Occupational health and safety			
	• Are workers wearing appropriate PPE? • Is there signage clearly posted in high danger areas?			

Code	Field monitoring of implementation of ESMP	Compliance / Non-compliance	Corrective actions	Comments
	• Are emergency numbers and meeting points clearly visible? • Are there logs/registers for training of workers on LMP and OHS plan developed and approved by PCU? • Are there reported incidents including severe accidents? If yes, has an incident report been prepared and incident investigated, and corrective action defined? • Are workers covered by insurance? • Are grievance channels and mechanism visually clear and accessible to all workers (e.g., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints? • How many Job Hazard Analyses have been conducted for high-risk tasks this month? • How many Toolbox Talks have been conducted on-site this week, and what safety topics were covered? • How many permits to work have been issued, and how many have been successfully closed this week? • Are safety checklists being completed for equipment and tools before the start of tasks? How many checklists were completed? • What percentage of the workforce has completed safety induction training? Are there any workers who still need to undergo induction? • Are welfare facilities such as restrooms, break areas, and first aid stations in good working condition and accessible to workers? • Have there been any safety breaches on-site? If so, how many have been reported and resolved by the contractor? • How many safety audits were conducted this month? Were any non-compliance issues identified during the audits? • How many training sessions have been delivered this month, and which topics were covered?			

Code	Field monitoring of implementation of ESMP	Compliance / Non-compliance	Corrective actions	Comments
	• How many medical checkups and drug tests have been conducted for the workforce? • Are there adequate safety signs and guidance posted throughout the worksite? • How many OHS supervisors are present on-site, and are they adequately monitoring compliance? • How many unsafe actions or conditions have been reported, and what corrective measures were implemented?			
CHS1	Community health and safety			
	• Are workers trained on LMP, prevention of covid-19 or any other pandemic spread? • Has a CHS plan been developed and approved by PCU? • Are grievance mechanisms and channels disclosed to the community, i.e., proper disclosure of channels? • Are there grievances/complaints reported? If yes, have complaints been investigated and addressed? • Is the project site properly fenced and inaccessible to local surroundings? • Have approvals for external works related to resources supply been obtained (EDC: to avoid resource insufficiency for surrounding community (electricity)? • Civil defense authority: to prevent health and safety hazards and risks associated with fire by ensuring proper firefighting systems are in place and operational, i.e., sufficient firefighting equipment in place.			
TIi1	Temporary labor influx			
	• No temporary labor influx is expected, as all construction laborers will be confined inside the depot during construction activities. • Has the code of conduct been signed by the subcontractor, if any? • Have any incidents of COC violations or other been reported? • Are external grievance mechanisms and channels adequately disclosed and known to the surrounding community?			
RCL1	Risks of child labor			

Code	Field monitoring of implementation of ESMP	Compliance / Non-compliance	Corrective actions	Comments
	• Are there any workers under 18 contracted by the project? • Are IDs diligently verified for all workers?			
GBV1	Risks of GBV			
	• Are confidential mechanisms, anonymous channels for grievances clearly available and accessible? • Are workers trained and informed on grievances including availability of confidential mechanisms, anonymous channels, referral systems? • Are external grievance mechanisms and channels adequately disclosed and known to the surrounding community, including availability of confidential mechanisms, anonymous channels, referral systems? • Are workers trained on COC and GBV prevention? • Is the COC signed by sub-contractor? • Are there any GBV related incidents reported? If yes, was reported to PCU and WB?			
CH1	Cultural heritage			
	• Are workers informed on 'chance find procedure'? • Are there any incidents reported? If yes, have relevant authorities been contacted?			
COV1	ß			
	• Has covid-19 and communicable diseases management plan been developed and approved by PCU? • Are protective measures visibly implemented onsite, namely: body-temperature measurements at the entrance of the site, wearing of facemasks, no gatherings or smoking in enclosed areas, provision of soap, water and disinfectants at the site • Have workers been trained on covid-19 prevention and precautionary measures? • How many reported infections onsite?			

9.15 Appendix P: Registration list in the public consultation

	الوظيفة	جهة العمل
1	مدير عام مساعد السلامة	شركة مصر للبترول
2	اخصائي بيئي	وحدة تنسيق المشروع **GCCC**
3	مساعد تقني المشروع GCCC	وحدة تنسيق المشروع **GCCC**
4		شركة **MCV**
5	نائب رئيس مجلس الإدارة	مواصلات مصر
6	مدير إدارة التخطيط	**CTA**
7	مهندس جهاز تنظيم النقل البري الداخلي والدولي	**LTRA**
8	مهندسة مشروعات معمارية	هيئة تخطيط مشروعات النقل
9	مهندسة مشروعات معمارية	**World Bank**
10	مدير قسم النقل	شاكر
11	مدير مبيعات	**MCV**
12	مدير مبيعات	**MCV**
13	مشرف مبيعات	**MCV**
14		جهاز شئون البيئة
15	مهندس MCV	**MCV**
16	منسق	الاتحاد الدولي لعمال النقل **ITF**
17	استشاري المشروع	**CCC**
18	مهندس مشروعات	**TPA**
19	مهندس تخطيط	**TPA**
20	انتجرال استشاري اجتماعي	جامعة القاهرة
21	مدير إدارة مشروعات الفنية جهاز شئون البيئة	وزارة البيئة
22		وزارة البيئة
23	مدير عام عادم السيارات	وزارة البيئة
24	مدير مشروع ITF مصر	الاتحاد الدولي لعمال النقل **ITF**
25		وزارة البيئة
26	أخصائي رصد وتقييم	مشروع **GCCC**
27	مهندس	الشركة العربية الأمريكية للسيارات **AAV**
28	خبير اجتماعي	جامعة حلوان
29	رئيس الإدارة المركزية لنوعية الهواء	وزارة البيئة
30	استشاري بيئي	**World Bank**
31	مدير إدارة الصيانة	مصر للبترول
32	social specialist	**PCU**
33	مهندس تخطيط	هيئة تخطيط مشروعات النقل
34	مهندسة مشروعات مدني	**TPA**
35	مهندس تخطيط	هيئة تخطيط مشروعات النقل
36	مهندس مشروعات	**TPA**
37	مهندس مدني	**TPA**

38	مدير مركز التدريب	**CTA**
٣٩	BD Specialist	مواصلات مصر
40	استشاري جهاز شئون البيئة	وزارة البيئة
41	استشاري المشروع	**Transport for Cairo**
42	استشاري نظم معلومات	**Transport for Cairo**
43	مدير عام المشروعات	جهاز شئون البيئة
44	مهندس تخطيط	وزارة النقل
45	أخصائي بيئي	**Integral**
46	أخصائي بيئي	**Integral**

9.16 Appendix Q: Surveys of the public consultation

9.18 Appendix R: Project Layout

9.19 Appendix S: List of Male FGDs Participants

#	Date	Area	English Name	Name	Age	Marital status	Education	Occupation	Car	Group
1	01/01/2024	Al-Waili	Mostafa Mousa	مصطفى موسى	62	Married	Bachelor of Social Work	Retired	None	Men
2	01/01/2024	Al-Wayli	Sha'aban Mahmoud Darwish	شعبان محمود درويش	62	Married	Commercial High School	Retired	None	Men
3	01/01/2024	Al-Wayli	Mostafa Abbas	مصطفى عباس	48	Married	Illiterate	Shoemaker	None	Men
4	01/01/2024	Al-Wayli	Mosatafa Mahmoud	محمود مصطفى	46	Married	Industrial High School	Microbus Driver	None	Men
5	01/01/2024	Al-Wayli	Moastafa Ra'fat	مصطفى رأفت	53	Married	Commercial High School	Merchant/Trader	None	Men
6	01/01/2024	Al-Wayli	Mohsen Elsayed	محسن السيد	48	Married	Bachelor of Commerce	Administrative employee	None	Men
7	01/01/2024	Al-Wayli	Amr sayed	عمرو سيد	47	Married	Middle Technical Institute	Administrative Employee	None	Men
8	01/01/2024	Al-Wayli	Ahmed Magdy	احمد مجدي	45	Married	Vocational Secondary Education	Worker	None	Men
9	01/01/2024	Al-Wayli	Mahmoud Radwan	محمود رضوان	39	Married	Social work institute	Administrative employee	None	Youth
10	01/01/2024	Al-Wayli	Adel Mahoud	عادل محمود	37	Married	Commercial High School	Gas Station worker	None	Youth
11	01/01/2024	Al-Wayli	Sha'aban Hussein	شعبان حسين	35	Single	Commercial High School	Tuk-tuk Driver	None	Youth
12	01/01/2024	Al-Wayli	Mostafa Ahmed	مصطفى احمد	36	Single	Illiterate	Mechanic	None	Youth
13	01/01/2024	Al-Wayli	Mohamed Abdelrahman	محمد عبد الرحمن	37	Married	Commercial High School	Worker in a Bakery	None	Youth
14	01/01/2024	Al-Wayli	Saed Mohamed	سعيد محمد	28	Single	Bachelor of Commerce	Administrative employee	None	Youth
15	01/01/2024	Al-Wayli	Ramadan Mahmoud	رمضان محمود	30	Single	Bachelor of Commerce	Accountant	None	Youth
16	01/01/2024	Al-Wayli	Omar Mohamed Omar	عمر محمد عمر	27	Single	Industrial High School	Air Conditioning Technician	None	Youth
17	01/03/2024	Al-Daher	Khaled Ahmed	خالد احمد	44	Married	Bachelor of Commerce	Accountant	None	Men
18	01/03/2024	Al-Daher	Hussein Khaled	حسين خالد	40	Married	Bachelor of Commerce	Accountant	None	Men
19	01/03/2024	Al-Daher	Mohamed Taher	محمد طاهر	39	Married	Bachelor of Commerce	Accountant	None	Men
20	01/03/2024	Al-Daher	Tamer Fou'ad	تامر فؤاد	38	Married	Bachelor of Engineering	Engineer	None	Men
21	01/03/2024	Al-Daher	Hassan Fergany	حسن فرجانى	50	Married	Commercial High School	Administrative employee	None	Men
22	01/03/2024	Al-Daher	Ahmed Ragab	احمد رجب	36	Married	Bachelor of Law	Storekeeper	None	Men

#	Date	Area	English Name	Name	Age	Marital status	Education	Occupation	Car	Group
23	01/03/2024	Al-Daher	Youssef Ibrahim	يوسف ابراهيم	42	Married	Bachelor of Engineering	Engineer	None	Men
24	01/03/2024	Al-Daher	Medhat Makram	مدحت مكرم	55	Married	Industrial High School	Administrative employee	None	Men
25	01/03/2024	Al-Daher	Mohamed Sherif	محمد شريف	21	Single	Bachelor of Commerce	Student	None	Youth
26	01/03/2024	Al-Daher	Mostafa Mahmoud	مصطفى محمود	21	Single	Student at Middle Technical Institute	Student	None	Youth
27	01/03/2024	Al-Daher	Ahmed Sabry	احمد صبري	42	Single	Bachelor of Agriculture	Agronomist	None	Youth
28	01/03/2024	Al-Daher	Shady Ragab	شادي رجب	26	Single	Bachelor of Social Work	Administrative Employee	None	Youth
29	01/03/2024	Al-Daher	Sherif Abdelaziz	شريف عبد العزيز	19	Single	Student at the Faculty of Arts	Student	None	Youth
30	01/03/2024	Al-Daher	Abdelfatah Mohamed	عبد الفتاح محمد	19	Single	Student at the Faculty of Arts	Student	None	Youth
31	01/03/2024	Al-Daher	Islam Ibrahim	اسلام ابراهيم	28	Single	Bachelor of Social Work	Customer Service	None	Youth
32	01/03/2024	Al-Daher	Montasser Salem	منتصر سالم	31	Married	Bachelor of Commerce	Salesman	None	Youth
33	01/04/2024	Hadayeq El-Qobba	Nader Abdelraheem	نادر عبد الرحيم	59	Married	Associate Degree in Commerce	Administrative Employee	None	Men
34	01/04/2024	Hadayeq El-Qobba	Abdelnaby Mohamed	عبدالنبى احمد	64	Married	Middle School	Retired	None	Men
35	01/04/2024	Hadayeq El-Qobba	Mostafa Mohamed Saleh	مصطفى محمد صالح	57	Married	Middle School	Worker	None	Men
36	01/04/2024	Hadayeq El-Qobba	Adel Mohamed	عادل محمد	59	Married	Illiterate	Worker	None	Men
37	01/04/2024	Hadayeq El-Qobba	Ayman Mohamed	ايمن محمد	48	Married	Industrial High School	Assembling Technician	None	Men
38	01/04/2024	Hadayeq El-Qobba	Osama Elsayed	اسامه السيد	42	Single	Bachelor of Engineering	Networks Engineer	Yes	Men
39	01/04/2024	Hadayeq El-Qobba	Mohamed Ra'fat	محمد رأفت	40	Married	Bachelor of Law	Receptionist	None	Men
40	01/04/2024	Hadayeq El-Qobba	Walled Abdelra'ouf	وليد عبد الرؤوف	39	Married	Bachelor of Commerce	Accountant	Yes	Men
41	01/05/2024	Al-Azbakeya	Eissa Soliman Abutafesh	عيسى سليمان ابوطافش	55	Married	Certificate of High School	Merchant/Trader	Motorcycle	Men
42	01/05/2024	Al-Azbakeya	Belal Mohsen	بلال محسن	45	Married	Bachelor of Law	Lawyer	Motorcycle	Men
43	01/05/2024	Al-Azbakeya	Abdelrahman Mohsen	عبد الرحمن محسن	48	Married	Certificate of High School	Driver	Yes	Men

#	Date	Area	English Name	Name	Age	Marital status	Education	Occupation	Car	Group
44	01/05/2024	Al-Azbakeya	Abdallah Mahmoud	عبد الله محمود	46	Married	Certificate of High School	Driver - Trader	None	Men
45	01/05/2024	Al-Azbakeya	Mohamed Khaled	محمد خالد	53	Married	Commercial High School	Café Owner	None	Men
46	01/05/2024	Al-Azbakeya	Mohamed Sa'd	محمد سعد	45	Married	Commercial High School	Worker	None	Men
47	01/05/2024	Al-Azbakeya	Ahmed Shiha	احمد شيحة	44	Married	Bachelor of Commerce	Accountant	None	Men
48	01/05/2024	Al-Azbakeya	Omar Yasser	عمر ياسر	43	Married	Bachelor of Commerce	Accountant	None	Men
49	01/05/2024	Al-Azbakeya	Mohamed Eissa	محمد عيسى	22	Single	Bachelor of Commerce	Accountant	Motorcycle	Youth
50	01/05/2024	Al-Azbakeya	Mahmoud Yasser	محمود ياسر	23	Single	Bachelor of Commerce	Accountant	None	Youth
51	01/05/2024	Al-Azbakeya	Imam Adel	امام عادل	20	Single	Student at the Faculty of Science	Worker in a Pharmacy	Yes	Youth
52	01/05/2024	Al-Azbakeya	Mostafa Nasser	مصطفى ناصر	20	Single	Student at College	Student	None	Youth
53	01/05/2024	Al-Azbakeya	Mohamed Hazem	محمد حازم	20	Single	Student at the Faculty of Agriculture	Student	None	Youth
54	01/05/2024	Al-Azbakeya	Ahmed Sameh	احمد سامح	24	Single	Bachelor of Law	Lawyer	None	Youth
55	01/05/2024	Al-Azbakeya	Omar Sayed	عمر سيد	27	Single	Bachelor of Education	Teacher	None	Youth
56	01/05/2024	Al-Azbakeya	Ahmed Saleh	احمد صالح	22	Single	Bachelor of Education	Teacher	None	Youth
57	31/12/2023	Heliopolis	Ali Elgendy	علي الجندي	49	Married	Bachelor of Engineering	Engineer	Yes	Men
58	31/12/2023	Heliopolis	Ahmed Hassan	احمد حسن	48	Married	Bachelor of Engineering	Engineer	Yes	Men
59	31/12/2023	Heliopolis	Ahmed Fattiuh	احمد فتوح	44	Married	Bachelor of Medicine	Doctor	Yes	Men
60	31/12/2023	Heliopolis	Amr Essam Eldeeb	عمرو عصام الديب	52	Married	Bachelor of Engineering	Engineer	Yes	Men
61	31/12/2023	Heliopolis	Ahmed Hany	احمد هاني	53	Married	Bachelor of Engineering	Engineer	Yes	Men
62	31/12/2023	Heliopolis	Ahmed Salah	احمد صلاح	47	Married	Bachelor of Engineering	Engineer	Yes	Men
63	31/12/2023	Heliopolis	Mohamed Eid	محمد عيد	35	Married	Bachelor of Commerce	Teacher	None	Men
64	31/12/2023	Heliopolis	Mohamed Mahmoud	محمد محمود	43	Married	Bachelor of Commerce	Accountant	None	Men

9.20 Appendix T List of Female FGDs Participants

#	Date	Area	Name	English Name	Age	Marital status	Education	Occupation	Car	Group
1	31/12/2023	Heliopolis	سيدة احمد	Sayeda Ahmed	50	Married	Vocational Education	Beauty Centre Owner	Private Car	Women
2	31/12/2023	Heliopolis	رشا بهاء	Rasha Bahaa	40	Married	Undergraduate Degree	Teacher	Private Car	Women
3	31/12/2023	Heliopolis	ابتسام ذكي	Ebtessam Zaky	55	Married	Undergraduate Degree	Teacher	Private Car	Women
4	31/12/2023	Heliopolis	حبيبة محمد	Habiba Mohamed	40	Married	Undergraduate Degree	Teacher	Private Car	Women
5	31/12/2023	Heliopolis	هناء عويس	Hanaa Owais	42	Married	Undergraduate Degree	Teacher	Private Car	Women
6	31/12/2023	Heliopolis	رانيا محمد	Rania Mohamed	39	Married	Post Graduate Degree	Civil Engineer	Private Car	Women
7	31/12/2023	Heliopolis	فاطمة عبد العزيز	Fatma Abdelaziz	45	Married	Undergraduate Degree	Teacher	Private Car	Women
8	31/12/2023	Heliopolis	عزيزه السيد	Aziza Elsayed	50	Widowed	Undergraduate Degree	Teacher	Private Car	Women
9	31/12/2023	Heliopolis	نشوى عيسى	Nashwa Eissa	29	Single	Undergraduate Degree	Teacher	Private Car	Girls
10	31/12/2023	Heliopolis	فاطمة مصطفي	Fatma Mostafa	26	Single	Undergraduate Degree	Teacher	Private Car	Girls
11	31/12/2023	Heliopolis	اسماء الديب	Asmaa Eldeeb	25	Single	Undergraduate Degree	Computer Engineer	Private Car	Girls
12	31/12/2023	Heliopolis	اية جلال	Aya Galal	30	Married	Post Graduate Degree	Teacher	Private Car	Girls
13	31/12/2023	Heliopolis	حبيبة حمدي	Habiba Hamdy	32	Married	Undergraduate Degree	Engineer	Private Car	Girls
14	31/12/2023	Heliopolis	هالة سعيد	Hala Sa'eed	31	Married	Undergraduate Degree	Teacher	Private Car	Girls
15	31/12/2023	Heliopolis	رشا محمود	Rasha Mahmoud	30	Married	Undergraduate Degree	Teacher	Private Car	Girls
16	31/12/2023	Heliopolis	اسماء فؤاد	Asmaa Fou'ad	29	Married	Undergraduate Degree	Teacher	Private Car	Girls
17	01/01/2024	Al-Wayli	فريال محمد	Feryal Mohamed	65	Married	Illiterate	None	None	Women
18	01/01/2024	Al-Wayli	شريهان السيد	Sherihan Elsayed	35	Married	Undergraduate Degree	None	None	Women
19	01/01/2024	Al-Wayli	ام ابراهيم	Om Ibrahim	67	Married	Illiterate	None	None	Women
20	01/01/2024	Al-Wayli	سارة عبيد	Sara Ebeid	26	Single	Undergraduate Degree	None	None	Women
21	01/01/2024	Al-Wayli	سمية عادل	Somaya Adel	28	Married	Middle School	None	None	Women
22	01/01/2024	Al-Wayli	دعاء ابراهيم	Do'aa Ibrahim	49	Married	Undergraduate Degree	Clerk in a company	Private Car	Women
23	01/01/2024	Al-Wayli	ريهام عزيز	Reham Aziz	33	Married	Undergraduate Degree	Data Entry	Private Car	Women
24	01/01/2024	Al-Wayli	فيروز محمود	Fayrouz Mahmoud	48	Married	Undergraduate Degree	None	None	Women
25	01/03/2024	Al-Daher	هويدا خيري	Howaida Khayry	45	Married	Undergraduate Degree	Employee at Al-Alsun Institute	Private Car	Women
26	01/03/2024	Al-Daher	مي صادق	Mai Sadeq	42	Married	Vocational Education	Employee at Al-Alsun Institute	Private Car	Women
27	01/03/2024	Al-Daher	عزة خلف	Azza Khalaf	45	Married	Vocational Education	Employee at Al-Alsun Institute	Private Car	Women
28	01/03/2024	Al-Daher	مني صبري	Mona Sabry	41	Married	Undergraduate Degree	Employee at Al-Alsun Institute	Private Car	Women
29	01/03/2024	Al-Daher	دهب عبد العزيز	Dahab Abdelaziz	39	Single	Undergraduate Degree	Call Center	None	Women

#	Date	Area	Name	English Name	Age	Marital status	Education	Occupation	Car	Group
30	01/03/2024	Al-Daher	امل عباس	Amal Abbas	38	Widowed	Undergraduate Degree	Online Trading	None	Women
31	01/03/2024	Al-Daher	نيرمين عبد السلام	Nermeen Abdelsalam	41	Married	Undergraduate Degree	None	Private Car	Women
32	01/03/2024	Al-Daher	شيماء مجدي	Shaimaa Magdy	38	Single	Undergraduate Degree	Sales Officer	None	Women
33	01/04/2024	حدائق القبة	عزة عبيد	Azza Ebeid	46	Single	Undergraduate Degree	Accountant	Private Car	Women
34	01/04/2024	Hadayeq Al-Qobba	مريم رمضان	Mariam Ramdan	44	Married	Undergraduate Degree	Shop Owner	Private Car	Women
35	01/04/2024	Hadayeq Al-Qobba	نوال سيد	Nawa Sayed	50	Married	Undergraduate Degree	None	Private Car	Women
36	01/04/2024	Hadayeq Al-Qobba	الفت عطية	Olfat Atteya	52	Married	Undergraduate Degree	Teacher	Private Car	Women
37	01/04/2024	Hadayeq Al-Qobba	عبير علي	Abeer Ali	38	Married	Undergraduate Degree	None	None	Women
38	01/04/2024	Hadayeq Al-Qobba	هويدا سيد	Howaida Sayed	43	Married	Undergraduate Degree	None	None	Women
39	01/04/2024	Hadayeq Al-Qobba	حنان لاشين	Hanan Lasheen	42	Married	Undergraduate Degree	None	None	Women
40	01/04/2024	Hadayeq Al-Qobba	رانيا حسين	Rania Hussein	39	Married	Undergraduate Degree	Clerk	None	Women
41	01/04/2024	Hadayeq Al-Qobba	اسراء علي	Esraa Ali	25	Single	Undergraduate Degree	Teacher	Private Car	Girls
42	01/04/2024	Hadayeq Al-Qobba	آيات صلاح	Ayat Salah	27	Single	Undergraduate Degree	Clerk in the Post Office	Private Car	Girls
43	01/04/2024	Hadayeq Al-Qobba	اسراء هارون	Esraa Haroun	26	Single	Undergraduate Degree	Lawyer	None	Girls
44	01/04/2024	Hadayeq Al-Qobba	ملك محمد	Malak Mohamed	23	Single	Undergraduate Degree	None	None	Girls
45	01/04/2024	Hadayeq Al-Qobba	مي موسي	Mai Mousa	22	Single	Undergraduate Degree	None	None	Girls
46	01/04/2024	Hadayeq Al-Qobba	منة عبد الله	Menna Abdallah	23	Single	Undergraduate Degree	None	None	Girls
47	01/04/2024	Hadayeq Al-Qobba	رحمة احمد	Rahma Ahmed	24	Single	Undergraduate Degree	None	None	Girls
48	01/04/2024	Hadayeq Al-Qobba	بسملة حسن	Basmala Hassan	22	Single	Undergraduate Degree	None	None	Girls
49	01/05/2024	Al-Azbakeya	زيزي عبد الحميد	Zizi Abdelhamid	42	Married	Undergraduate Degree	Clerk	Private Car	Women
50	01/05/2024	Al-Azbakeya	حنان حلمي	Hanan Helmy	45	Married	Undergraduate Degree	Clerk	Private Car	Women
51	01/05/2024	Al-Azbakeya	نهي سالم	Noha Salem	42	Married	Undergraduate Degree	Clerk	None	Women
52	01/05/2024	Al-Azbakeya	سحر نادي	Sahar Nadi	44	Married	Undergraduate Degree	Clerk	None	Women
53	01/05/2024	Al-Azbakeya	غادة مجدي	Ghada Magdi	36	Married	Undergraduate Degree	Clerk	Private Car	Women
54	01/05/2024	Al-Azbakeya	ايمان اسماعيل	Eman Esma'il	37	Married	Undergraduate Degree	Clerk	None	Women
55	01/05/2024	Al-Azbakeya	فاطمة احمد	Fatma Ahmed	46	Married	Undergraduate Degree	Lawyer	None	Women
56	01/05/2024	Al-Azbakeya	جيهان حسين	Jihan Hussein	43	Married	Undergraduate Degree	Clerk	None	Women

9.21 Appendix U: List of NCPD FGD Participants

#	Name	English Name	Sex	Age	Type of disability	Employment	Marital status	No of children	Car
1	صابحة حمدى	Sayha Hamdy	Female	33	Visual	NCPD	Married	3	No
2	وائل همام فؤاد	Waeel Hammam Fou'ad	Male	44	Upper mobility	NCPD	Married	2	No
3	عمر علاء الدين	Omar Alaa Eldin	Male	39	Mobility (spastic cerebral palsy)	NCPD	Married	1	No
4	داليا عاطف مصطفى	Dalia Atef Mostafa	Female	45	Mobility	NCPD	Married	3	No
5	رامز محمود رجب	Ramez Mahmoud Ragab	Male	38	Hearing	NCPD	Married	3	No
6	بسام نبيل عبد الحكيم	Bassam Nabil Abdelhakim	Male	38	Mobility	NCPD	Married	2	Yes
7	آية محمد كامل	Aya Mohamed Kamel	Female	34	Hearing	NCPD	Engaged	-	No
8	إيمان خالد	Eman Khaled	Female			assistant at NCPD			
9	فيروز الجوهرى	Fayrouz Elgohary	Female			Sign language specialist			

9.22 Appendix V: List of Al-Ameriyah Interview Participants

#	Name	English Name	Sex	Position
1	م. سيد إبراهيم	Eng. Sayed Ibrahim	Male	Head of central directorate
2	م. علا زكريا	Eng. Ola Zakareya	Female	Head of planning department
3	م. شيرين	Eng. Sherine	Female	Head of training department
4	م. محمد عبد المجيد	Eng, Mohamed Abdulmajeed	Male	Head of central department, North Cairo
5	م. رمضان محمد	Eng. Mohamed Ramadan	Male	Head of east Cairo region
6	محمد وهبة	Mohamed Wahba	Male	Depot manager
7	محمد مصطفى	Mohamed Mostafa	Male	Head of engineering department
8	محمد سعيد عبد العزيز	Mohamed Saed Abdulaziz	Male	Depot observer
9	أحمد حافظ الصياد	Ahmed Hafez Elsayad	Male	Deputy depot observer
10	أحمد سيد	Ahmed Sayem	Male	Bus driver
11	حجاج أبو الليل	Haggag Abu-Eliel	Male	Bus driver
12	هالة جورج	Hala George	Female	Head of public relation office
13	سماح سمير عبد السلام	Samah Samir Abdelsalam	Female	Head of complaint department
14	صليب جرجس صليب	Saleeb Girgis Saleeb	Male	Head of human resources department
15	أحمد سعد الدين	Ahmed Saa'd Eldin	Male	Deputy head of workers syndicate

9.23 Appendix W: Grievance Mechanism